

## ASSESSMENT OF CRIZOTINIB IN METASTATIC SOLID TUMORS WITH MET OVEREXPRESSION

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**Background:** Precision medicine individualizes therapy according to the molecular profiling of the patient's tumor. Over the past few years this approach has made great strides due to advances in predictive biomarker research and the understanding of cancer on a molecular basis. The MET proto-oncogene encodes the receptor tyrosine kinase MET, which is aberrantly activated in a wide range of tumors. MET-positive tumors have been associated with increased metastatic potential, increased depth of tumor invasion, poor differentiation, advanced stage, and poor prognosis making this a promising therapeutic target. Currently, there is a lack of evidence to use a MET targeted approach for patients found to have overexpression of this protein. Crizotinib is an oral multikinase inhibitor of MET, ALK, and ROS1. Positive clinical responses seen in prior studies using precision medicine and the lack of research in this area led to the purpose of this study. **Objectives:** The primary objective of this study was to compare the progression free survival ratios (PFSr) for patients with MET overexpression treated with crizotinib versus non-crizotinib therapy. Secondary objectives included progression free survival and overall survival. **Methods:** Data was prospectively collected in patients with MET overexpression since April 2014 and retrospectively analyzed in this study. Data collected consisted of patient demographics, tumor type, performance status, IHC intensity of MET overexpression, number of prior failed treatment regimens, and current treatment regimen. The number of days until progression on both the most recent prior therapy and current therapy were also collected. Patients served as their own control and analyzed using a PFSr that compares the PFS on their most recent prior therapy to the PFS on their current therapy. A PFSr > 1.3 was considered significant. **Results:** Results and conclusions will be presented at Great Lakes

### Learning Objectives:

Discuss immunohistochemistry (IHC) used to analyze MET protein expression

Describe the rationale behind using crizotinib in patients with MET overexpression

### Self Assessment Questions:

Which of the following would correlate with the highest level of MET overexpression?

- A: IHC 0
- B: IHC 1+
- C: IHC 2+
- D: IHC 3+

Crizotinib is a multi-kinase inhibitor that targets all of the following except

- A: ALK
- B: Kras
- C: Met
- D: Ros1

Q1 Answer: D      Q2 Answer: B

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## EVALUATION OF PRESCRIBING PATTERNS OF ACETYLCHOLINESTERASE INHIBITORS AT JESSE BROWN VA MEDICAL CENTER

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**Purpose:** With the increase in dementia diagnoses due to the aging population, it is expected that dementia treatment will resultantly increase worldwide. There are currently two FDA-approved classes of medications to stall the progression of dementia: acetylcholinesterase inhibitors and N-methyl-D-aspartate (NMDA) antagonists. According to the American Psychiatric Association dementia treatment guidelines, acetylcholinesterase inhibitors should be offered to patients with mild dementia and NMDA antagonists should be considered as add-on therapy in moderate to severe dementia. The National Institute for Health and Care Excellence guidelines state that only specialists in dementia care should initiate these medications. Additionally, the Alzheimer's Drug Discovery Foundation recommends that patients be re-evaluated within two months after initiating dementia therapy and then every six months. The current VA criteria for use recommend re-evaluation within three months after initiation of acetylcholinesterase inhibitors and then every 12 months for renewal; previous criteria for use required renewals every six months. Currently, prescribing of acetylcholinesterase inhibitors is open to all providers at Jesse Brown VA Medical Center (JBVAMC), with donepezil being the preferred agent since 2011. The purpose of this study is to examine the prescribing patterns and follow-up of acetylcholinesterase inhibitors for dementia treatment in general medicine clinics (GMC) compared to specialty services. **Methods:** This study is a retrospective, electronic chart review of patients at JBVAMC newly initiated on acetylcholinesterase inhibitors for dementia between January 1, 2012 and July 31, 2014. The primary endpoint of this study is to compare the types and timing of first follow-up for patients started on acetylcholinesterase inhibitors between GMC and specialty prescribers. Secondary endpoints include evaluation of changes in cognitive function, referrals to specialty clinics and neuropsychological testing, documentation of adverse drug reactions, and adherence to criteria for use. **Results/Conclusion:** Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss guideline recommendations for the treatment of dementia

Identify when follow-up should occur after initiation of acetylcholinesterase inhibitors for the treatment of dementia

### Self Assessment Questions:

According to the American Psychiatry Association guidelines, in what degree of dementia should acetylcholinesterase inhibitors be considered?

- A: Mild
- B: Moderate
- C: Severe
- D: Terminal

According to the Alzheimer's Drug Discovery Foundation, when should an initial follow-up appointment be scheduled after initiating acetylcholinesterase inhibitor therapy?

- A: Within 1 month
- B: Within 2 months
- C: Within 3 months
- D: Within 6-12 months

Q1 Answer: A      Q2 Answer: B

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## RETROSPECTIVE EVALUATION OF TARGET SPECIFIC ORAL ANTICOAGULANT (TSOAC) USE AT AN ACADEMIC MEDICAL CENTER

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**Purpose:** The target specific oral anticoagulants (TSOACs) have gained tremendous momentum in clinical practice in recent years. Dabigatran, rivaroxaban, apixaban and edoxaban are approved in the United States for treatment and prevention of thromboembolism as well as stroke prevention in patients with atrial fibrillation. The TSOAC popularity stems from the distinct advantages offered by the newer class paired with their demonstrated efficacy in clinical trials compared to traditional therapy with Vitamin K antagonists (VKAs). The fixed dosing and predictable pharmacokinetic effects of the TSOACs eliminates the need for routine monitoring and offers an attractive alternative compared to warfarin for both patients and prescribers. Despite these benefits, the TSOACs are not without risk and carry an inherent bleeding risk in the ambulatory care setting. Clearance of these drugs is dependent on renal function, placing several patient populations at risk. Caution or avoidance of TSOACs should be exercised in severe renal or hepatic impairment. Different FDA-approved TSOAC doses exist based on indication and renal function for each agent, creating potential for dosing errors, toxicity and under treatment. **Methods:** Multi-center, retrospective chart review of adult patients prescribed dabigatran, rivaroxaban, and apixaban between January 1st, 2014 to December 31st, 2014 and receiving ambulatory care within the health network. The primary endpoint is the incidence of hospital admissions and emergency department visits in each group. Secondary end points include the rate of inappropriate prescribing as well as prevalence of risk factors and predictors of hospital admissions and emergency department visits in patients maintained on TSOAC therapy in the ambulatory care setting. A statistical comparison between groups will involve an analysis of variance for each outcome. **Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Outline the incidence of therapy-related hospital admissions and emergency department visits in patients prescribed TSOAC therapy  
Identify patient populations on TSOAC therapy who would benefit from increased ambulatory care monitoring and follow-up

### Self Assessment Questions:

What is the lowest creatinine clearance cutoff of FDA approved dosing for dabigatran and rivaroxaban?

- A: 30 ml/min
- B: 15 ml/min
- C: 30 ml/min for use in VTE and 15 ml/min for use in atrial fibrillation
- D: 30 ml/min for use in atrial fibrillation and 15 ml/min for use in VTE

Which of the following is a significant barrier to the safety and effectiveness of TSOAC use in the ambulatory setting?

- A: Multiple dietary interactions
- B: Higher potential for drug interactions
- C: Higher risk of intracranial bleeding
- D: Patient non-adherence

Q1 Answer: C      Q2 Answer: D

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## IMPACT OF PATIENT CONTROLLED ANALGESIA LOCKOUT INTERVAL IN POST-OPERATIVE PAIN MANAGEMENT

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**Purpose:** While PCA use is supported in the literature for post-operative pain, there is little data regarding optimal dosing regimens. This study seeks to compare the level of pain control achieved with eight versus ten minute lockout intervals in order to better guide PCA dosing. **Methods:** This retrospective cohort study was conducted at St. John Hospital and Medical Center and was approved by the Institutional Review Board. The study included adult patients who received PCA within 24 hours of surgery for the management of postoperative pain between June 2013 and May 2015. Patients were excluded if they received PCA with continuous infusion, had a history of sickle cell disease, had a history of opiate drug abuse, were undergoing organ transplantation, utilized less than 10% of their available dose, or had less than five documented pain scores in the first 24 hours. The primary outcome for this study is to compare pain area under the curve adjusted for time (AUC/T) for the first 72 hours of PCA management in patients with lockout times of 8 versus 10 minutes. Secondary outcomes include evaluation of pain AUC/T at different post-operative intervals, time to first dose change, use of breakthrough analgesia over the first 72 hours, and a composite of adverse events. Linear regression will be used to analyze the association of lockout interval with pain AUC/T. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the risk factors for increased post-operative pain.

Describe an optimal regimen for post-operative pain management.

### Self Assessment Questions:

Which of these is not a risk factor for increased pain in the post-operative setting?

- A: History of anxiety
- B: Pre-operative pain
- C: Obesity
- D: Long duration of surgery

What strategy is recommended for optimal pain management in post-operative patients?

- A: Ketorolac for 72 hours
- B: Multimodal pain management
- C: Patient controlled analgesia with tramadol
- D: IV opiates for the first 24 hours

Q1 Answer: C      Q2 Answer: B

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## OUTCOMES OF AN ESTABLISHED PHARMACIST-MANAGED OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY PROGRAM IN A VETERAN POPULATION

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**Purpose:** Outpatient parenteral antimicrobial therapy (OPAT) is a form of medical therapy that is used in many healthcare systems nationwide. OPAT has been shown to reduce costs, decrease hospital length of stay, decrease risk of nosocomial infections, and demonstrate overall favorable outcomes. Additionally, OPAT improves quality of life for most patients, as they can receive their therapy in the comfort of their own home and resume their normal daily routine. Some disadvantages to OPAT include the risk of severe adverse drug reactions in the outpatient setting, heavy reliance on patient adherence and health literacy, and suboptimal antimicrobial stewardship given a heavier emphasis on convenient drug administration. The purpose of this project is to provide a retrospective analysis and evaluate outcomes of the OPAT program at the Clement J. Zablocki Veterans Affairs Medical Center. Furthermore, this project will serve to provide a foundation for more efficient and standardized outcome analyses for this institutions OPAT program.

**Methodology:** This is a quality improvement project that is exempt from the Institutional Review Board. The study design is a single-center, multiyear, retrospective chart review. Patients enrolled in the institutions OPAT program from July 1, 2009 to July 1, 2015 will be included into this study. Data that will be collected will include patient demographics, indication for OPAT, antimicrobial therapy used, duration of therapy, infection resolution, need for re-hospitalization, adverse drug events, necessity for oral antibiotics after completing OPAT therapy, and complications associated with peripherally inserted central catheters. A standardized spreadsheet for prospective data collection will be created to enhance the process for future evaluations of this institutions OPAT program. **Results/conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference pending data collection and analysis.

### Learning Objectives:

Select an appropriate OPAT regimen for a patient to be discharged on IV antibiotics.

Identify important monitoring parameters for commonly used outpatient IV antibiotics.

### Self Assessment Questions:

AB is a 77 year old male veteran with PMH of HTN, poorly controlled DM II (A1c = 9.7%), and PVD, being discharged on OPAT for empiric treatment of osteomyelitis. He is currently being treated as an in

- A Patient should not be discharged on OPAT because osteomyelitis
- B: Continue vancomycin Q8H, but switch piperacillin/tazobactam to g
- C: Switch to daptomycin 6mg/kg daily and ampicillin/sulbactam 3 gra
- D: Switch to daptomycin 6mg/kg daily and ertapenem 1 gram daily

YZ is a 74 year old male being treated for native valve endocarditis. Blood cultures grew out Enterococcus faecalis, susceptible to ampicillin and gentamicin. YZ was discharged on OPAT with ampicillin

- A Once the patient has a stable gentamicin peak and trough, no furth
- B Ampicillin stability makes it difficult to use as outpatient therapy
- C A dose adjustment must be made if the patient has a gentamicin t
- D Ampicillin is a desirable outpatient antibiotic due to its infrequent d

Q1 Answer: D Q2 Answer: B

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## IMPLEMENTING A PAIN PROTOCOL IN THE PALLIATIVE CARE SETTING OF A RURAL HOSPITAL

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**Statement of the purpose:** According to the American Society of Health-System Pharmacists (ASHP), pharmacists are an integral part of the palliative care interdisciplinary team and assist in providing the best quality of life for these patients through proper medication management, especially analgesics. The objective of this project is to evaluate current pain management practices in palliative care at a rural community teaching hospital in order to implement a universal palliative care pain protocol based on best practices. **Statement of methods used:** This study has been submitted and approved by the Institutional Review Board. A retrospective chart review was performed on patients that have been coded as palliative care per ICD-9-CM from September 2014 to August 2015. The pain management medications include fentanyl, hydromorphone, lorazepam, midazolam, and morphine. The data collected included patient demographics, utilization of pain scales, the different types of pain medications used, and number of boluses of each pain medications given over a 24 hour period. This information is being compiled and assessed to determine if medications used for pain management were appropriate and if converting certain pain medications to a continuous drip protocol would have been therapeutically appropriate. **Summary of (preliminary) results to support conclusion:** Data collection and analysis is ongoing. **Conclusions reached:** Final results/conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the purpose and benefits of a standardized palliative pain protocol

Recognize the importance of proper pain management in the palliative care setting

### Self Assessment Questions:

Which of the following barriers will most likely delay proper pain management?

- A Patient's age
- B: Patient's allergies
- C: Patient's education status
- D: There are no barriers to pain management

Which of the following combinations of pain medications is likely to be most helpful?

- A Opioids ± NSAIDs ± Adjuvants
- B Opioids alone
- C Homeopathic medications ± Essential Oils
- D Combinations of medications are never appropriate

Q1 Answer: B Q2 Answer: A

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Activity Type: Knowledge-based Contact Hours: 0.5

## **INFLUENCE OF ANTIMICROBIAL STEWARDSHIP EFFORTS ON TREATMENT OF UNCOMPLICATED SKIN AND SOFT TISSUE INFECTIONS IN THE EMERGENCY DEPARTMENT**

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Recent increase in the incidence and severity of skin and soft tissue infections (SSTI) has led to practice guideline updates published by the Infectious Diseases Society of America (IDSA). Due to emerging resistance to commonly-used antimicrobial agents, appropriate empiric selection for initial treatment becomes increasingly important. As emergency department (ED) visits and hospitalizations for SSTI continue to rise, more patients will be affected by these treatment decisions. By adhering to the current national practice guidelines, these infections can be more appropriately managed to help decrease hospital admissions, ED revisits, and deter the rise in antimicrobial resistance. The purpose of this study is to improve adherence to national practice guideline recommendations tailored based on local antimicrobial resistance rates following ED prescriber education. This is a pre- and post-intervention study conducted at a teaching hospital involving patients discharged home from the ED with an uncomplicated SSTI. Based on local antimicrobial resistance rates and the IDSA guidelines, education and recommendations for empiric treatment was provided to ED prescribers. The primary objective is to compare empiric treatment prescribed at discharge before and after education and assess adherence to provided recommendations. Data collected includes: local antimicrobial resistance rates, patient demographics, SSTI diagnosis, empiric antibiotic regimen selection, and repeat ED visit within 30 days.

### **Learning Objectives:**

Discuss the current 2014 IDSA purulent and non-purulent skin and soft tissue infection guideline recommendations.

Identify appropriate antibiotic therapy based on a given patient case and the 2014 IDSA SSTI guidelines.

### **Self Assessment Questions:**

Identify which of the following antibiotics is recommended by 2014 IDSA SSTI guidelines to empirically treat a mild, non-purulent SSTI:

- A Doxycycline
- B: Cephalexin
- C: Sulfamethoxazole/Trimethoprim
- D: Amoxicillin/Clavulanate

A 52 year old male presents to the ED with a purulent abscess and surrounding erythema. PMH is significant for HTN and hyperlipidemia. The ED attending would like some assistance with empiric antibiotic

- A Clindamycin
- B Ceftriaxone
- C Sulfamethoxazole/Trimethoprim
- D Azithromycin

Q1 Answer: B Q2 Answer: C

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Activity Type: Knowledge-based Contact Hours: 0.5

## **RELIABILITY OF ENOXAPARIN DILUTION VERSUS COMMERCIAL PRODUCT IN ATTAINING THERAPEUTIC ANTICOAGULATION IN A PEDIATRIC POPULATION.**

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**Purpose**Anticoagulation in pediatrics is becoming more common in conjunction with the advances in treatment of diseases, such as cancer, congenital heart defects, and hypercoagulable states, as well as in the setting of trauma or surgery. The incidence of thrombotic events in pediatrics still remains very low when compared to the adult population, however, event rates are significantly increased in hospitalized patients. Given that enoxaparin is supplied as a 100 mg/mL commercial product, preparation of doses for very young or low weight patients may require volumes that cannot be measured with accuracy; this challenge is overcome with the preparation of dilutions. We hypothesize that use of a 15 mg/mL enoxaparin dilution may lead to variability in time to reach target anti-Xa levels and require more dose adjustments.  
**Methods**This is a single-center, retrospective chart review that has been approved by the Institutional Review Board. Patients less than 18 years of age who were treated with enoxaparin at the University of Chicago Comer Childrens Hospital, including those in intensive care settings, will be included; those receiving prophylactic dosing will be excluded. Attainment of therapeutic anticoagulation will be determined through analysis of anti-Xa levels. The primary objective is to determine if utilization of an enoxaparin dilution has an impact on the time to therapeutic anticoagulation, which will be measured in days. Secondary endpoints that will be evaluated are number of bleeding and clotting events, and number of dose adjustments required. Continuous variables will be analyzed through an unpaired students t-test, while nominal data will require the use of chi-square or Fishers exact test. Linear regression analysis will be performed to identify factors that impact attaining therapeutic levels. Results and ConclusionsData collection and analysis is ongoing.

### **Learning Objectives:**

Review the 2012 CHEST guideline recommendations for anticoagulation in a pediatric population.

Discuss the implications of preparing dilutions for pediatric patients.

### **Self Assessment Questions:**

1. According to the 2012 CHEST guidelines, what is an appropriate initial treatment dose of enoxaparin for a 1 month old infant?

- A 1 mg/kg/dose SubQ every 24 hours
- B: 1 mg/kg /dose SubQ every 12 hours
- C: 1.5 mg/kg/dose SubQ every 12 hours
- D: 2 mg/kg/dose SubQ every 24 hours

Which of the following is a disadvantage associated with dilutions in a pediatric population?

- A Error in preparation
- B Lack of stability data
- C Lack of potency data
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-306L01-P

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## CHARACTERIZATION OF EMERGENCY DEPARTMENT (ED) FREQUENT USERS AT A LARGE, URBAN, COMMUNITY TEACHING HOSPITAL

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**Purpose:** The purpose of this study is to characterize frequent users of ED services and identify potential areas for pharmacist intervention in the ED. **Methods:** This study will consist of a retrospective, chart review of patients presenting to St. John Hospital and Medical Center (SJH) between August 1, 2014 and July 31, 2015 and interviews of patients who meet the inclusion criteria for subset analysis. This study will describe demographics and utilization patterns of frequent users through records generated from the SJH information system and electronic medical records. Patients with more than three ED visits in the previous 12 months will be included. Patients will be excluded from analysis if they are missing data from their medical records or are less than 18 years of age. Between December 2015 and February 2016, a pharmacist will interview patients who present to the ED and meet inclusion criteria to gather additional data for subset analysis. Patients will be excluded if they have a history of sickle cell disease, pregnant, from external facility, or are unable to complete the interview or give informed consent. Descriptive statistics will be generated to characterize the study population with respect to demographic and clinical factors. Differences between patients by visit frequency, age, gender, race and common comorbidities will be assessed using Student's t-test, analysis of variance and the chi-square test. Multivariate logistic regression models will be used to determine the influence of patient factors on the frequency of ED use. **Results:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Describe patient demographics associated with frequent visitors to emergency departments.

Describe the challenges frequent users present to emergency departments.

### Self Assessment Questions:

Which of the following is true about frequent users of emergency department services?

- A: Patients are more likely to be younger
- B: Patients are less likely to be female
- C: Patients are more likely to have insurance
- D: Patients are less likely to have mental illness

Which of the following statements is true?

- A: Frequent users of emergency services represent a disproportionate
- B: Frequent visitors do not contribute to overcrowding in emergency
- C: Frequent users are not subject to stereotyping by emergency depar
- D: Frequent users do not have insurance and cost emergency depart

Q1 Answer: C Q2 Answer: A

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Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF A DISCHARGE BEDSIDE PRESCRIPTION DELIVERY PROGRAM AT A FOUR-HOSPITAL HEALTH SYSTEM: IMPACT ON PATIENT SATISFACTION

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**Purpose:** Approximately 20% of patients admitted to the hospital do not fill their discharge medications. It is crucial for patients to continue their outpatient medication therapy after being discharged in order to prevent the worsening of the patients health and hospital readmission. The purpose of this project is to evaluate the impact of a discharge bedside prescription delivery program on patients as they transition from the inpatient to outpatient setting. **Methods:** This pilot discharge prescription delivery program will take place at a single hospital within a four-hospital health system. A multidisciplinary taskforce will be created with pharmacists, hospitalists, and nurses to assist with the development and implementation of the program. The program will include patients being discharged home from three general medicine floors who agree to the discharge services offered by the hospital-based outpatient pharmacy. After hospital admission to a general medicine floor, patients will be introduced to the program by a discharge liaison (pharmacy resident, pharmacy student, or pharmacy technician). Upon agreement to the discharge services, pertinent demographic and insurance information will be collected from the patient and entered into the pharmacy's computer system. When the electronic discharge prescription orders are placed, the discharge liaison will be paged by the hospitalist. The outpatient pharmacy staff will be notified and will prepare the discharge prescriptions. The discharge liaison will deliver the medications to the patients room and offer medication counseling. The patient will be asked to fill out a five-question Likert-scale satisfaction survey. The survey questions will assess the value and convenience the program provides for the patient. Outcomes to be evaluated will include pre- and post-implementation outpatient pharmacy prescription capture rates and responses to the patient survey. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the potential benefits to patients when a discharge prescription delivery program is implemented.

Identify strategies to overcome specific barriers in the development and implementation of a bedside prescription delivery program at a community health system.

### Self Assessment Questions:

Which of the following are potential benefits to patients upon the successful implementation of a bedside prescription delivery program?

- A: Increased medication compliance
- B: Improved patient satisfaction
- C: Increased patient understanding of discharge medications
- D: All of the above

Which of the following is a potential barrier(s) to the implementation of a bedside prescription delivery program?

- A: Longer than expected prescription turnover times
- B: Decrease in outpatient pharmacy revenue
- C: Unresolved medication-related issues at discharge
- D: A and C

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-709L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THERAPEUTIC DRUG MONITORING OF LACOSAMIDE AND LEVETIRACETAM

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**Purpose:** Therapeutic drug monitoring (TDM) of antiepileptic drugs (AEDs) may allow clinicians to individualize regimens to achieve optimal seizure control while avoiding severe adverse effects. Established goal levels for efficacy and safety exist for the majority of first generation AEDs, such as phenytoin, however newer AEDs such as lacosamide and levetiracetam lack similar data. These newer agents exhibit fairly predictable pharmacokinetics and have few adverse events and drug-drug interactions, thereby decreasing the need for frequent TDM. Despite this, clinicians may order drug levels in an effort to perform TDM for these agents; the clinical and financial impact is currently unknown. This study aims to evaluate current practices at Cleveland Clinic Main Campus with regards to utilization and application of TDM of lacosamide and levetiracetam, and to determine appropriateness of levels ordered as well as potential cost savings. **Methods:** This quality improvement study is a non-interventional, retrospective chart review. The study population includes inpatient adults (aged 18 years or older) admitted to Cleveland Clinic Main Campus between June 1, 2010 and May 31, 2015 who have had at least one serum drug level drawn for either lacosamide or levetiracetam. A sample size of 3002 patients comprised of 386 patients with TDM for lacosamide and 2616 patients with TDM for levetiracetam will be included. The primary objective of this study is to determine the appropriateness of each lacosamide and levetiracetam therapeutic drug level and the clinical application of the result. Appropriateness of a level is defined by the time of the blood draw in relation to the medication administration time. Secondary endpoints include characterization of the number of therapeutic drug levels drawn and the cost of therapeutic drug monitoring. **Results and Conclusions:** Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recall the rationale for therapeutic drug monitoring of many older-generation antiepileptic drugs (AEDs)

Describe the appropriate timing of therapeutic drug monitoring of lacosamide and levetiracetam

### Self Assessment Questions:

Which of the following is/are reason(s) therapeutic drug monitoring of many older-generation antiepileptic drugs may be required?

- A: High protein binding
- B: Normal hepatic and renal function
- C: Metabolism via CYP 450 enzymes
- D: A and C

Which of the following would be considered the most appropriately drawn therapeutic drug level for lacosamide or levetiracetam?

- A: Trough level prior to steady state
- B: Peak level at steady state
- C: Trough level at steady state
- D: Random level at steady state

Q1 Answer: D    Q2 Answer: C

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## EVALUATION OF PHARMACY SERVICES FOR OSTEOPOROSIS MANAGEMENT IN A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** Osteoporosis-related fractures are associated with significant morbidity and mortality. Osteoporosis screening and treatment rates are poor both nationally and at a facility level. Pharmacists have medication expertise and counseling skills that can help enhance osteoporosis care and ensure that patients receive appropriate treatment in order to minimize fracture risk. Currently, few studies have been performed that evaluate pharmacist-managed osteoporosis clinics and related medication adherence and outcomes. This study aims to assess osteoporosis management and related patient outcomes after the implementation of a pharmacist-run osteoporosis clinic. **Methods:**

Institutional Review Board approval for this prospective chart review has been granted. A computerized list was generated of all patients seen in the osteoporosis clinic at the Richard L. Roudebush VA Medical Center between May 1, 2015 and December 31st, 2015. Descriptive statistics will be used to characterize the study subjects and assess the primary outcome, which is the percentage of patients receiving treatment after diagnosis of osteoporosis with DEXA scan. Secondary outcomes of percentage of patients receiving appropriate calcium and vitamin D supplementation, percentage of patients receiving non-pharmacological education and barriers to treatment initiation will also be assessed.

**Preliminary Results:** At the end of the study period, 22 unique patients had been seen in the pharmacy bone clinic. Prior to enrollment, 2 out of 22 patients were receiving anti-resorptive therapy. After enrollment, 15 of the 22 patients were receiving appropriate therapy either by initiation of anti-resorptive therapy or initiation of a drug holiday. Prior to enrollment, 59% of patients were receiving adequate calcium and vitamin D supplementation. After enrollment, all 22 patients were receiving appropriate supplementation. All patients also received education regarding osteoporosis and lifestyle changes beneficial in this disease state. **Conclusions:** Initiation of a pharmacist driven osteoporosis clinic has resulted in an improvement of osteoporosis care for veterans at this facility.

### Learning Objectives:

Identify common risk factors for osteoporosis among the Veteran population

Describe the current treatment rates for those patients screened for osteoporosis

### Self Assessment Questions:

Which of the following is a common risk factor for osteoporosis among the Veteran population?

- A: Aromatase inhibitor use
- B: Smoking
- C: Elevated BMI
- D: Joint replacement surgery

What is the estimated percentage of veterans with osteoporosis receiving appropriate treatment at the Richard L. Roudebush VAMC?

- A: 72%
- B: 56%
- C: 42%
- D: 28%

Q1 Answer: B    Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-308L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**ASSESSMENT OF ADVANCED PHARMACY PRACTICE EXPERIENCE (APPE) ROTATION STUDENTS PERCEPTIONS TOWARDS MEDICALLY UNDERSERVED POPULATIONS**

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**Purpose:** Pharmacists may face the challenge of providing care to medically underserved patients, which includes those with lack of access to healthcare, inability to afford healthcare, and low literacy. Additionally, it encompasses reasons of race, religion, culture, or language, and disabilities including mental illness or addictions. This study will investigate fourth-year pharmacy students' perceptions toward underserved patient populations and the impact of advanced pharmacy practice experiential (APPE) rotations on those perceptions of underserved patients. **Methods:** Fourth-year pharmacy students from Purdue University will complete a pre- and post- APPE survey assessing their attitudes regarding underserved populations. The 47-item survey was developed using Qualtrics, an electronic survey software program. Students will respond to each item using a Likert scale of 1 to 7, where 1 is strongly disagree and 7 is strongly agree. Items are focused around the following themes: attitudes toward pharmacy education of underserved patients, attitudes towards resources, services, or rights of underserved patients, concern for underserved individuals, and attitudes regarding working with the underserved. Information regarding demographics, elective courses taken, and completion of APPE rotations at sites serving underserved populations will also be collected. Data analysis will include descriptive statistics and nonparametric statistical testing. **Results and Conclusions:** Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Define medically underserved populations.  
Describe the number of counties containing medically underserved areas in the state of Indiana.

**Self Assessment Questions:**

Which of the following groups is considered to be medically underserved?  
A: Minority groups  
B: Substance abusers  
C: Uninsured individuals  
D: All of the above

As of 2014, what percentage of counties in Indiana contained medically underserved areas?  
A: 55%  
B: 65%  
C: 75%  
D: 85%

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-710L04-P  
Activity Type: Knowledge-based Contact Hours: 0.5

**IMPLEMENTING A CLINICAL PHARMACIST-LED COPD SERVICE IN A PRIMARY CARE CLINIC**

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**Purpose:** Chronic obstructive pulmonary disease (COPD) is a common preventable and treatable respiratory condition associated with exacerbations that increase a patient's utilization of health care resources. COPD management clinics led by pharmacists are believed to have a positive impact on the number of emergency department and general practitioner visits, hospital admissions, and medication compliance. This study is a longitudinal and prospective trial of the outcomes observed after the initiation of a pharmacist-led COPD service in an outpatient primary care network. **Methods:** The service was presented to primary care providers at Indiana University Health Southern Indiana Physicians (SIP). Provider referrals to the service will provide a cohort of COPD patients for this study. Under the clinic protocol, pharmacists will be able to make therapeutic adjustments according to the GOLD 2015 guidelines and implement a pharmacist-led spirometry service. Appointments with pharmacists will include diagnostic and yearly spirometry, completion of a CAT questionnaire and Morisky-scale for medication adherence, disease state education, proper inhaler technique assessment, evaluation of immunization and smoking status, and establishment of a management plan for signs of an exacerbation. Follow-up assessments will be conducted every 3-12 months based on patient disease control. Results: 304 patients with a diagnosis of COPD were seen from August 1, 2014 to August 31, 2015. 9.3% (n=28) had spirometry documented in the past year, 27.3% (n=83) did not have a rescue inhaler prescribed, 51.6% (n=157) were smokers, and 52.9% (n=161) were not up-to-date with their pneumococcal vaccines. During the year there were a total of 222 outpatient exacerbations managed by SIP providers and 97 inpatient exacerbations at a local hospital. Baseline data supports the need for the establishment of a pharmacist-led COPD service to aid in adherence to GOLD guidelines and reduce exacerbations. **Conclusion:** Final results and conclusion will be presented at Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify patient outcomes that may be influenced by adherence to GOLD guidelines in COPD patients.  
Describe key elements to be incorporated to pharmacy-led COPD services to ensure adherence to GOLD guidelines

**Self Assessment Questions:**

1. Patient education programs, including disease state education, action plans, and assessment of inhaler technique have been associated with improvement in which of the following patient outcomes?  
A: Reduced ED visits  
B: Increased general practitioner visits  
C: Increased medication compliance  
D: A and C

2. Based on GOLD 2015 guidelines, how frequently should spirometry be performed in patients with a COPD diagnosis?  
A: Every 6 months  
B: Yearly  
C: Every 5 years  
D: When symptoms worsen and during exacerbations

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-309L01-P  
Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PHARMACY IMPACT ON TRANSITIONS OF CARE FOR FAMILY MEDICINE PATIENTS AT A COMMUNITY HOSPITAL WITHIN A FOUR-HOSPITAL HEALTH SYSTEM

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**Purpose:** Recent literature suggests up to 60% of all medication errors occur during the discharge process, with nearly 20% of discharged patients experiencing medication-related adverse events within three weeks of an inpatient stay. To prevent and manage medication errors and adverse events following discharge, published data has examined the role of pharmacists in the transitions of care process. Pharmacist involvement in transitions of care includes medication reconciliation and post-discharge telephonic phone calls to confirm medication regimens and ensure adherence. This project aims to improve medication related transitions of care for patients followed by an outpatient clinic at a community hospital after hospital discharge. **Methods:** This six month pilot program targeted patients admitted to the inpatient family medicine service with planned follow up in the outpatient family medicine clinic between September 2015 and March 2016. Patients included were at least 18 years of age and were followed by a primary care physician who practices in the outpatient family medicine clinic. An inpatient pharmacist and pharmacy resident practicing in ambulatory care were involved in the project workflow. The inpatient pharmacist performed medication reconciliation and discharge counseling to the target population with findings communicated to the pharmacy resident. The pharmacy resident practicing in ambulatory care then contacted these patients through the use of a telephonic phone call within four days of discharge. Barriers to medication access, adherence, side effects experienced, or other concerns were assessed and discussed with the patient. Primary outcomes included the number of patients reporting difficulties related to medication side effects, access or adherence, and 30 day readmission rates. During the project, a physician questionnaire will be e-mailed to determine the perceived benefits of the pilot program. **Results/Conclusions:** Data analysis in progress. Results and conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify potential barriers or complications in the transitions of care process

Describe methods in which pharmacists may positively impact post-discharge follow up

### Self Assessment Questions:

The Centers for Medicare & Medicaid Services have adopted readmission measures for which of the following disease states?

- A: Pneumonia
- B: Heart failure
- C: Acute myocardial infarction
- D: All of the above

Which of the following is an opportunity for pharmacist involvement in the hospital discharge process?

- A: Resolution of insurance coverage difficulties related to prior authorization
- B: Discharge counseling regarding adherence, side effects, and when to return
- C: Discharge medication reconciliation
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-711L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PROVIDER EXPERIENCE AND SATISFACTION WITH ACCESS TO SPECIALTY MEDICATIONS

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**Purpose:** Specialty pharmacies optimize pharmaceutical care by streamlining the acquisition and delivery process for specialty medications, ensuring cost effectiveness, facilitating appropriate medication use and maximizing patient adherence. There are unique barriers that can hinder access to specialty medications including distribution restrictions, cost and complex approval processes. There is limited data on the impact of specialty pharmacy services on overall provider perception in regards to specialty medications. The primary objective of this study is to assess healthcare provider experience and satisfaction with access to specialty medications. Secondary objectives include: assess healthcare provider overall experience and satisfaction with specialty pharmacy services and identify prescribing trends for specialty medications. **Methods:** This is a cross-sectional survey assessing provider attitude and awareness regarding barriers and satisfaction with access to specialty medications. A pretested electronic survey, developed through an electronic data capture tool (Qualtrics) was distributed electronically to physicians, pharmacists and nurses in two phases. The first phase was distributed to providers at the University of Illinois Hospital and outpatient clinics. The second phase will be distributed to providers at other institutions in February 2016. The primary outcome, overall provider satisfaction with access to specialty medications, will be rated using a Likert scale. The survey will also collect data on access barriers of specialty medications, provider attitude towards specialty pharmacy services, and suggestion for improvement of services. The study received IRB approval from the University of Illinois at Chicago Institutional Review Board. Appropriate statistical tests will be used to evaluate the study objectives. **Results and Conclusions:** Results and conclusions will be presented at the conference

### Learning Objectives:

Describe the common characteristics of specialty medications

Identify access barriers for specialty medications

### Self Assessment Questions:

Which of the following is a common characteristic of specialty medications?

- A: High cost
- B: Management of common disease states
- C: Simple monitoring and administration requirements
- D: Open access or distribution

Which of the following is NOT a potential access barrier for specialty medications?

- A: Prior authorization process
- B: Medication cost
- C: Preferred Pharmacies
- D: Bioavailability of the medications

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-310L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATING THE USE OF SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) AND SEVERE SEPSIS DIAGNOSTIC CRITERIA FOR THE IDENTIFICATION AND MANAGEMENT OF ACUTELY ILL PATIENTS IN THE EMERGENCY DEPARTMENT

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**Purpose:** Early recognition and treatment of sepsis have dually been identified as primary influences in decreasing mortality. However, recent data suggests emergency department (ED) patients frequently do not meet the diagnostic criteria for severe sepsis or septic shock at the time of presentation to the ED which may limit the ability to provide treatment within the time parameters recommended by the 2012 Surviving Sepsis Bundle. In an effort to better recognize and treat septic patients, it is the study's intent to correlate several early presenting diagnostic criteria to patients with bacteremia. **Methods:** This single-center, retrospective chart review was conducted in the ED of an academic medical center that has approximately 72,000 visits annually. Septic patients presenting to the ED between July 2014 to June 2015, were identified using a sepsis alert database and were randomized for inclusion if they had cultures drawn during their stay in the ED. Patients transferred from an outside facility and incarcerated patients were excluded. Data collection points included: patient demographics, sepsis predisposing comorbidities, systemic inflammatory response syndrome (SIRS) criteria, lactate levels, blood culture results, hospital length of stay, and all-cause in-hospital mortality. Diagnostic criteria outcomes were evaluated utilizing univariate logistic models to provide unadjusted associations. Subgroup analyses evaluating the variations in baseline diagnostic values were conducted in patients who were immunosuppressed, compared to those that were immunocompetent, and patients with gram-negative blood stream infections (BSI) compared to those with gram-positive BSIs. **Results/Conclusion:** Data collection is ongoing and final results will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify Systemic Inflammatory Response Syndrome (SIRS) criteria in a potentially septic patient.  
Discuss the implications of early recognition of sepsis in emergency department patients.

### Self Assessment Questions:

According to the 2012 Surviving Sepsis Guidelines, a patient that presents with a body temperature of 102F, heart rate of 95 beats per minute, respiratory rate of 12 breaths per minute, and a white blood

- A: 1
- B: 4
- C: 3
- D: 2

In order to be compliant with The Centers for Medicare and Medicaid Services quality measure, "Sepsis Bundle Project", patients who meet severe sepsis criteria in the emergency department, should be a

- A: 1 hour
- B: 3 hours
- C: 0.5 hours
- D: The time necessary to provide usual care

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-712L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## PHARMACIST OWNED DISCHARGE MEDICATION RECONCILIATION AND PATIENT EDUCATION IN A COMMUNITY HOSPITAL SETTING

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**Purpose:** Medication errors due to inadequate medication reconciliation are an ongoing problem in healthcare. These errors, many of which are preventable, can result in costly adverse events. At Wheaton Franciscan Healthcare - All Saints, the physician solely completes the medication reconciliation and nursing staff does the majority of the education. The pharmacy currently has a single transition of care pharmacist responsible for patient education for high risk patients including heart failure and diabetes. The purpose of this study is to evaluate the impact of pharmacist time on the patient's discharge process in terms of medication errors, patient satisfaction, and capture rate of discharge prescriptions at the onsite outpatient pharmacy. **Methods:** This was a quality improvement study specific to a community hospital and did not need IRB approval. Patients over the age of 18 who were being discharged to home from the general medicine and cardiac units were included. The pharmacist confirmed the medication reconciliation once completed by the hospitalist and notified the physician of any discrepancies. The pharmacist then created a medication list and consulted the patient and/or caregiver and assisted in getting the prescriptions to the patients preferred pharmacy. The following information was collected: patient demographics, number of medication changes, errors, and prescriptions filled at the hospital's on-site pharmacy, the time it took for pharmacists to complete medication reconciliation, create a medication list, educate patients on their medications, and facilitate filling of medications, the results of patient satisfaction surveys, nursing satisfaction surveys, and total revenue captured at the onsite pharmacy. **Results/Conclusions:** Data collection and analysis is currently in progress and will be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Identify reasons for which medication errors occur at discharge.  
Describe the responsibilities of an inpatient pharmacist during a patient's transition from hospital to home.

### Self Assessment Questions:

Which of the following is a reason why medication errors occur at discharge?

- A: The physician and pharmacist did not communicate with each other
- B: The physician contacted the PCP with an updated medication list,
- C: The pharmacist completed medication reconciliation.
- D: The pharmacist completed medication education.

What is one role of the inpatient pharmacist at discharge?

- A: Schedule the patients' outpatient follow up appointment with the PCP
- B: Manually fill the prescription at the outpatient pharmacy.
- C: Compare the discharge medications to the inpatient and home medications
- D: Set up home healthcare

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-713L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATION OF VASOPRESSIN USE IN PATIENTS WITH SEPTIC SHOCK

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**Purpose:** Vasopressin has been shown to decrease norepinephrine requirements and progression to renal failure in patients with septic shock; however, severity of shock at initiation appears critical to reduction in mortality. The purpose of this study was to evaluate current practices and outcomes of patients receiving vasopressin for septic shock at St. John Hospital and Medical Center. **Methods:** This retrospective, observational study evaluated adult critically ill patients with presumed septic shock who received vasopressin infusion from January 2013-2015 (n=214). Vasopressor requirements were expressed in terms of norepinephrine equivalents (NEQ); less severe shock was defined as less than 15 mcg/min. Timing of vasopressin initiation based on severity of shock was evaluated by NEQ dose, allowing for characterization of patients into two cohorts. Vasopressor requirements in each cohort were evaluated for 24 hours following vasopressin initiation to assess for therapeutic benefit. Changes in renal function following vasopressin initiation were analyzed in each cohort using the RIFLE criteria. Mortality at hospital discharge was evaluated according to timing of vasopressin initiation. **Results:** The majority of patients receiving vasopressin for septic shock were initiated at a NEQ dose > 15mcg/min (77.5%). Changes in vasopressor requirements for the initial 24 hours following vasopressin initiation were not significantly different between less severe and more severe shock groups (p=0.077). Vasopressin initiation during less severe shock was not associated with greater improvements in renal function compared to more severe shock (15.6% vs. 8.7%; p=0.416). Patients initiated on vasopressin with less severe shock were more likely to survive to hospital discharge (36% v. 16%; p=0.004). **Conclusion:** The majority of vasopressin initiation occurred in patients with more severe shock. Timing of initiation did not significantly impact changes in subsequent vasopressor requirements or improvements in renal function. Reinforcement of appropriate vasopressin use remains a crucial role of the pharmacist.

### Learning Objectives:

Describe potential benefits of vasopressin in patients with septic shock  
Discuss an evidence-based approach to vasopressin utilization in septic shock

### Self Assessment Questions:

In the 2012 Surviving Sepsis Campaign Guidelines, utilization of which of the following vasopressors is an ungraded recommendation?

- A: Vasopressin
- B: Norepinephrine
- C: Epinephrine
- D: Phenylephrine

Vasopressin has been associated with decreased mortality in septic shock patients when initiated at what point in the treatment course?

- A: Initial vasopressor therapy
- B: Less severe septic shock (NEQ dose < 15 mcg/min)
- C: More severe septic shock (NEQ dose > 15 mcg/min)
- D: Vasopressin has not been associated with decreased mortality in :

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-311L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PHARMACIST IMPACT ON HEALTH LITERACY SCORES IN A HEART FAILURE TRANSITIONAL CARE PROGRAM AT A LARGE ACADEMIC MEDICAL CENTER

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**Background:** Heart failure (HF) affects over 6 million Americans. Heart failure patients are faced with complex treatment plans that include medications, diet and lifestyle changes and the need for symptom recognition. Patient education is crucial in preparing patients and caregivers to manage this multifaceted treatment plan. Past efforts have shown that upwards of 20% of heart failure patients have low health literacy, which can be linked to increased mortality and hospital readmissions. Recognizing these challenges and deficits in our system, the organization has developed a process to assess patients health literacy and heart failure knowledge, allowing the multidisciplinary team to customize an education plan tailored to the patients individual needs.

**Purpose:** The objective of this study is to identify if pharmacist involvement in the development of education plans for HF patients, based on health literacy scores, has a beneficial impact on health outcomes and patient satisfaction. **Methods:** A retrospective cohort study design was used to assess the impact of pharmacist involvement in transitions of care and education, on patients knowledge scores, health outcomes and satisfaction. Patients admitted to a unit where a validated health literacy questionnaire and the Atlanta Heart Failure Knowledge Assessment Test (AHFKT-VQ) are administered were included. Patients who scored less than 67% on the medications section of AHFKT-VQ, triggered a consult for pharmacist education as well as a follow up with an outpatient pharmacist. A post education knowledge test is then administered to evaluate improvement in patients knowledge. Factors collected will include patient demographics, education level, AHFKT-VQ scores, average length of stay, 30-day all cause readmissions and ED visits to list a few. **Results:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the role of a pharmacist among a multidisciplinary healthcare team  
Describe the benefits of having pharmacist involvement in the education of Heart failure patients during their transition home

### Self Assessment Questions:

ACE inhibitors are medications used to treat heart failure. These drugs help the heart pump stronger by:

- A: Removing extra fluid and salt from the body
- B: Causing blood vessels to get smaller
- C: Blocking the harmful effects of stress hormones
- D: Improving blood counts (reducing anemia)

If a person with heart failure has a headache or pain, which would be the best medicine to take?

- A: Aspirin
- B: Acetaminophen
- C: Ibuprofen
- D: Acetaminophen and Caffeine

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-714L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF ANTIMICROBIAL UTILIZATION AFTER ADDITION OF ELECTRONIC MEDICAL RECORD TOOLS AND INCORPORATING ANTIMICROBIAL STEWARDSHIP ACTIVITIES INTO PHARMACY RESIDENT ROTATION

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**Purpose:** Antimicrobial stewardship programs (ASP) are recommended to combat the overutilization of antimicrobials and the increase in multidrug resistant pathogens. By reducing emergence of antimicrobial resistance, promoting prudent use of antimicrobials, limiting drug-related adverse events, and minimizing the risk of other unintentional consequences of antimicrobial use; ASPs have improved clinical outcomes, safety, resistance patterns, and reduced healthcare costs. To fully optimize ASP outcomes, electronic medical records (EMR) technologies are developing high-level antimicrobial utilization reports and monitoring tools. These tools will allow the ASP to identify targets for interventions, provide reports, and evaluations of prescribing habits. At this institution, an evaluation was conducted last year to determine the impact on antimicrobial utilization and optimization pre and post implementation of workflow changes to the existing ASP. Recently, new antimicrobial stewardship tools were implemented in the EMR to support the ASP activities. The intent of these new tools are to assist in organization, notification, and evaluation of patients antimicrobial therapy by the use of a point system. The primary objective of this project is to determine the impact of the implementation of EMR tools or antimicrobial utilization and optimization. **Methods:** This Institutional Review Board exempt project involved a retrospective chart review of adult inpatients administered antimicrobial agents between November 1 2015 and January 31, 2016. Patients were excluded if they were admitted to the Womens Hospital, labor and delivery, ambulatory surgery, psychiatric, pediatric, neonatal units, received emergency care or went to the operating room. The project measured several factors assessing ASP post implementation of EMR tools including: antimicrobial agent use as days of therapy, length of therapy, and defined daily dose; utilization of oral versus intravenous antimicrobial agents, broad spectrum antimicrobial agents, anti-methicillin resistant staphylococcus aureus agents, and anti-pseudomonal agents; and cost containment. Data will be evaluated using descriptive and categorical statistics.

### Learning Objectives:

Identify how antimicrobial stewardship programs have improved clinical outcomes, safety, resistance patterns, and reduced healthcare costs  
Discuss how electronic medical record tools can assist antimicrobial stewardship programs

### Self Assessment Questions:

Antimicrobial stewardship programs have improved clinical outcomes, safety, resistance patterns, and reduced healthcare costs by which of the following:

- A Increasing the duration of antimicrobial therapy
- B Promoting the prudent use of antimicrobials
- C Ignoring antimicrobial related drug-drug interactions
- D Increasing the use of broad spectrum antimicrobial agents

Electronic medical record tools can assist antimicrobial stewardship programs by which of the following:

- A Identify targets for intervention
- B Eliminating the need for clinical judgment
- C Provide prescribers with reports and evaluations of their prescribing
- D A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-312L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## GLUCOSE DEPENDENT INSULIN DOSING (GDID) IN THE OUTPATIENT SETTING; EVALUATION OF EFFICACY AND SAFETY

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**PURPOSE:** The purpose of this study is to assess the efficacy and safety of GDID (including sliding scale insulin and correction factor insulin) in the outpatient setting. **METHODS:** This study is a retrospective cohort analysis that examines patients with type-2 diabetes mellitus who received GDID (i.e. dosing for which each dose of insulin depends on a recently measured glucose value) with insulin aspart in the outpatient setting. Patients were included if they were 18 years or older, had a diagnosis of type 2 diabetes, and had an active prescription for insulin aspart during 2014 with terms suggesting GDID (e.g. "scale" or "correction") in the sig or comments field. Patients were excluded if they had any missing laboratory values (specifically, glycated hemoglobin value at time points of evaluation), were managed with insulin pumps, used medications affecting glycemic control not directed at managing type 2 diabetes, or if their diabetes was managed by a non-VA provider. Glycemic control will be compared prior to and after initiation of GDID. The primary outcome is the change in glycated hemoglobin value from baseline. Secondary outcomes include measures of hypoglycemia (patient self-reported, emergency department admission diagnosis, laboratory reported blood glucose value < 70 mg/dL, and presence of associated symptoms). The position and specialty of the ordering provider as well as any rationale provided for use of GDID will be assessed and described. Use of other medications targeting glycemic control, (including other scheduled insulins), insulin scale intensity, body mass index, and renal function will be assessed for confounding. **RESULTS AND CONCLUSION:** Data collection was in progress at the time of abstract submission.

### Learning Objectives:

Identify an example of Glucose Dependent Insulin Dosing (GDID)  
Describe the state of evidence evaluating outpatient use of GDID regimens

### Self Assessment Questions:

Which of the following is an example of Glucose Dependent Insulin Dosing (GDID)?

- A A nurse checks the patient's blood glucose, and then identifies the
- B A patient self administers 20 units of insulin glargine at night
- C A nurse checks the patient's blood glucose before breakfast and k
- D A patient self administers 10 units of insulin aspart before breakfa

Evidence supporting the outpatient use of GDID (i.e. dosing for which each dose of insulin depends on a recently measured glucose value) is best summarized by which of the following statements?

- A GDID has been found safe and effective by large prospective rand
- B GDID has been associated with significant hypoglycemia in prosp
- C GDID has been identified as a risk for progression of kidney disea
- D GDID has not been evaluated sufficiently to allow an assessment

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-715L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECT OF BRONCHODILATOR THERAPY ON THE INCIDENCE OF POST-OPERATIVE ATRIAL FIBRILLATION AFTER THORACIC SURGERY

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**Purpose:** Post-operative atrial fibrillation (POAF) is one of the most common complications after thoracic surgery with an incidence ranging from 2-40% depending upon the type and intensity of the surgical procedure. The occurrence of POAF is associated with increased pulmonary complications, length of stay, and mortality. Bronchodilator therapy is commonly prescribed early in the post-operative period to improve lung function. The beta-2 adrenergic receptor agonist component of the nebulized combination bronchodilator, ipratropium bromide and albuterol sulfate, could possibly induce tachycardia and predispose patients to POAF. The purpose of this study is to measure the effect of cumulative exposure to inhaled beta-2 adrenergic receptor agonist over the first three post-operative days on the incidence of POAF after thoracic surgery. **Methods:** This single center, retrospective cohort study evaluated consecutive patients, 18 years of age and older, who underwent thoracic surgery and received ipratropium bromide and albuterol sulfate post-operatively between October 31, 2011 and November 1, 2015. Patients were stratified according to their cumulative exposure to inhaled ipratropium bromide and albuterol sulfate and the incidence of POAF was compared. Secondary endpoints evaluated were ICU and hospital length of stay, initiation of therapeutic anticoagulation for new onset atrial fibrillation, and identification of risk factors for POAF. Continuous variables will be analyzed utilizing a Student's t-test for parametric data and Mann-Whitney U test for nonparametric data. Chi-squared analysis will be used to determine differences between dichotomous data. Risk factors for POAF will be identified utilizing multivariate logistic regression.

**Results/Conclusion:** Data collection is ongoing with results and conclusions to be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the effect of bronchodilators after thoracic surgery and the potential risk associated with use  
Identify risk factors for post-operative atrial fibrillation after thoracic surgery

### Self Assessment Questions:

The \_\_\_\_\_ component of the nebulized combination bronchodilator, ipratropium bromide and albuterol sulfate, is thought to induce \_\_\_\_\_ which may predispose patients to post-operative atria

- A: Beta 1 agonists; tachycardia
- B: Beta 1 antagonist; bradycardia
- C: Beta 2 agonists; tachycardia
- D: Beta 2 antagonist; tachycardia

Which of the following statements is correct regarding risk factors for post-operative atrial fibrillation (POAF) after thoracic surgery?

- A: Younger patients are at higher risk for POAF after thoracic surgery
- B: History of atrial fibrillation increases a patient's risk for developing POAF
- C: Female patients are at higher risk for POAF after thoracic surgery
- D: All thoracic surgery types have the same risk for developing POAF

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-313L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EFFECT OF DIRECT ACTING ORAL ANTICOAGULANTS (DOACS) ON MORTALITY IN TRAUMATIC BRAIN INJURY PATIENTS

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**Purpose:** Higher mortality amongst patients with traumatic brain injuries (TBI) on preinjury warfarin has been well established in the literature despite methods of reversal. However, current evidence is not suggestive of whether, or to what extent, this mortality risk extends to TBI patients with preinjury direct acting oral anticoagulants (DOACs). Furthermore, reliable data to guide the management of major bleeding preinjury DOAC patients in the absence of reversal agents is lacking, causing many clinicians to turn to non-specific reversal strategies, such as four-factor prothrombin complex concentrate (4F-PCC).

**Methods:** In this three arm study, patients with preinjury DOACs, warfarin, and a matched cohort of non-anticoagulated patients admitted for acute traumatic brain injuries will be retrospectively reviewed from nineteen Trinity Health hospitals across the United States following Institutional Review Board approval. Patients will be excluded if their care was transferred to another healthcare facility or if they were taking other anticoagulant or antiplatelet medications (aside from aspirin) prior to admission. The primary objective of this study is to evaluate the mortality risk of patients on preinjury DOACs admitted with traumatic brain injuries. We will also evaluate the efficacy of 4F-PCC for management of bleeding associated with traumatic brain injuries. Secondary objectives include: need for neurosurgical intervention, complications during hospital stay, blood product use, hospital and intensive care unit lengths of stay, number of days on the ventilator, Glasgow coma score, and disposition at discharge. Other baseline data to be collected will include: age, weight, and gender, injury severity score, comorbid conditions, medications prior to admission, and mechanism of injury. **Results:** Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

**Conflict of Interest Statement:** The speaker has no actual or potential conflict of interest in relation to this presentation

### Learning Objectives:

Identify current options available for reversing bleeding associated with Direct Acting Oral Anticoagulants (DOACs)  
Explain the mechanism of action for 4F-PCC and how it may be useful for anticoagulant reversal

### Self Assessment Questions:

Which of the following is an FDA approved indication for 4F-PCC?

- A: Reversal of anticoagulants in acute bleeding
- B: Reversal of warfarin in acute bleeding
- C: Hemophilia
- D: Coagulation factor deficiency

Which factor in 4F-PCC is potentially useful for reversal for direct-acting oral anticoagulant (DOAC) reversal?

- A: 2
- B: 7
- C: 9
- D: 10

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-716L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## IMPACT OF PHARMACIST INVOLVEMENT ON WARFARIN THERAPY

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**Purpose:** Nontherapeutic international normalized ratio (INR) levels continue to be a leading cause of adverse drug events (ADEs), Emergency Department (ED) arrivals, and inpatient admissions. Compromised health and medication changes contribute to the high-risks of warfarin. Close monitoring of warfarin is essential to obtain therapeutic INR levels, as well as ensure patient understanding of dosing, diet, and monitoring. This study examines the association of warfarin management and the impact of pharmacist inpatient education on post-discharge therapeutic INR. **Methods:** The primary Ho states that pharmacists educating patients is not associated with post-discharge follow-up therapeutic INR levels. Following IRB approval, an ecological study design was employed with observational periods being pre and post-pharmacist education. Three inpatient warfarin management scenarios were examined: 1) physician managed warfarin/nurse educated patient, 2) pharmacist managed warfarin/nurse educated patient, 3) pharmacist managed warfarin/nurse + pharmacist educated patient. Pharmacists were trained on a patient warfarin education standard during October 2015. The pre-education component occurred between August and September 2015 (N=80); post-education phase covered November and December 2015 (N=80). Alliance Health inpatients were included if on warfarin therapy. Exclusion criteria included pregnant women, inpatients <18 years old, and prisoners. All patients dosed on warfarin were accounted for in one of the three scenarios. Dependent outcomes of interest include the percentage of patients following up to a clinic or physician 3-7 days post-discharge, and the result of a therapeutic INR level at that visit. Covariates include time to education from warfarin administration, length of stay, and time to follow up. **Results:** Data compilation and analysis are in process and will be presented. **Conclusions:** Conclusions will be drawn once results are completed.

### Learning Objectives:

Identify appropriate warfarin therapy techniques to inpatients transitioning to ambulatory care.  
Describe the transition of care process for inpatients on warfarin therapy

### Self Assessment Questions:

What is the INR goal during warfarin treatment for patients with DVT, PE, or AFib?

- A 1.0 – 2.0
- B: 1.5 - 2.5
- C: 2.0 - 3.0
- D: 2.5 - 3.5

What is the recommended patient follow up with INR testing after discharged from the hospital?

- A within 24-48 hours post discharge
- B 3 - 7 days post discharge
- C 7 - 14 days post discharge
- D within 30 days post discharge

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-314L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST-LED METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) POLYMERASE CHAIN REACTION (PCR) NASAL SCREENING ON DE-ESCALATION OF EMPIRIC PNEUMONIA TREATMENT

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**Purpose:** The purposes of this study are to i) describe a strategy for discontinuing empiric anti-MRSA coverage for pneumonia using nasal MRSA PCR screen and blood and/or respiratory culture results, ii) assess the adherence to the nasal MRSA PCR screening algorithm, iii) describe the safety and efficacy of this initiative and iv) investigate characteristics of patients with false negative MRSA PCR results. **Methods:** At Wheaton Franciscan Healthcare St. Joseph Hospital, pharmacists order nasal MRSA PCR screens for patients on anti-MRSA therapy for pneumonia per pharmacy and therapeutics committee approved protocol. If the PCR and blood and/or respiratory cultures are negative at 48 hours and the patient does not meet exclusion criteria, pharmacists contact physicians to discuss potential discontinuation of empiric anti-MRSA coverage. Patients with septic shock, cavitory lesions, empyema or lung abscesses are excluded from de-escalation consideration. Patient data was collected daily in a retrospective, observational design. Adherence to MRSA PCR screening was defined as the percentage of patients screened out of the total number of patients that met the criteria for screening. Safety and efficacy data collected includes days of anti-MRSA therapy, length of hospital stay and 30-day readmission rates for pneumonia. The incidence of MRSA pneumonia and the negative predictive value was calculated for those meeting the ATS definition of pneumonia. The characteristics of those with false negative MRSA PCR results were described. **Results/Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Relate the MRSA incidence and the PCR's negative predictive value to its utility in de-escalating empiric pneumonia treatment  
Recognize Wheaton Franciscan Healthcare St. Joseph Hospital's exclusion criteria for pharmacist-led nasal MRSA PCR screening

### Self Assessment Questions:

According to the MRSA screening policy for pneumonia at Wheaton Franciscan Healthcare St. Joseph Hospital, which of the following patients would be included in the screening algorithm?

- A A patient on linezolid for septic shock
- B: A patient on vancomycin and hemodialysis
- C: A patient on linezolid with a cavitory lesion on chest X-ray
- D: A patient on vancomycin for pneumonia and cellulitis

Which of the following characteristics of the nasal MRSA PCR makes it desirable for ruling out MRSA pneumonia and discontinuing anti-MRSA therapy?

- A Low positive predictive value
- B High positive predictive value
- C Low negative predictive value
- D High negative predictive value

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-315L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE FREQUENCY OF ADVERSE EVENTS FROM DOFETILIDE THERAPY IN OBESE PATIENTS

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Background Obesity has become commonplace in the U.S. Dosing certain medications remains a challenge as clinical trials often exclude obese patients. Dofetilide, a renally cleared class III antiarrhythmic, has potentially life-threatening outcomes, and patients must receive the first six doses in a hospital with continuous ECG monitoring. No guidelines exist on dosing dofetilide in obese patients. Currently, actual body weight (ABW) is used to calculate creatinine clearance (CrCl) per manufacturer recommendation which may grossly overestimate a patient's renal function. This can cause dofetilide overexposure and increased rates of adverse effects. The objective of this study is to determine if obese patients experience a higher rate of adverse outcomes from dofetilide than non-obese patients. Methods The study is a retrospective chart review that identified patients initiated on dofetilide to treat an arrhythmia during their hospital stay at Kettering Medical Center between 01/01/11 and 11/30/15. Obese patients, defined as a BMI > 30 mg/m<sup>2</sup>, were compared to non-obese patients. Included patients were between 18 and 80 years old, and patients were excluded if they transferred to another medical center, had a BMI < 18 kg/m<sup>2</sup>, had a CrCl less than 20 mL/min, or were previously taking dofetilide. The following data was collected and analyzed for trends: patient age, gender, weight, height, BMI, length of stay, baseline serum creatinine, magnesium, and potassium, presence/absence of torsades and diabetes, number of dosage adjustments of dofetilide, initial and subsequent dosages of dofetilide, baseline QTc interval and QTc after each dose, daily potassium and magnesium, and ICU admission or death. The collected data will be used to evaluate patient outcomes and adverse events with the use of dofetilide therapy. Major adverse events are defined as presence of torsades and QTc interval > 500 milliseconds. Results 182 patients have been enrolled, and the resulting analysis will be presented at the conference.

### Learning Objectives:

Recognize that dosing certain medications remains a challenge in the obese population.

Identify how dofetilide is currently dosed and discuss the potential dangers of such dosing in obese patients.

### Self Assessment Questions:

Which of the following statements is correct?

- A: It is required that drug companies submit information on dosing the
- B: Pharmacokinetics derived from drug studies are often based off of
- C: ASHP has published guidelines on dosing medications in the obese
- D: It is required to specify in the package insert whether a drug should

Per manufacturer recommendation, dofetilide is currently dosed based on:

- A: Actual body weight
- B: Ideal body weight
- C: A specialized dofetilide dosing equation
- D: Adjusted body weight

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-901L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF RAPID ORGANISM IDENTIFICATION VIA MALDI-TOF COUPLED WITH REAL-TIME ANTIMICROBIAL STEWARDSHIP INTERVENTIONS ON TIME TO OPTIMAL ANTIMICROBIAL THERAPY IN PATIENTS WITH POSITIVE BLOOD CULTURES

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Purpose: Despite advances in antimicrobial therapy, bloodstream infections (BSI) remain a considerable cause of morbidity and mortality among hospitalized patients. During a time where antimicrobial resistance poses a serious threat to public health, early administration of appropriate antimicrobial therapy targeted towards specific pathogens is crucial to patient survival. Utilizing conventional organism identification techniques, which involves several time-consuming steps, delays the time to optimal therapy as well as discontinuation of inappropriate therapy. Matrix-assisted laser desorption ionization time of flight (MALDI TOF) utilizes mass spectrometry to rapidly and accurately identify clinically isolated organisms by genus and species, decreasing time to organism identification by approximately 1.2-1.5 days when compared to conventional methods. Combined with antimicrobial stewardship interventions, several studies have demonstrated improved clinical and financial outcomes with the use of MALDI-TOF. The purpose of this study is to utilize MALDI-TOF to evaluate the impact of rapid organism identification coupled with real-time, pharmacist-driven, antimicrobial stewardship interventions on time to optimal antimicrobial therapy.

Methods: This single-center, pre-post quasi-experimental study evaluated hospitalized patients with positive blood cultures. Prospective data were collected real-time via page from the microbiology lab between November 2015 and January 2016 and compared to retrospective data from the same time period during the previous year. Once a page was received, antimicrobial therapy was evaluated and interventions were made based on antimicrobial stewardship team-approved adult and pediatric BSI protocols. The primary outcome was time to optimal therapy with secondary outcomes including: time to effective therapy; 30-day mortality; hospital length of stay; microbiologic clearance; recurrent bacteremia with the same pathogen; and antimicrobial days of therapy. Results/Conclusion: Data collection and analysis are pending and will be presented at the Great Lakes Pharmac Resident Conference in April 2016.

### Learning Objectives:

Define Matrix-Assisted Laser Desorption Ionization Time of Flight (MALDI-TOF) technology

Identify advantages and limitations associated with MALDI-TOF utilization

### Self Assessment Questions:

What analytical technique does MALDI-TOF utilize to rapidly identify organisms?

- A: Mass spectrometry
- B: Ultraviolet visible spectrometry
- C: Nuclear magnetic resonance spectrometry
- D: Infrared spectrometry

Which of the following statements best reflects the primary advantage of MALDI-TOF implementation in a clinical setting?

- A: Completely eliminates the need for microbiologic gram staining in
- B: Allows for organism identification and antimicrobial optimization with
- C: Financial benefits noted in studies were clinically significant but, far
- D: It decreases time to organism identification by 1.2-1.5 days when

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-316L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF LEVOCARNITINE ON THE HALF-LIFE OF VALPROIC ACID IN PATIENTS WITH VALPROIC-ACID INDUCED HYPERAMMONEMIA

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**Purpose:** The use of levocarnitine as an antidote for valproic acid-induced hyperammonemia has been described in the form of small case series and case reports, however no data exists comparing the pharmacokinetic impact of intravenous (IV) or oral (PO) levocarnitine on valproic acid (VPA) clearance to supportive care in these patients. This investigation will evaluate the effectiveness of levocarnitine on enhancement of VPA metabolism, as characterized by a decrease in half-life, for patients with VPA-induced hyperammonemia secondary to acute ingestions of VPA. **Methods:** This is a non-interventional, retrospective cohort at two hospitals within one health system that including patients who were admitted between 10/15/2011 and 10/15/2015. Patients were included if they were  $\geq 18$  years of age, had at least two VPA levels within 24 hours, and had an ammonia level  $\geq 35$  mol/L. Patients were excluded if they had a urea cycle disorder, pre-existing liver disease, were pregnant, or received renal replacement therapy or activated charcoal as a result of the ingestion. Descriptive statistics will be utilized for data analysis. **Results:** 512 patients were reviewed for inclusion and 14 patients were included in the primary analysis. Eight patients received oral levocarnitine, one patient received IV levocarnitine, and five patients received no levocarnitine. The average half-life was 15.23 ( 4.69) hours for the PO levocarnitine cohort and 11.8 ( 3.05) hours for the group that did not receive levocarnitine. The sole patient who received IV levocarnitine had a half-life of 8.43 hours.

**Conclusions:** Based upon a small sample size, VPA elimination half-life was similar with and without oral levocarnitine and was shorter in one patient treated with IV levocarnitine. The dose and route of levocarnitine in the setting of VPA-induced hyperammonemia needs further explanation before a standard regimen can be established.

### Learning Objectives:

Describe the mechanism of valproic acid-induced hyperammonemia in acute overdoses, and the proposed role levocarnitine plays in reversing this toxicity.

Discuss the prevalence of hyperammonemia in patients taking valproic acid.

### Self Assessment Questions:

Which type of metabolism results in the production of metabolites that inhibit the elimination of ammonia through the urea cycle?

- A:  $\beta$ -oxidation
- B:  $\omega$ -oxidation
- C: Acetylation
- D: Glucuronidation

Valproic acid is estimated to cause hyperammonemia in what percent of patients?

- A: 10 – 20%
- B: 25 – 35%
- C: 35 – 45%
- D: 50 – 60%

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-317L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## INCIDENCE AND CLINICAL OUTCOMES OF OFF-LABEL ORAL ANTICOAGULANT DOSING IN NONVALVULAR ATRIAL FIBRILLATION WITHIN A COMMUNITY HOSPITAL HEALTH SYSTEM

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**Purpose:** Atrial fibrillation (AF) is a common heart arrhythmia affecting more than 2.3 million people in the United States. The use of target-specific oral anticoagulants, including apixaban, rivaroxaban, and dabigatran, to prevent stroke and systemic embolism in patients with nonvalvular AF has increased due to ease of administration, lack of frequent monitoring, and lack of extensive drug interactions. Within a community hospital health system, deviations from FDA-approved dosing regimens have been observed. This study aims to evaluate the incidence of off-label dosing of apixaban, rivaroxaban, and dabigatran in nonvalvular AF. **Methods:** This study was approved by the Institutional Review Board as a retrospective chart review evaluating the incidence and clinical outcomes of off-label target-specific oral anticoagulant dosing. The study includes patients 18 to 89 years of age diagnosed with atrial fibrillation who received at least one dose of apixaban, rivaroxaban, or dabigatran during an inpatient visit from June 1, 2014 through December 31, 2014. The primary objective of the study is to establish incidence of off-label dosing of apixaban, rivaroxaban, and dabigatran. The secondary objectives include evaluating time to first stroke or systemic embolism, time to first major bleeding event, readmission rate within 6 months, length of hospital stay, and frequency of underdosing or overdosing of each agent. The secondary outcomes will be analyzed by organizing patients in a 1:3 fashion and matching for age within 10 years and gender for each agent. Other data to be collected from the electronic medical record includes: patient demographics, creatinine clearance at dose initiation, concomitant antiplatelet or anticoagulant therapy, and presence of valvular heart disease. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List recommended renal dose adjustments for apixaban, rivaroxaban, and dabigatran when used for nonvalvular atrial fibrillation.

Identify opportunities for pharmacist involvement in selection of appropriate target-specific oral anticoagulant dosing regimens.

### Self Assessment Questions:

Which of the following agents requires a dose adjustment when being used for nonvalvular atrial fibrillation in a 73-year-old male who is 72 inches tall, weighs 75 kg, and has a serum creatinine of 1.

- A: Rivaroxaban
- B: Apixaban
- C: Dabigatran
- D: A and B

Which of the following statements is true regarding target-specific oral anticoagulants?

- A: Frequent monitoring of target-specific oral anticoagulants is required
- B: Pharmacists should utilize patient-specific factors when recommending
- C: Renal dosing recommendations for target-specific oral anticoagulants
- D: Target-specific oral anticoagulants are FDA-approved for use in patients

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-318L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## TARGETED DISCHARGE COUNSELING IN HIGH-RISK PATIENT POPULATIONS

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**Purpose:** Clinical pharmacists continue to advance their role in patient care throughout the inpatient hospital setting. As the responsibilities of pharmacists grow, it is imperative to provide a high level of care while continuing to be efficient. Hospital readmission rates play a large role in reimbursement as well as quality of patient care. Pharmacists have unique opportunities to verify appropriateness of medications, offer personal medication counseling prior to discharge, discuss potential lifestyle changes, and educate about disease state management. Due to multiple tasks performed by inpatient pharmacists, targeting patients with high risks for readmission is essential in maximizing pharmacist time. **Methods:** Recent literature suggests that pharmacist driven patient counseling to targeted high risk patients yielded a reduction in readmission rates in this population. The study objective was to determine the difference in 30-day readmission rates and number of clinical interventions between health system patients utilizing the current discharge model versus patients identified as high risk for readmission by a risk stratification scoring system who have been counseled by a pharmacist. Risk stratification took into account patient parameters, comorbidities, and home medications that were associated with higher readmission rates. By comparing the difference in 30-day readmission rates, it was possible to evaluate the average annual cost savings to the health system in the intervention arm of the study. It was our goal to determine if targeted discharge counseling in high risk patients would result in lower readmission rates compared to a traditional discharge process, while not incurring any additional costs to the health system. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define parameters for risk evaluation for patients admitted to the hospital  
Identify the required services provided by pharmacists completing discharge education and medication reconciliation

### Self Assessment Questions:

Which of the following is a factor currently used to determine risk of admitted patients for being readmitted in the first 30 days following discharge?

- A: Number of hospital admissions in the last 5 years
- B: Compliance score that measures average number of missed medications
- C: Length of stay during current hospital admission
- D: Ability to afford medications after discharge

Which education point is considered mandatory as part of the high-risk patient counseling session upon patient discharge?

- A: Location of the nearest pharmacy to receive new medications
- B: Explanation of rationale for medication selection related to diagnosis
- C: Providing medications to the patient prior to discharge
- D: Education directed at all medication taken prior to admission

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-319L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## OLANZAPINE FOR THE PREVENTION OF EMESIS IN PATIENTS WITH MULTIPLE MYELOMA RECEIVING HIGH DOSE MELPHALAN PRIOR TO AUTOLOGOUS TRANSPLANTATION

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**Purpose:** The optimal prophylactic regimen for patients receiving melphalan conditioning prior to autologous stem-cell transplantation (ASCT) remains unknown. The purpose of this study is to evaluate outcomes related to the addition of olanzapine to a regimen of ondansetron and dexamethasone in this patient population. Specific aims include: assessing the impact of adding olanzapine to a regimen of ondansetron and dexamethasone in achievement of a complete response against delayed phase chemotherapy induced emesis and transplant related emesis in patients with multiple myeloma undergoing ASCT, and to determine cost difference associated with the use of rescue anti-emesis medications. **Methods:** This study is a single-center quasi-experimental study utilizing a historical control. Patients 18 years or older with multiple myeloma admitted to UMHS after receiving a high-dose melphalan conditioning regimen prior to autologous stem-cell transplantation between June 1, 2014 and February 1, 2016 will be included in the analysis. Patients treated prior to July 1, 2015, the intervention implementation date, will be compared to patients treated after July 1, 2015. Patients treated after July 1, 2015 that did not receive olanzapine or received aprepitant within 24 hours of admission and those that were treated under study protocols that prohibit the use of dexamethasone will be excluded from the analysis. The primary outcome of interest is overall complete response (defined as no emesis or rescue therapy) against delayed phase chemotherapy induced emesis. Secondary endpoints include complete response against transplant related emesis (defined as emesis occurring > 4 days after conditioning due to transplant related factors), and inpatient cost of rescue anti-emetic medications. Descriptive statistics will be utilized to describe demographic data. Student's t-test will be used to compare continuous variables and Fisher's exact test will be used to compare dichotomous variables. **Results/Conclusions:** In progress

### Learning Objectives:

Recognize the multifactorial mechanism of action of olanzapine in the prevention of chemotherapy induced nausea and vomiting  
State the need for evaluating an olanzapine containing regimen in patients with multiple myeloma receiving melphalan conditioning prior to autologous stem-cell transplantation

### Self Assessment Questions:

Olanzapine (Zyprexa) is useful for prevention of chemotherapy induced nausea and vomiting due to its effect on which receptors?

- A: Dopamine receptors
- B: Serotonin receptors
- C: Neurokinin-1 receptors
- D: Dopamine, serotonin, muscarinic, and histamine receptors

Why is it important to evaluate the addition of olanzapine to the current antiemetic regimen used in patients receiving melphalan conditioning prior to transplant?

- A: To limit the use of ondansetron in this patient population
- B: To improve emetic control as the current regimen fails in 50% of cases
- C: Additional risk factors for emesis exist in this patient population
- D: B and C

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-320L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**TRANSITIONS OF CARE: PHARMACIST REFERRAL OPTIMIZATION AND MEASUREMENT OF PREVENTED MEDICATION RELATED ACUTE CARE EPISODES**

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Purpose: Pharmacist involvement at and post discharge reduces medication discrepancies and adverse drug events. Therefore, referral workflows from inpatient to outpatient are needed for patients at high risk for drug related problems (DRPs), as well as methods to quantify the value of resolved DRPs that can prevent medication related acute care episodes (MACEs). The primary objective was to develop an efficient workflow to identify and refer high risk patients from the inpatient to primary care pharmacist for post discharge follow-up. Secondary objectives were to standardize primary care pharmacist workflows to accommodate patient referrals and to implement MACEs methodology at UW Health. Methods: An electronic medical record (EMR) pharmacist referral workflow was developed and approved. It was piloted on medicine and cardiology units, and referrals were screened by a primary care pharmacist. The inclusion criteria for post discharge follow-up are UW Health primary care provider, at least 18 years old, and at least four chronic medications or two chronic conditions. Patients receive follow-up targeted at resolving DRPs. Observation of primary care activities was conducted to identify time spent on clinic tasks. Enhanced EMR note documentation of pharmacist resolution of DRPs will be developed to improve efficiency. A manual of primary care workflows will be developed to assist with pharmacist task and documentation consistency. Lastly, MACEs methodology will be implemented. Pharmacists will track DRPs and potential MACEs. A pharmacist and physician will review and validate potential MACEs. Outcomes measured will be the number and types of high risk patient referrals, 30 day readmission rates compared to the non-intervention referral group, time spent conducting primary care activities after workflow and documentation enhancements compared to baseline, number of identified DRPs, number of pharmacist identified MACEs, and number of physician validated MACEs.

Results/Conclusions: Results will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Review an inpatient to primary care pharmacist referral workflow of high risk patients

Describe MACEs methodology and implementation strategies

**Self Assessment Questions:**

How can an inpatient to primary care pharmacist referral be communicated both effectively and efficiently?

- A Telephone call
- B: Automated in-basket alert
- C: Page
- D: Typed out in-basket message

What is the purpose of MACEs methodology?

- A To quantify the value of pharmacist resolution of DRPs
- B To validate pharmacist impact on reducing readmissions
- C To engage nurses in monitoring for adverse drug events
- D Both A and B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-902L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

**ANALYSIS OF CART FILL PROCESS AND REMODEL WITHIN HUNTINGTON VA MEDICAL CENTER (HVAMC).**

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Analysis of Cart Fill Process and Remodel within Huntington VA Medical Center (HVAMC) William J. Nash, Pharm.D.; Bethany L. Bentley, Pharm.D.\* Huntington Veterans Affairs Medical Center 1540 Spring Valley Drive Huntington, WV 25704 304-429-6742 Ext. 3784 Bethany.Bentley2@va.gov

Purpose: The purpose of this research is to evaluate current issues within the cart fill process within a VA system and improve those processes for maximum efficiency within the pharmacy. The analysis will include the total time spent filling carts prior to floor delivery, errors during the process and technician satisfaction towards the process. The cart fill process will then be re-evaluated once the new model has been implemented. Methods: The data gathering of the current process will be collected over a two week time and will include the amount of time to initially fill the carts, time to update and deliver the carts, and problems associated with the FastPak system and lastly, medication errors. Secondly, a survey will be distributed to the pharmacy technicians and pharmacists to evaluate their thoughts and attitudes towards the current cart fill model. The current model will then be recreated based on the current process data analysis and a new model will be implemented. The new model will occur for month and then a new survey will be generated to the pharmacy technicians and pharmacists who will identify their attitudes and satisfaction of the new process. Results: Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Describe the current unit dose cart fill process with the medication delivery at the Huntington VA Medical Center.

Identify strategies of improvement of the cart fill process

**Self Assessment Questions:**

Which of the following best describes the role of a pharmacist in the unit dose cart fill process?

- A The pharmacist plays NO role in the cart fill process
- B: The pharmacist verifies the carts from which technicians have filled
- C: The pharmacist delivers the medication carts to the floor
- D: None of the above

Which of the following parameters in this study were NOT measured in the unit cart fill process?

- A Time spent by pharmacy technicians to fill medication carts
- B Time spent by pharmacy technicians to charge out medications
- C Medication errors as a result of cart fill errors
- D Time spent by pharmacist to deliver medication carts to the floor

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-903L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A FOSPHENYTOIN AND VALPROATE LOADING DOSE PROTOCOL IN THE EMERGENCY DEPARTMENT

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Purpose: Fosphenytoin and valproate are commonly used medications for the treatment of status epilepticus (SE) and acute seizure control in the emergency department. Rapid achievement of a therapeutic antiepileptic concentration is ideal to acutely stabilize neuronal membranes and electrical activity during a seizure. Fosphenytoin and valproate loading doses can be determined using pharmacokinetic dosing equations or on a milligram-per-kilogram basis. At our institution, patients commonly receive fixed-doses of these antiepileptic medications due to prescriber familiarity and ease of medication ordering. In obese patients, this dosing strategy may result in a higher proportion failing to achieve therapeutic levels. Furthermore, in our underweight patient population this strategy may lead to supratherapeutic concentrations, resulting in an increased frequency of adverse effects. The goal of this project is to improve patient outcomes and adherence to national guidelines for emergency management of status epilepticus and acute seizures by utilizing a pharmacy-department initiated, loading dose protocol, of fosphenytoin and valproate. Methods: This is a single-centered, observational, preimplementation-postimplementation study evaluating 100 adult patients receiving intravenous (IV) loading doses of fosphenytoin and valproate in the emergency department prior to and following implementation of a loading dose protocol. Patients were excluded if they were pregnant, had a neurologic emergency requiring immediate surgical intervention, or if they were administered fosphenytoin or valproate in the ED for continuation of maintenance therapy. The primary outcome of this study will compare the proportion of optimal loading doses pre- and post-implementation assessed in terms of appropriateness according to the implemented loading dose protocol that mirrors nationally accepted dosing strategies. Secondary outcomes for the preimplementation and postimplementation groups will include reported adverse drug reactions (ADRs) and recurrence of seizures within 24 hours of loading dose administration. Results/Conclusions: Data collection and analysis are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review loading dose strategies for fosphenytoin and valproate  
Describe barriers to administration of appropriate loading doses of fosphenytoin and valproate in an emergency department

### Self Assessment Questions:

Status epilepticus (SE) is defined as \_\_\_ minutes or more of continuous clinical seizure activity or recurrent seizure activity without recovery between seizures.

- A 15
- B: 5
- C: 10
- D: 30

Most common etiology of status epilepticus:

- A Noncompliance/insufficient dosing
- B Acute vascular injury
- C Alcohol related
- D CNS infection

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-717L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ANTIMICROBIAL STEWARDSHIP CLINICAL DECISION SUPPORT: COMPARISON OF FUNCTIONALITY WITHIN THE ELECTRONIC MEDICAL RECORD VERSUS THIRD PARTY SOFTWARE

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One of the most important strategies identified for promoting optimal antimicrobial use and antimicrobial stewardship is prospective audit and feedback. For large institutions, this can be difficult to achieve because a significant portion of hospitalized patients receive antibiotics, and it is arduous to review all patients or even identify which patients are at highest risk. Because of this, many institutions have invested in third party clinical decision support systems (CDSSs) to assist with antimicrobial decision making. Froedtert & the Medical College of Wisconsin - Froedtert Hospital currently employs two CDSSs: a third party software (TPS) and a functionality built within the electronic medical record (EMR). The TPS contains alerts to promote prospective audit and feedback and tools to support infection control workflows. The functionality within the EMR has recently been developed by our pharmacy informatics team, and also functions to identify opportunities for prospective audit and feedback. The purpose of this project is to evaluate and describe the EMR functionality with regard to antimicrobial stewardship clinical decision support and compare it to that of the TPS to determine which has more clinical utility. This single-center, prospective chart review will evaluate adult inpatients who have alerts generated in either CDSS for the following alert types: drug-bug mismatch, Staphylococcus aureus bacteremia, SPICE and SPACE cultures, duplicate anaerobes, and broad spectrum antibiotics. The primary outcome is the percentage of actionable alerts generated by each system for each alert type. The following secondary outcomes will be measured: total number of alerts generated, total number of alerts generated for each alert type, reasons for unactionable alerts, and time difference between alert generation defined as time of alert generation in EMR minus time of alert generation in TPS. Alerts will be assessed on a daily basis, and evaluated by two independent pharmacists. Results and conclusion will be presented at the conference.

### Learning Objectives:

Identify important strategies for promoting optimal antimicrobial use and antimicrobial stewardship.  
Recall the various positive impacts clinical decision support systems have on antimicrobial stewardship.

### Self Assessment Questions:

Which of the following is one of the most important strategies for promoting antimicrobial stewardship?

- A Prospective audit and feedback
- B: Clinical decision support systems
- C: Prior authorizations
- D: Antibiotic "Time outs"

How can third party software or EMR functionality for antimicrobial stewardship assist with performing prospective audit and feedback?

- A Identify patients who meet pre-specified criteria for antimicrobial stewardship
- B Stratify patients by level of acuity
- C Provide alerts for antimicrobial use in real-time
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-718L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE IMPACT OF IMPLEMENTING A -LACTAM ALLERGY GUIDELINE AT A LARGE ACADEMIC MEDICAL INSTITUTION

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**Background:** -lactam antibiotics are the most commonly reported drug allergens. However, literature suggests that only about 10% of patients have a true allergy in which -lactam antibiotics should be avoided. To get a better idea of the patient population encountered at Rush, the Infectious Diseases pharmacy department conducted a retrospective study assessing the total number of patients who reported a -lactam/intolerance, the number of patients who are considered to be truly allergic (based on the type of reaction), and the unnecessary use of broad-spectrum (stronger) antibiotics in cases where -lactam are considered first-line therapy. Based on those results, it was determined that our institution could benefit from implementation of a practice guideline. As such, a guideline was implemented by the Infectious Diseases pharmacy team, in January of 2014, in collaboration with the Infectious Diseases, and the Allergy/Immunology Medical teams. **Purpose:** The intent of this study is to assess compliance to the guideline and evaluate its impact on practice at Rush. **Methods and Materials:** This will be a retrospective, before-and-after, matched cohort study. These patients will be matched based on age, gender, diagnosis, and the presence of multiple drug hypersensitivity syndrome to historical controls (prior to implementation of -lactam allergy guidelines at Rush) of -lactam allergic patients that received at least one dose of an antibiotic between 1/1/2011 and 12/31/2014. For patients who receive antibiotics on multiple admissions, only the first admission during the time period will be used in the study. **Anticipated Results:** We anticipate that prescribing behavior for -lactam antibiotics has changed as a direct result of guideline implementation. Specifically, we expect that in this patient population, the utilization of -lactam antibiotics will have increased, the prescribing of alternative antibiotics will have decreased, and the healthcare costs as well as the clinical outcome will have improved.

### Learning Objectives:

Recognize the true cross-reactivity between penicillins, cephalosporins, and carbapenems in -lactam allergic patients  
Identify patients with reported -lactam allergies who can safely tolerate -lactam antibiotics

### Self Assessment Questions:

Patient MH requires IV treatment for a skin infection due to MSSA. Her allergy history shows that she previously experienced a rash after receiving penicillin. Which of the following statements is true?

- A Oxacillin is the safest and most efficacious agent for patient MH
- B: Vancomycin is the recommended first line therapy for MSSA and t
- C: Due to its low cross-reactivity with penicillin, meropenem is a cons
- D: Cefazolin is one of the treatment choices, but should be given to p

A ceftriaxone graded challenges is recommended in a patient

- A With low likelihood of experiencing a type I allergic reaction to  $\beta$ -la
- B With confirmed Type I allergy to penicillin
- C Who has a positive penicillin skin test result
- D Who has previously tolerated ceftriaxone without a reaction

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-321L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COLLABORATION OF PHARMACY AND MEDICAL RESIDENTS IN DEVELOPING AND IMPLEMENTING A TRANSITION OF CARE PROGRAM AT A COMMUNITY HOSPITAL WITHIN A FOUR-HOSPITAL HEALTH SYSTEM

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**Purpose:** An estimated 20% of all readmissions are attributed to poor care coordination upon discharge, including errors in medication continuity. The objective of this project is to implement a pilot program that improves the transition of care process by increasing medication adherence in order to reduce readmission rates for indigent patients as they are discharged from a medical resident-run hospital unit, to a medical resident-run outpatient clinic. **Methods:** A taskforce composed of pharmacy and medical residents, pharmacy staff, and the associate medical residency directors was created to develop the pilot. The program installed interventions in three phases: targeted discharge counseling from a medical resident-run hospital unit, follow-up phone calls, and education to medical and pharmacy staff regarding drug pricing. First, medical residents alert inpatient pharmacists of a patient discharge, indicating any new discharge prescriptions. Pharmacists or pharmacy students then counsel the patients on these medications, and inform the pharmacy resident staffing the medical resident-run outpatient clinic of the patients discharge. The pharmacy resident calls the patients within two business days after discharge to discuss their medication therapy. The pharmacy resident alerts the patients physician if the patient is unable to afford the medication or if they are experiencing any adverse drug reactions. Outcomes of each phone call and any therapy changes initiated by the pharmacist will be tracked and analyzed. Finally, a drug pricing tool was developed for the medical and pharmacy staff to aid in selecting affordable medications for the patients at discharge. The primary outcome to be measured is the percentage of patients who did not pick up newly prescribed discharge medications from the pharmacy within two business days. **Results/Conclusions:** Analysis of results is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the potential benefits in providing a transition of care program to low-income patients.  
Discuss the possible barriers in implementing a transition of care program and the methods to overcome the challenges.

### Self Assessment Questions:

Benefits in providing a transition of care program to low-income patients includes all of the following except:

- A increased medication compliance
- B: higher readmission rates
- C: aiding in medication affordability
- D: identifying adverse drug reactions

Which are difficulties that may prevent patients from medication adherence?

- A Cost of medication
- B Adverse drug reactions
- C Misinterpreting directions on pill bottles
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-719L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## BRADYCARDIA WITH DEXMETETOMIDINE USE IN ACUTE NEUROLOGIC INJURY: INCIDENCE AND RISK FACTORS

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**Purpose:** Hypotension and bradycardia are cited as the most common side effects associated with the use of dexmedetomidine. The incidence of bradycardia in the neurocritically ill patient is not well documented in the literature. The primary aim of this study is to assess the incidence of bradycardia with dexmedetomidine use in patients presenting with an acute neurologic injury. Risk factors associated with the development of bradycardia in this patient population will be identified. **Methods:** A single center retrospective, observational analysis will be performed to determine the incidence of bradycardia in patients with an acute neurologic injury on dexmedetomidine infusion and identify potential risk factors for its development. Patients who received continuous dexmedetomidine infusion for sedation and have a primary diagnosis of an acute neurologic injury admitted to the Neurosciences Critical Care Unit or to the Surgical Intensive Care Unit, between October 2011 and September 2015 will be eligible for evaluation. Prisoners, pregnant or lactating women and patients with vasopressor use prior to initiation of dexmedetomidine will be excluded. Those with preexisting heart block or a pacemaker prior to initiation of dexmedetomidine will also be excluded. Bradycardia will be defined as a heart rate less than 60 beats per minute at any time during dexmedetomidine infusion. Secondary endpoints to further characterize bradycardia will include the mean percent decrease in heart rate from baseline, the time to the first bradycardic event, and the incidence of any intervention for bradycardia. Intensive care unit length of stay and mortality will be reported. A risk factor analysis using logistic regression will be performed to find the association between endpoint incidences and the patient clinical characteristics or demographics. **Results and Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the most common side effects associated with the administration of dexmedetomidine.

Identify the primary advantage of dexmedetomidine use in a neurocritically ill patient as compared to other classes of sedative

### Self Assessment Questions:

1. What are the most commonly published side effects associated with the administration of dexmedetomidine?

- A: QTc prolongation and bradycardia
- B: Bradycardia and hypotension
- C: Hypotension and serotonin syndrome
- D: Bradycardia and tinnitus

What is the primary reason a clinician would likely prefer dexmedetomidine for sedation, specifically in the neurocritically ill patient?

- A: Dexmedetomidine produces a mild reduction in level of arousal w/
- B: Dexmedetomidine causes minimal respiratory depression
- C: Dexmedetomidine does not cause an elevation in serum triglyceric
- D: Dexmedetomidine is associated with a decrease in the incidence of

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-322L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RISK OF ACUTE KIDNEY INJURY IN CRITICALLY ILL SURGICAL PATIENTS RECEIVING VANCOMYCIN OR LINEZOLID FOR NOSOCOMIAL PNEUMONIA

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**Purpose:** Methicillin-resistant Staphylococcus aureus (MRSA) represents 10-40% of healthcare-associated pneumonia (HCAP), hospital-acquired (HAP) and ventilator-associated pneumonia (VAP) infections. Vancomycin and linezolid are commonly used to treat MRSA but acute kidney injury (AKI) remains a concern with the use of vancomycin. This is of particular interest in critically ill patients as they may be exposed to concomitant nephrotoxins, contrast dye, periods of hemodynamic instability, and sepsis placing them at higher risk for AKI. However, retrospective risk factor analyses confirming a relationship between vancomycin and AKI are lacking. The primary objective of this study is to quantify the incidence of AKI in surgical intensive care unit (SICU) patients receiving vancomycin or linezolid for nosocomial pneumonia treatment and to identify predictors of AKI with a focus on MRSA therapy. **Methods:** This is a retrospective, risk factor analysis evaluating patients treated for nosocomial pneumonia with linezolid or vancomycin during SICU admission, between October 1, 2014 and September 30, 2015. Patients admitted to the SICU who received at least 48 hours of either vancomycin or linezolid for pneumonia treatment are eligible for evaluation. Exclusion criteria are: pregnancy, incarceration, age >89 or <18 years, renal replacement therapy prior to antibiotic initiation, administration of both vancomycin and linezolid, or a history of end-stage renal disease. Potential AKI risk factors such as MRSA antibiotic therapy, hypotensive episodes, nephrotoxic medication exposures and number of surgical operations will be collected. The primary outcome is the development of AKI as defined by Risk/Injury/Failure/Loss/End-Stage Renal Disease (RIFLE) criteria. The incidence of AKI will be compared between linezolid and vancomycin using a Pearson chi-square test. Logistic regression will estimate adjusted percentages for AKI between the two groups while controlling for patient demographics and clinical characteristics. **Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the incidence of AKI in SICU patients receiving vancomycin or linezolid for empiric or directed MRSA HCAP treatment.

Review risk factors leading to AKI in SICU patients receiving treatment for MRSA HCAP.

### Self Assessment Questions:

Which of the following antibiotics is an acceptable alternative to vancomycin for the treatment of MRSA HCAP?

- A: Ciprofloxacin
- B: Linezolid
- C: Aztreonam
- D: Cefepime

In addition to serum creatinine, what other variable is used in the RIFLE criteria to categorize the severity of AKI?

- A: Heart rate
- B: Blood pressure
- C: Blood urea nitrogen
- D: Urine output

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-323L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## DEVELOPMENT, IMPLEMENTATION AND EVALUATION OF A PERIOPERATIVE BLOOD GLUCOSE MANAGEMENT PROTOCOL IN DIABETIC GENERAL SURGERY PATIENTS

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**Purpose:** Recent studies suggest that hyperglycemia nearly doubles the risk of surgery site infections and up to 60 percent of diabetic patients experience hyperglycemia in the perioperative setting. Current guidelines recommend maintaining blood glucose below 180 mg/dL in diabetic patients during hospitalization. This recommendation extends into the perioperative setting. The objective of this study is to evaluate the impact of implementation of a protocol developed by a multidisciplinary team for the recognition and monitoring of diabetic general surgery patients, to ensure insulin correction maintains euglycemia in the perioperative setting. **Methods:** Approval was obtained from the Institutional Review Board prior to data collection for a retrospective chart review. Gundersen Health Systems electronic health record was used to identify general surgery patients with a previous diagnosis of diabetes. Patients were included if they met the following criteria: 18 years of age or older, prescribed two or more oral antidiabetic medications or insulin prior to surgery and undergoing admission day surgery. The data collected included the following: patient demographics, blood glucose in preoperative, intraoperative and postoperative phases of care, A1C, outpatient medications, surgery type and time spent each phases of perioperative care. The primary outcome is compliance to the perioperative blood glucose protocol after protocol implementation. The secondary outcome is the percentage of patients with euglycemia in the perioperative setting **Results/Conclusions:** Data collection is ongoing. Final results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the consequences of poor of peri-operative insulin management in surgery patients

List the risk factors that can increase the risk for surgery site infections in patients with diabetes

### Self Assessment Questions:

Which property of an insulin infusion makes it an appealing option for perioperative glucose management?

- A Ability to make rapid adjustments
- B: Amount of glucose monitoring required
- C: Stability of insulin infusion once compounded
- D: Increased safety

Which of the following has been correlated to predict an increased risk of surgery site infections in diabetic patients?

- A A1c
- B Fasting blood glucose
- C Intraoperative blood glucose
- D Preoperative blood glucose

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-324L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## STANDARDIZING MEDICATION SAFETY RESOURCES ACROSS A HEALTH CARE SYSTEM

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**Purpose:** Ensuring patient safety during the medication use process is a critical component of health care delivery. In a fifteen hospital health care system, variation exists in how site medication safety teams review and respond to medication event data. Standardization of medication safety training and resources for individuals who participate in medication event review at these sites should promote consistent application of best practices. We sought to develop a medication safety toolkit to support standardization of the medication safety infrastructure across a health care system. **Methods:** Organizational stakeholders were surveyed to identify components of medication safety training and processes related to medication event review that were discordant between hospital sites. A medication safety toolkit was developed to provide resources to all the hospital sites within the health care system. This toolkit included a mechanism for sharing lessons learned from individual hospitals to the entire health care system.

Furthermore, this toolkit will be presented to the organizations medication safety oversight team to determine how it will be used and implemented across all hospital sites. **Summary of preliminary results to support conclusion:** The medication safety toolkit contains tip sheets on adverse drug reporting. Specifically, the tip sheets provided information on medication event severity coding and how to utilize adverse drug reporting systems. In addition, medication safety onboarding materials were developed and include a learning module to address foundational medication safety topics, as well as the organizations safety processes and resources. The process of disseminating the information in the toolkit and mechanisms for lessons learned will be presented in detail at the Great Lakes Pharmacy Residency Conference. **Conclusions:** Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe three topics that should be included when onboarding individuals to an organizations medication safety team

Explain how to effectively share lessons learned throughout a healthcare system

### Self Assessment Questions:

Which of the following medication safety statements should be emphasized when orientating individuals to an organizations medication safety team?

- A Safety culture with fair and just principles
- B: Adverse drug reaction reporting is mandatory
- C: Preventing medication errors will increase hospital readmissions
- D: Do not be concerned with specific populations at risk

Which of the following national organizations provide recommendations for improving medication safety principles in a health care system?

- A Food and Drug Administration (FDA)
- B Institute for Safe Medication Practices (ISMP)
- C Drug Enforcement Agency (DEA)
- D World Health Organization (WHO)

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-904L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF GENOMIC GUIDED THERAPY FOR METASTATIC SOFT TISSUE SARCOMAS

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**Purpose:** Soft tissue sarcoma is a heterogeneous group of tumors that comprise of over 50 histological subtypes. These tumors can exhibit a wide range of molecular pathologies, which can pose as a diagnostic and therapeutic challenge. While surgical intervention is critical for local disease, in metastatic or locally advanced disease, systemic chemotherapy is required. However, many patients with metastatic or advanced disease will have limited treatment options. Advances in next generation sequencing (NGS) technology has provided insight into cancer biology. NGS is an emerging tool to identify potential targets treatable with agents currently on the market or in clinical trials. Previous molecular profiling studies have identified clinically relevant mutations and promising targets for chemotherapy, however few have examined the clinical efficacy. We seek to determine the clinical benefit of genomic selected therapy versus non-genomic selected therapy in advanced soft tissue sarcoma. **Methods:** This is a retrospective analysis of an established database of patients at the Indiana University Health Precision Genomics program. Patients referred to the program from May 2014 to November 2015 with a diagnosis of soft tissue sarcoma were identified for analysis. Eligible patients included those 18 years and older with measurable or evaluable disease, and documented disease progression (based on RECIST criteria) under prior regimen. Patients were excluded if the immediate previous therapy received was a part of a phase I or II clinical trial, and patients who did not go on to receive additional therapy (i.e. hospice, death).

**Results/Conclusions:** Final results and conclusions of this study will be

### Learning Objectives:

Explain the difference between an actionable aberration and a druggable aberration.

Recognize the potential benefits of next generation sequencing for a patient with cancer.

### Self Assessment Questions:

Which of the following is a term for aberrations that can be targeted with a novel therapy?

- A: Druggable aberration
- B: Driver mutation
- C: Actionable aberration
- D: Germline mutation

Human equilibrative nucleoside transporter 1 (hENT1) over expression has been shown to be a predictive marker of benefit for \_\_\_\_\_ in patients with pancreatic cancer.

- A: Paclitaxel
- B: Etoposide
- C: Gemcitabine
- D: Cisplatin

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-325L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## MEASURING COMMUNITY PHARMACISTS PERCEPTIONS OF NALOXONE DISTRIBUTION

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**Purpose:** The purpose of this study is to assess perceptions of drug abuse and pharmacist-driven naloxone services among community pharmacists. As a secondary endpoint, pharmacists will be invited to participate in a Volunteers of America Real Journey Tour and complete a survey to determine if this exposure altered perceptions or willingness to dispense naloxone. **Background:** Kentucky Senate Bill 192 was signed into law on March 25, 2015. The bill, nicknamed the "Heroin Bill", had several components, including increased emergency access to naloxone. Pharmacists, who complete the required training and receive certification from the Kentucky Board of Pharmacy, can now enter into protocol agreements with physicians. The protocol authorizes pharmacists to dispense naloxone to patients or third parties without a prescription. The pharmacist is also required to provide written and verbal education when dispensing naloxone under protocol. The Center for Advancement of Pharmacy Practice at the University of Kentucky is conducting research on Kentucky pharmacists perceptions of these programs and willingness to become naloxone certified; however, the perceptions of community pharmacists specifically has not been evaluated. **Methods:** The survey developed by the Center for Advancement of Pharmacy Practice was modified to include only community/retail based questions. It was then distributed to 284 pharmacists employed by Walgreens in the Louisville area. Pharmacists were excluded if they did not have an active Kentucky license. Also, pharmacists will be invited to participate in a Journey tour with the Volunteers of America, a one-hour tour of treatment facilities for community members struggling with drug abuse. They will complete a pre- and post- survey on site using paper surveys. Pre- and post- tour differences will be determined by utilizing a paired t-test.

### Learning Objectives:

Describe the mechanism of action of naloxone.

Explain how Kentucky Senate Bill 192 expands the pharmacists role in provision of opioid overdose services.

### Self Assessment Questions:

Naloxone reverses overdoses of which of the following substances:

- A: Heroin
- B: Oxycodone
- C: Cocaine
- D: Both A & B

Kentucky Senate Bill 192:

- A: Requires pharmacists enter collaborate practice agreements to dispense
- B: Is nicknamed "The Cocaine Bill"
- C: Requires pharmacists provide counseling before dispensing naloxone
- D: Limits the amount of naloxone someone may purchase in a pharmacy

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-720L03-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## OPTIMIZATION OF PATIENT-SPECIFIC INHALER REGIMENS: A PHARMACIST-MANAGED PILOT PROGRAM IN THE AMBULATORY CARE SETTING

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**Purpose:** Optimal control of COPD and asthma can have a large impact on hospital admissions, ED visits, and quality of life for patients. In order to achieve optimal control, patients must be able to use their inhalers properly. Evidence suggests, however, that 50-90% of patients use their inhalers improperly and demonstrate that detailed training alone is insufficient in maintaining correct inhaler technique. Identifying patients with improper technique early on can lead to more appropriate selection of therapy; however, current guidelines do not provide strong recommendations for selecting the appropriate device and there are currently no objective assessments to direct therapy. The purpose of this study is to describe the pharmacist role in assessing technique and optimizing inhaler regimens using a Vitalograph Aerosol Inhalation Monitor (VAIM). It aims to identify barriers patients face when receiving optimized therapy as well as a pharmacist's impact on clinical outcomes and patient adherence. **Methods:** This prospective, cohort pilot study was approved by Henry Ford Hospital Institutional Review Board. Patients who had a diagnosis of COPD or asthma, spoke English, and were 18 years of age or older were included. Patients were excluded if they presented for imaging results review, had a tracheostomy, or had a diagnosis of interstitial lung disease, sarcoidosis, or lung cancer. The primary outcome was to determine the pharmacist's impact on improving asthma and COPD control as defined by changes in asthma control test or COPD assessment test scores, patient reported symptoms, and rescue inhaler use. Secondary outcomes included determining the barriers both patients and providers face when using and prescribing pulmonary medications, changes in patient adherence as measured by the Morisky Medication Adherence Scale, and utility of the VAIM in objectively assessing inhaler technique. **Results and Conclusions:** Data collection and analysis will be presented at the Great Lakes Conference.

### Learning Objectives:

Recognize the importance of appropriate delivery device selection for patients with COPD and asthma  
Identify the objective measurements the VAIM provides in the assessment of inhaler technique

### Self Assessment Questions:

Which of the following statements is correct and supports the development of an objective assessment of inhaler use:

- A: COPD is the number one cause of death in the US
- B: COPD/asthma cost the US \$1 billion in 2008
- C: 25% of patients have improper inhaler technique
- D: Education alone has been shown to be inadequate to optimize inh

The VAIM device objectively assesses which of the following respiratory parameters:

- A: Inspiratory rate
- B: Total lung capacity
- C: Forced expiratory volume
- D: Forced vital capacity

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-326L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF DE-ESCALATION STRATEGIES FOR EMPIRIC INTRAVENOUS VANCOMYCIN THERAPY IN PATIENTS WITH HEALTHCARE ASSOCIATED PNEUMONIA (HCAP)

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**Purpose:** Infectious Diseases Society of America guidelines recommend de-escalation of anti-methicillin-resistant Staphylococcus aureus (MRSA) therapy in patients with HCAP based on negative microbiological data and demonstration of clinical improvement. Negative sputum cultures can be used as a tool for de-escalating anti-MRSA therapy. In the absence of adequate sputum samples, nasal and throat surveillance cultures, when used together, have a negative predictive value of 92-100% for MRSA pneumonia. The objective of this study is to evaluate de-escalation of empiric vancomycin in patients with HCAP following implementation of sputum, nasal, and throat cultures at Swedish Covenant Hospital (SCH). Primary endpoints include average duration of vancomycin therapy, discontinuation rate for vancomycin, length of hospital stay, and 30 day re-admission rates to SCH.

**Methods:** Electronic medical records for patients with HCAP started on empiric vancomycin were evaluated. Patients were excluded if they had positive MRSA cultures, lacked demonstration of clinical improvement, or had a Clinical Pulmonary Infection Score (CPIS) greater than six. The historical control group data for 50 patients from September, 2014 to February, 2015 will be compared with the prospective group data from September, 2015 to February, 2016. Prospective group patients meeting inclusion criteria were followed by a pharmacist who ordered sputum, if a patient was able to produce a specimen, or nasal and throat cultures. Pharmacists recommended vancomycin discontinuation in patients with negative cultures, clinical improvement, and a CPIS score of less than six. Data will be analyzed using a t-test and Fishers exact test. **Results:**

For the historical control group of 50 patients, average duration of vancomycin was six days, with a discontinuation rate of 42%. The average length of stay was 10 days and the 30-day re-admission rate was 6%. Prospective data collection is in progress and final results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify risk factors for developing HCAP.  
Review criteria for anti-MRSA de-escalation in HCAP.

### Self Assessment Questions:

Which of the following is a risk factor for developing HCAP?

- A: Hospitalization in the past 120 days
- B: History of asthma or COPD
- C: Chronic kidney disease not on dialysis
- D: Residence in a nursing home or extended care facility

Which of the following is a criteria to de-escalate anti-MRSA therapy in a patient with HCAP?

- A: Elevated white blood cell count
- B: Negative sputum culture
- C: Increased serum creatinine
- D: Patient is febrile

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-327L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF POLYMYXIN B AND COLISTIN FOR THE TREATMENT OF VENTILATOR-ASSOCIATED PNEUMONIA IN CRITICALLY ILL ADULTS

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**Purpose:** Ventilator-associated pneumonia (VAP) is a common nosocomial infection associated with high morbidity and mortality. Cases of VAP due to multi-drug resistant organisms (MDRO) are increasingly difficult to treat due to the lack of active antimicrobial agents. Therefore, repurposing of existing antibiotics, particularly aerosolized colistin and polymyxin B, have become attractive options due to their broad spectrum of activity against many MDROs. The use of intravenous colistin was gradually abandoned in the 1980s due to high rates of nephrotoxicity. Administering aerosolized colistin by the inhalation route allows delivery of higher doses while potentially minimizing systemic toxicity. Little data exists to illustrate clinical response of aerosolized colistin. A recent systematic review demonstrated a low level of existing evidence and failed to demonstrate improved clinical outcomes with the use of aerosolized colistin. Further, of the studies included, no safety issues were identified. The purpose of our study is to describe the clinical outcome and disposition of patients treated with aerosolized colistin compared to polymyxin B. **Methods:** This will be a retrospective cohort study of patients admitted to the ICU at Northwestern Memorial Hospital. Patients who receive at least 2 doses of colistin or polymyxin B for the treatment of VAP will be included in our analysis. Collected data will include baseline comorbidities, severity of illness, serum chemistries during treatment, duration of mechanical ventilation, microbiological data including results of quantitative respiratory culture and species identification and susceptibility. Rates of in-hospital death or discharge disposition will also be collected. Patients and clinical endpoints will be identified with the use of the Enterprise Data Warehouse. Other information systems to collect endpoints will include PowerChart, Theradoc, and medication administration reports. **Results/conclusion:** Results and conclusion will be presented at the 2015 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the theoretical differences between aerosolized polymyxin B and colistin.

Explain why administration of this drug class via aerosolized route minimalizes adverse effects.

### Self Assessment Questions:

What makes polymyxin B, theoretically, a better option as an aerosolized medication than colistin?

- A Polymyxin B is a smaller molecule.
- B: Colistin needs to be activated.
- C: Colistin is less stable.
- D: Polymyxin B is more lipophilic.

Which of the following are adverse reactions commonly associated with colistin and polymyxin B?

- A Hepatotoxicity
- B Ototoxicity
- C Myelosuppression
- D Nephrotoxicity

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-328L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DAPTOMYCIN DOSING BASED ON IDEAL BODY WEIGHT VERSUS ACTUAL BODY WEIGHT: A STUDY ON CLINICAL OUTCOMES AND SAFETY

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**Purpose:** Daptomycin is a lipopeptide antibiotic most commonly used to treat skin and soft tissue infections and bacteremia caused by methicillin resistant staphylococcus aureus (MRSA). Daptomycin is an ideal target for antimicrobial stewardship due to the medication's high cost and clinical outcomes associated with infections requiring daptomycin treatment. Additionally, there is some debate as to whether daptomycin should be dosed using ideal body weight or actual body weight. The study purpose is to assess the safety and efficacy of a pharmacy-driven daptomycin ideal body weight dosing protocol in a community hospital setting. **Methods:** This retrospective quality improvement analysis has been approved by the Institutional Review Board. A pharmacy-driven daptomycin dosing protocol utilizing ideal body weight was implemented at the study institution in July 2015. Data will be collected for three months pre-protocol and seven months post protocol for retrospective analysis. Patients included in this study will be at least 18 years old and have received daptomycin for at least 72 hours. A list of patient profiles will be generated through hospital software. Data meeting the inclusion criteria will be arranged in a Microsoft Excel format. The primary endpoint will be days to de-escalation or definitive therapy. De-escalation is defined as patients who received daptomycin therapy and their condition allowed for switching to a different antimicrobial agent for cost, outpatient therapy, or reason other than microbiologic failure. Definitive therapy is defined as a final decision by the health care team for a certain treatment based on clinical judgment and objective parameters. Secondary endpoints include microbiologic success, hospital length-of-stay, and in-hospital mortality. Safety endpoints will include incidence of rhabdomyolysis, myopathy, and creatinine kinase elevation. **Preliminary Results/Conclusions:** Data collection is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define ideal body weight

Identify the potential risks and benefits of dosing daptomycin on ideal body weight versus actual body weight.

### Self Assessment Questions:

1. Which of the following best describes ideal body weight as defined by the Devine formula?

- A Ideal body weight is always less than actual body weight
- B: A weight that is believed to be maximally healthful for a person, per
- C: A measure of body fat based on height and weight
- D: Body weight minus body fat, typically 60-90% of total body mass

The potential benefits of dosing daptomycin on ideal body weight include

- A Decreased incidence of creatinine kinase elevation and myopathy
- B Increased efficacy against microbiologic organisms
- C Decreased cost of therapy
- D A & c

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-329L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CLINICAL CONSEQUENCES OF DISRUPTION IN PSYCHIATRIC MEDICATIONS UPON HOSPITALIZATION AT A VETERANS AFFAIRS MEDICAL CENTER

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**Background:** The purpose of medication reconciliation is to avoid medication errors such as omissions, duplications, dosing errors, or interactions as patient transitions through different care settings. Inappropriate medication reconciliation while hospitalized may lead to increased mental health service utilization and worse patient outcomes. Three of the top ten indications for hospital re-admissions are mental health related. Factors that increase the likelihood of readmission include patient age, mental illness, substance abuse history, co-morbid illnesses, and socio-economic status. The objective of this study is to examine the clinical consequences of disruption in mental health medications during hospital admission through a review of unscheduled mental health service utilization within 30 days of discharge for patients admitted to a local Veterans Affairs medical center. The results of the study will be used to identify how errors or omissions in prescribing during a hospital admission may impact a patient in the long-term.

**Methods:** Eligible participants had active mental health (MH) medications and were admitted to the hospital between June 1, 2014 and December 31, 2014. Data will be collected via retrospective chart review of the Computerized Patient Record System (CPRS). Patients will be in two cohorts, those who had MH medications held upon hospital admission and those who did not. Primary outcome to be assessed will be the number of unscheduled health services (walk-in clinic interactions, mental health appointments, nursing phone encounters, primary care encounters) utilized 30 days post-hospital discharge. The supporting documentation for withholding and resuming mental medications will be evaluated for appropriateness. Difference in holding patterns among admitting services will be used to identify trends in acute MH medication management. Our hope is to continue to work with providers to ensure appropriate medication reconciliation. This study has been approved by the facility Institutional Review Board. **Results/Conclusions:** To be presented at Great Lakes Conference.

### Learning Objectives:

Describe the patterns for holding mental health medications at a local Veterans Affairs Medical Center

Explain how inappropriate patterns for holding mental health medications impact patient outcomes and disease state management

### Self Assessment Questions:

Patients who tend to have a high level of medication non-adherence also tend to utilize \_\_\_\_\_ mental health services.

- A: More
- B: Less
- C: About the same
- D: N/a

Which one of the following is not a factor to increase the likelihood of hospital readmissions?

- A: Mental Illness
- B: Number of hospital admissions in the last year
- C: Co-morbid conditions
- D: Substance abuse history

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-330L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF SPECIALTY PHARMACY ACCREDITATION SERVICES IN OUTPATIENT PHARMACIES WITHIN A FOUR-HOSPITAL COMMUNITY HEALTH SYSTEM

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**PURPOSE:** To evaluate current specialty pharmacy procedures within a four-hospital, community health system to determine the necessity and feasibility of specialty pharmacy accreditation. The goal of this study is to improve specialty pharmacy operations, ensure compliance, and quality improvement, thereby advancing the continuity of patient care.

**METHODS:** A systematic evaluation will be completed of multiple specialty pharmacy accreditation organizations to gain insight on the pharmacy accreditation process, including accreditation standards, timeline, and fees. Based on this information, a full review and self-evaluation of current procedures in place at the hospital outpatient pharmacies will be conducted to determine the viability and cost of accreditation. Following the self-evaluation, an action plan will be created to improve the specialty pharmacy procedures in accordance with the standards set forth by the accreditation organizations. Procedures will be designed and implemented based on an action plan created through interdisciplinary coordination and considerations. After the implementation of improved specialty pharmacy procedures, a SWOT analysis will be performed to determine the feasibility of pursuing specialty pharmacy accreditation. In the form of a business proposal, an analysis of the benefits and cost-effectiveness of accreditation and the improved specialty pharmacy practices will be presented to hospital administration. **RESULTS/CONCLUSIONS:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss benefits of various specialty pharmacy accreditation organizations and their standards

Identify methods of self-evaluation that specialty pharmacies may utilize to implement accreditation standards and achieve the main focus of specialty pharmacy accreditation

### Self Assessment Questions:

Benefits of specialty pharmacy accreditation include all of the following, except:

- A: Guaranteed access to specialty medications
- B: Standardization of pharmacy procedures
- C: Increased quality improvement practices
- D: Growth of inter-disciplinary healthcare professional relationships

What is the main focus of obtaining specialty pharmacy accreditation?

- A: Increasing revenue and gaining access to medications
- B: Advancing the continuity of patient care
- C: Standardizing pharmacy procedures
- D: Gaining recognition among physicians, insurance companies, and

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-721L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RISK FACTORS FOR CEFEPIME-NON-SUSCEPTIBLE GRAM-NEGATIVE INFECTIONS IN HEMATOPOIETIC CELL TRANSPLANT (HCT) RECIPIENTS

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**Purpose:** Cefepime is a first-line empiric anti-pseudomonal agent in HCT recipients. HCT recipients are at increased infectious risk due to myelosuppressive chemotherapy utilized to allow engraftment and the immunosuppression used to prevent graft-versus-host-disease. Increasing rates of gram-negative resistance have been reported in this patient population. Limited studies have analyzed risk factors for multi-drug resistant infections in HCT recipients and none have looked explicitly at cefepime. By examining risk factors for cefepime non-susceptibility in HCT recipients, the study aims to better guide empiric therapy in this high risk patient population. **Methods:** This study was conducted as a single-center, retrospective, case-controlled analysis approved by the University of Michigan Institution Review Board. Adult (≥18 years) HCT recipients who were culture positive for gram-negative bacilli from any source from January 2009 through November 2015 were included in the study. For patients with multiple positive cultures, only the index culture per treatment course was analyzed. Patients were excluded if they were treated at an outside institution without complete records. The primary outcome is the identification of unique risk factors associated with cefepime non-susceptibility to gram-negative bacilli. Secondary outcomes include 30-day all-cause mortality, ICU admission following positive culture, hospice length of stay, and characterization of sensitivity patterns to other antimicrobials in patients with cefepime non-susceptible cultures. Descriptive statistics will be utilized to describe demographics and transplant data between groups. Student's t-test and Mann-Whitney U will be used to compare continuous variables that are parametric and non-parametric, respectively. Fisher's exact test will be used to compare dichotomous variables. A logistic regression analysis will be conducted for the primary outcome of the study. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Describe the pathogenesis of infectious risk in HCT recipients  
Define appropriate first-line antimicrobial agents in HCT recipients with febrile neutropenia

### Self Assessment Questions:

During which phase are HCT recipients at the highest risk of bacterial infections post-transplant?

- A: Early Phase (pre-engraftment)
- B: Mid Recovery Phase (post-engraftment)
- C: Late Recovery Phase
- D: Extended Phase

Which of the following is NOT an appropriate first-line antimicrobial agent for a HCT recipient who presents to the emergency department with febrile neutropenia?

- A: Cefepime
- B: Meropenem
- C: Piperacillin/Tazobactam
- D: Cefazolin

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-331L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## MONITORING AND TREATING METABOLIC ABNORMALITIES IN PATIENTS WITH EARLY PSYCHOSIS INITIATED ON ANTIPSYCHOTIC MEDICATIONS

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**Purpose:** For patients with schizophrenia spectrum disorders, antipsychotic medications are essential to improve psychosocial functioning. Unfortunately, these agents carry a lifetime metabolic syndrome risk. Some studies involving first-episode psychosis patients hypothesize that this drug-naïve population already has elevated metabolic syndrome risk before initiating any clinical interventions. Available research pertaining to metabolic monitoring and subsequent treatment in the setting of early psychosis with antipsychotic use is growing yet still scarce. The primary objective of this study is to characterize monitoring for metabolic abnormalities according to an established clinic protocol focusing on weight, blood pressure, and metabolic labs in the Prevention and Recovery Center for Early Psychosis (PARC), an outpatient mental health clinic guiding the care of individuals in the early stages of psychotic disorders. Other objectives are to describe referrals to primary care and wellness programs, as well as medication prescribing in response to abnormal labs as indicated. **Methods:** A retrospective chart review will be performed for patients seen for at least one visit at PARC between July 1, 2013 and June 30, 2015, in Indianapolis, Indiana. Subjects will include patients who are at least 18 years old, have lab results provided by Eskenazi Health or from an outside provider documented in their electronic medical record, and have one of the following diagnoses: schizophrenia, schizoaffective disorder, schizophreniform disorder, or psychosis not otherwise specified. Data will be collected on demographics; medications prescribed, specifically antipsychotics and those used to treat metabolic abnormalities; baseline weight, blood pressure, HgbA1c, and LDL direct or lipid profile; and referral status to a primary care provider or other health care services. Descriptive statistics will be used for the study's objectives, though other statistical tests may be used for subgroup analyses. **Results/Conclusions:** Data collection and analysis are in progress. Conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify medication- and disease-related risk factors for metabolic syndrome in patients with early psychosis  
Review current literature and guidelines concerning metabolic syndrome in patients with early psychosis

### Self Assessment Questions:

Which antipsychotic appears to carry the greatest risk of causing metabolic syndrome?

- A: Aripiprazole
- B: Olanzapine
- C: Quetiapine
- D: Risperidone

Which National Institute of Mental Health study demonstrated an increased prevalence of metabolic syndrome in patients with first-episode psychosis and less than 6 months of cumulative antipsychotics,

- A: Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE)
- B: Comparison of Atypicals in First Episode of Psychosis (CAFE)
- C: Recovery After an Initial Schizophrenia Episode-Early Treatment F
- D: Schizophrenia Patient Outcomes Research Team (PORT)

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-332L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING THE SAFETY AND EFFICACY OF DORNASE ALFA IN NON-CYSTIC FIBROSIS PEDIATRIC PATIENTS

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**Purpose:** Limited published evidence exists regarding the use of dornase alfa in pediatric patients who are not diagnosed with cystic fibrosis. The objective of this study is to determine the extent of safety and efficacy in pediatric patients receiving dornase alfa who do not have cystic fibrosis. **Methods:** This study was submitted to the Institutional Review Board and approved as a quality improvement project. The electronic medical record system was used to identify inpatients aged 0 to 18 years who were prescribed dornase alfa between January 1, 2015 and December 31, 2015 at a tertiary care pediatric hospital. Data that will be included for review, if available, are: patient age, gender, past medical history, concurrent airway clearance medications, dornase alfa dosing regimen, number of doses of dornase alfa received, intubation status, imaging results, respiratory rate, and pulmonary function studies. Patients will also be evaluated for adverse effects related to therapy. All data will be recorded without patient identifiers and maintained confidentially. Descriptive statistics will be performed on the data collected. **Results and Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the mechanism of action and approved indication of dornase alfa in pediatric patients.

Review the mechanisms of action of medications used to help with airway clearance.

### Self Assessment Questions:

Dornase alfa is approved for use in pediatric patients for which indication?

- A: Atelectasis
- B: Bronchiolitis
- C: Cystic Fibrosis
- D: Airway Clearance

Which of the following combinations of airway clearance medication and mechanism of action is correct?

- A: 3% saline – increase secretion volume and hydration
- B: Acetylcysteine – hydrolyzes DNA polymer and reduces DNA length
- C: Dornase alfa – increases chloride secretion and severs disulfide bonds
- D: Surfactant – depolymerizes filamentous actin

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-333L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATING VACCINATION ADMINISTRATION IN VETERANS IN PARTNERSHIP HEALTHCARE NETWORK 11

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**Purpose:** Providing vaccinations to Veterans is an important goal of the Veterans Health Administration and is essential to public and patient health. From July 2014 to June 2015 Veterans in Partnership Healthcare Network (VISN) 11 spent over \$5,000,000 on vaccinations, excluding the influenza vaccine, representing a significant healthcare expenditure. In the past year, an increase in reports indicating that vaccines were administered in duplicate or at inappropriate time intervals was noted at the VA Ann Arbor Healthcare System (VAAHS). The purpose of this project is to determine the incidence of duplicate vaccinations in VISN 11 over a 3-year time span, conduct a cost-analysis to determine the monetary loss associated with inappropriate vaccine administration, and identify potential causes of inappropriate vaccine administration. The long-range goal of this project is to make a case through cost-benefit for the importance of streamlining immunization documentation nationally within the electronic medical record (EMR). **Methods:** This retrospective review will identify duplicate or inappropriate administration of the pneumococcal (PPSV-23 and PCV-13), Tdap, herpes zoster, and influenza vaccines within VISN 11. A report of pneumococcal, Tdap, and zoster immunizations administered at any VISN 11 medical center between June 1, 2012 and June 1, 2015 will be reviewed to assess for duplications within and across sites. Additionally, we will identify any duplicate influenza vaccines given within the VAAHS between July 1, 2014 and July 1, 2015. A chart review will be performed to assess potential duplications based on the CDC's Advisory Committee on Immunization Practices (ACIP) recommendations. Finally, local Bar Code Medication Administration records will be reviewed for 2014-2015 to determine if documentation into the EMR is completed following inpatient immunization administration. **Summary of Preliminary Results and Conclusions:** Results are pending and final conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the barriers that prevent adult patients from being adequately immunized.

Discuss the ACIP's current recommendations regarding the pneumococcal, Tdap, and zoster vaccinations.

### Self Assessment Questions:

Which of the following is a barrier that prevents adult patients from being adequately immunized?

- A: Patient is properly educated about the importance of the vaccination
- B: Patient asks questions regarding vaccination schedules and which
- C: Patient has routine follow up with provider for well visits
- D: Patient believes that the vaccination will make him sick

A 67-year-old male with a PMH significant for hypertension and BPH presents to clinic today. He has never received the pneumococcal vaccine. Which of the following options represents the appropriate

- A: Both PPSV23 and PCV13 today
- B: PPSV23 today followed by PCV13 at least 12 months from now
- C: PCV13 today followed by PPSV23 at least 12 months from now
- D: Neither pneumococcal vaccine is indicated for this patient today

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-334L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EFFECTS OF IMPLEMENTING DELIRIUM SCREENING IN A PEDIATRIC INTENSIVE CARE UNIT

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**Purpose:** Delirium is a global encephalopathic process, characterized by fluctuating mental status and altered cognition and consciousness. The intensive care environment, infection, and several medications can cause delirium. Diagnosing delirium in children is especially challenging. The Cornell Assessment for Pediatric Delirium (CAPD) screening tool has recently been validated in critically ill patients 0 to 21 years of age. This tool allows nurses to evaluate the patient over the course of a 12 hour shift. The purpose of this work is to evaluate the effect CAPD has on detecting and managing delirium in our pediatric intensive care unit (PICU). **Methods:** Baseline data consists of patients prescribed antipsychotics in the PICU for signs and symptoms consistent with delirium. The screening tool was implemented in November 2015 and was performed for all patients in the PICU. After which, the number of patients diagnosed with delirium based on the screening tool was collected. Additional data collected includes time to pharmaceutical management, described as minimizing benzodiazepines and other offending medications and/or adding antipsychotics, starting dose of antipsychotics, dose changes, and duration of antipsychotic use. **Results:** The incidence of delirium increased from 1.9% prior to implementation of the CAPD to 46% after implementation of the CAPD. Of the 35 patients diagnosed with delirium from the CAPD, 11 (31.4%) were developmentally delayed. The median age of patients diagnosed with delirium prior to implementation was 14 years, compared to 2 years for patients diagnosed with delirium after implementation.

**Conclusions:** The CAPD increased the detection of delirium, especially in younger patients. As described in a previous study, the CAPD appears to over predict delirium in patients with developmental delay. Based on these findings, adjustments to education of the multidisciplinary team and how the CAPD is utilized in practice will be implemented.

### Learning Objectives:

Identify medications that cause ICU delirium  
Discuss beneficial characteristics of the CAPD screening tool

### Self Assessment Questions:

Which of the following medications cause ICU delirium?

- A: Benzodiazepines
- B: Dexmedetomidine
- C: Potassium chloride
- D: Cefepime

Which of the following characteristics is a benefit of the CAPD screening tool?

- A: Requires baseline data from the parents
- B: Can see fluctuations in the patient over the course of the day
- C: Must be performed multiple times per shift
- D: Validated for patients from 5 to 21 years of age

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-335L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF DIRECT ORAL ANTICOAGULANTS VERSUS LOW MOLECULAR-WEIGHT-HEPARINS FOR THE TREATMENT OF VENOUS THROMBOEMBOLISM IN PATIENTS WITH CANCER: A RETROSPECTIVE STUDY

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**Background/Purpose:** Venous thromboembolism (VTE) is a frequent cause of morbidity and mortality in the cancer population. National guidelines recommend treatment with a low-molecular-weight heparin (LMWH) for at least 6 months following an initial VTE. This recommendation is based on demonstration of increased safety and efficacy with LMWH compared to warfarin in prospective, randomized trials. Although two meta-analyses have evaluated the use of direct oral anticoagulants (DOAC) in the cancer population using original landmark trial data, no studies directly comparing DOAC to LMWH in the cancer population exist. The primary objective of this study was to compare the safety and efficacy of DOAC to LMWH for the treatment of VTE in patients with cancer. The primary efficacy outcome was recurrent VTE, and the primary safety outcome was major bleeding. The secondary objectives were to compare the rates of each individual type of VTE event (DVT, PE, or other), all clinically relevant bleeding, clinically relevant non-major bleeding alone, and death. **Methods:** An IRB-approved, retrospective, chart review was conducted to evaluate patients with active cancer and confirmed VTE treated with either a DOAC or LMWH at evidence-based doses between December 1, 2010 and September 30, 2015. Charts were reviewed up to 6 months following the start of treatment or until censored for the primary outcome, death, or cessation of study therapy. Patient demographics including type of cancer and VTE, treatment selection for VTE, risk factors for both VTE and bleeding, and the primary and secondary endpoints mentioned above were recorded. **Results/Conclusions:** The final results and conclusions of this study are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the current literature and guideline recommendations regarding treatment options for VTE in the cancer population.  
Describe safety considerations and efficacy data surrounding the use of DOAC for the treatment of VTE in patients with cancer.

### Self Assessment Questions:

The American Society of Clinical Oncology and National Comprehensive Cancer Network recommend which of the following treatments and duration for the treatment of VTE in patients with cancer?

- A: Low-molecular-weight heparin, 3 months
- B: Vitamin K antagonist, 6 months
- C: Direct oral anticoagulant, 12 months
- D: Low-molecular-weight heparin, 6 months

Two limitations of existing studies evaluating the safety and efficacy of DOAC for VTE in patients with cancer which may limit external validity to the general cancer population include which of the f

- A: Comparator group and patient population
- B: Sample size and bias
- C: Comparator group and sample size
- D: Study design and confounding variables

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-336L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DUAL ANTI-PLATELET THERAPY AFTER CORONARY STENT PLACEMENT: IMPACT OF DURATION ON MORTALITY, MAJOR CARDIAC EVENTS AND ADVERSE EVENTS

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**Purpose:** Thousands of veterans experience a myocardial infarction every year. Many receive coronary stenting to save their lives. After stenting, patients are started on anti-platelets to prevent stent thrombosis. Although we know dual antiplatelet therapy (DAPT) is effective, the duration of treatment remains controversial. The DAPT trial recently suggested extending DAPT past twelve months may reduce risk of stent thrombosis and major cardiovascular/cerebrovascular events. There is also evidence that show no advantage and even harm in extending treatment. The purpose of this study is to determine if extending DAPT past 12 months decreases the incidence of myocardial infarction, cerebrovascular accidents, or all-cause mortality in the veteran population. **Methods:** This will be a retrospective database analysis of veterans who received a coronary stent and were then started on DAPT between January 1, 2004 and December 31, 2013. Patients excluded will be those on concurrent anticoagulation. Data collection includes patient demographics, diagnosis of comorbidities, history of MI, cerebrovascular accident, or PCI/CABG, type of stent placed, date of event post-stent, fill history for clopidogrel, and other medication history. Time to myocardial infarction, cerebrovascular accident or all-cause mortality will be measured and the main outcome will be the percentage of patients with an event or death in each group. VINCI systems of data extraction will be pursued to facilitate data collection. Data analysis will be conducted using SAS. Categorical data will be analyzed by chi square test. Student t-test will be used for continuous data analysis and Wilcoxon Rank Sum test for ordinal data. A multivariate analysis using cox proportional hazard regression and Kaplan Meier curve will be used to compare time to death among the two treatment groups. This study has been approved by the institutional review board. **Results & Conclusion:** To be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define the purpose and importance of dual antiplatelet therapy after coronary stenting.

Recall current guidelines and evidence regarding duration of dual-antiplatelet therapy after coronary stenting.

### Self Assessment Questions:

Coronary stent thrombosis can lead to which of the following:

- A: A cerebrovascular accident with a low mortality rate
- B: An acute myocardial infarction with a high mortality rate
- C: The development of peripheral arterial disease
- D: The development of acute pulmonary embolism or deep vein thrombosis

The ACC/AHA guidelines recommend what duration of DAPT after receiving coronary stenting with a drug-eluting stent?

- A: At least 3 months
- B: At least 3-6 months
- C: At least 12 months
- D: Lifetime therapy

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-337L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSMENT OF THE CLINICAL INDICATIONS AND DOSING STRATEGIES OF NALOXONE IN OPIOID-INDUCED RESPIRATORY DEPRESSION

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**BACKGROUND** Opioid analgesics are commonly used in healthcare for their analgesic effects. When opioid dosing exceeds a patient's therapeutic window, severe adverse effects can present, having detrimental and even lethal effects on an individual. An opioid overdose encompasses a range of clinical findings such as apnea, lethargy, and miosis. These findings, however, are not consistently present. The diagnostic hallmark of an opioid overdose is respiratory depression, determined by measuring the respiratory rate and oxygen saturation. The FDA approved indication of naloxone is for reversal of respiratory depression secondary to opioid overdose. In an emergency setting, administration of a 0.4 mg IV/IM/IN dose may be necessary to reverse severe respiratory depression. However, in patients with non-life threatening respiratory depression or change of consciousness, administration of a full naloxone dose may cause an opioid withdrawal syndrome. For these reasons in an inpatient setting, the recommended dosing strategy of naloxone is 0.04 mg with reassessment every 60 seconds to assess respiratory rate and consciousness.

**OBJECTIVE** The primary objective was to evaluate the appropriateness of naloxone use in patients with suspected opioid-induced respiratory depression by assessing clinical indications and dosing strategies. **METHODS** A naloxone medication use evaluation was conducted at The Ohio State University Wexner Medical Center. A total of 30 patients were retrospectively reviewed with the help of a naloxone trigger tool to flag usage. Some patients received multiple doses, for a total of 45 naloxone administrations. **RESULTS** 12 of the 45 naloxone administrations (26.7%) met our predetermined definition of respiratory depression. There were a total of 7 cases (15.6%) where naloxone was administered to patients when there were no documented opioid administrations. Dosing was highly inconsistent and a wide range of doses were used. **CONCLUSION** This evidence suggests that there is a gap in knowledge regarding the mechanism of action of naloxone in addition to indications when naloxone would be clinically indicated.

### Learning Objectives:

Describe the hallmark signs of opioid overdose, the mechanism of naloxone, and FDA approved dosing strategies for reversal

Review results from the naloxone use evaluation at a large academic medical center.

### Self Assessment Questions:

What is the FDA approved dose of naloxone for reversal of respiratory depression with therapeutic opioid doses?

- A: 0.4 mg
- B: 0.2 mg
- C: 0.1 mg
- D: 0.04 mg

Which of the following are the most appropriate markers to identify opioid-induced respiratory depression?

- A: Altered Mental Status & Lethargy
- B: Respiratory Rate & Oxygen Saturation
- C: Blood Pressure & Heart Rate
- D: Pupil Reactivity

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-905L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF EXPANDED PHARMACY SERVICES IN THE EMERGENCY DEPARTMENT

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**Purpose:** The purpose of this study is to improve pharmacist and provider satisfaction with pharmacy services in the emergency department by expanding the spectrum of services pharmacists provide at a community hospital (primary objective). Also, it is hypothesized that the percentage of prescriptions filled upon discharge will increase, rates of appropriate healthcare utilization will increase, and rates of inappropriate healthcare utilization will decrease (secondary objectives).

**Methods:** This study was approved by the Institutional Review Board at St. Marys Hospital in Madison, Wisconsin. Patients included in the study were those presenting to the St. Marys Hospital emergency department during the hours staffed by a pharmacist. The intervention of expanded services consisted of the addition of medication discharge counseling to select patients and assistance in anticoagulation coordination for patients with deep vein thrombosis or pulmonary embolism. Pre- and post-intervention surveys were used to prospectively collect data regarding pharmacist and provider satisfaction with services. Pre- and post-intervention data regarding healthcare utilization were extracted retrospectively from the electronic health record from November 2015 through December 2015 and January 2016 through March 2016. Pre- and post-intervention data regarding prescription fill rate were extracted from the electronic prescription dispensing cabinet for the same time period. The chi-square test was used to evaluate the significance of categorical data, including ordinal survey data. **Preliminary Results:** Pending completion of data collection. **Conclusions:** Conclusions to be determined by the final results.

### Learning Objectives:

Identify areas in which pharmacy involvement in the emergency department may be beneficial.

Recognize the key stakeholders involved in the approval and the success of new procedures in the emergency department.

### Self Assessment Questions:

Which of the following are services already being performed by pharmacists at some institutions?

- A: order verification
- B: code response
- C: drug information resource
- D: all of the above

What is a barrier that made expanding pharmacy services in the emergency department difficult?

- A: lack of support from other disciplines
- B: time constraints
- C: cost limitations
- D: hurdles to gain approval from intradepartmental management

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-722L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## TRANSITIONAL CARE SERVICES DELIVERED THROUGH A COMPREHENSIVE MEDICATION THERAPY MANAGEMENT MODEL A MULTI-SITE PILOT STUDY

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**Purpose:** Only a few hospitals across the country fully utilize pharmacists at hospital discharge. Furthermore, current studies of pharmacist-driven medication reconciliation and education at discharge are retrospective, focus on specific disease states, or lack external validity. Froedtert Hospital piloted a study in 2011 that resulted in the expansion of pharmacy services to include medication reconciliation and education at discharge. It was found that physicians agreed with pharmacists detection of medication-related problems 78% of the time, 90% of pharmacists recommendations were accepted, and discharge prescription capture was increased by 11%. The multi-site pilot study will assess the impact of this sustainable practice model on patient outcomes. The primary objective is to provide the foundation necessary for the design of clinical practice models that fully optimize pharmacists in team-based care. This will be achieved by pooling prospectively collected data from several large academic medical centers, analyzing the impact of pharmacist services at hospital discharge, identifying patients at risk of readmission or hospital utilization, and developing future recommendations for the effective implementation of Comprehensive Medication Management (CMM) models. **Methods:** Three decentralized pharmacists will prospectively identify and document interventions on medication-related problems for 150 patients discharged from cardiology, medicine, and surgery service lines at Froedtert Hospital. Data will be collected to identify patient-, medication- and system-related predictors of patients at risk of readmission or healthcare utilization between and within service lines. Outpatient pharmacies in the community and at Froedtert Hospital will be contacted to identify the time from hospital discharge to prescription fill. **Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the perceived impact of pharmacist-driven identification of medication-related problems at hospital discharge

Describe how patient utilization of an onsite outpatient pharmacy can impact organizational, patient care, and financial outcomes

### Self Assessment Questions:

The Joint Commission (TJC) requires that hospitals "maintain and communicate accurate patient information" during transitions-of-care. Who is responsible for maintaining and communicating the information?

- A: Pharmacists
- B: Nurses
- C: Physicians
- D: No one is specifically designated or recommended

Which of the following is/are example(s) of medication-related problems that are commonly identified by pharmacists at hospital discharge?

- A: Inappropriate duration of therapy
- B: Therapeutic duplication
- C: Lack of affordability
- D: All the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-338L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF AN ALGORITHM TO GUIDE MEDICATION THERAPY FOR ACUTE AGITATION IN BEHAVIORAL HEALTH PATIENTS IN THE EMERGENCY DEPARTMENT

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**Purpose:** As the funding for mental health services in Illinois has been cut, the number of behavioral health patients presenting to the AIMMC emergency department has increased. Acute agitation in these patients is a common occurrence and currently there are no validated scales in the literature designed to measure acute agitation specifically in patients in the emergency department. The assessment and treatment of agitation often varies among physicians and relies on a subjective evaluation technique. The objective of this project is to promote an interdisciplinary team approach to prompt earlier detection of agitation in behavioral health patients and to optimize care via the implementation of an agitation assessment tool and treatment algorithm to help guide appropriate therapy. **Methods:** This quality improvement project was exempt from Institutional Review Board approval and includes adult patients over 18 years presenting to the emergency department with acute agitation who require a behavioral health consult. An agitation assessment tool and treatment algorithm were created by a multidisciplinary team based on expert opinion and consensus guidelines. There will be a run-in period utilizing the agitation assessment tool by nursing and social workers before and after medication administration based on the current standard of care. Then, the patients will be reassessed based on the same pre and post agitation assessment tool after implementation of the treatment algorithm. A retrospective review will be performed to determine if implementation of the treatment algorithm led to an increased percentage of appropriate treatment. **Results:** Data collection and analysis are in progress. Final results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify limitations of using the current agitation assessment scales in the literature in the emergency department

Recognize early signs of agitation that may prompt medication therapy in order to prevent escalation of agitation

### Self Assessment Questions:

Which of the following is a limitation for using available scales in the literature to assess agitation in the emergency department?

- A: Developed to assess agitation in specific patient populations, such as
- B: Designed for use in certain settings, such as nursing homes.
- C: Time required for completion not suitable for the fast paced environment
- D: All of the above.

Which of the following behaviors does not strongly warrant medication therapy?

- A: Physically violent
- B: Angry tone of voice
- C: Responding to internal stimuli
- D: Throwing objects

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-339L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PROCALCITONIN (PCT) ON ANTIMICROBIAL USE IN INTENSIVE CARE UNIT PATIENTS AT A COMMUNITY HOSPITAL

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**Purpose:** Overuse of antibiotics is associated with increasing resistance and adverse drug events, such as *C. difficile* infection (CDI). Previous studies showed PCT-based algorithms can decrease antibiotic duration without increased mortality. Our study examined the impact of a PCT-based algorithm on antibiotic use for undifferentiated sepsis.

**Methods:** We reviewed patients admitted to the intensive care unit (ICU) or progressive care unit between February - July, 2015 who had a diagnosis of sepsis from the Emergency Department (ED) with a PCT ordered (post-intervention group). The pre-intervention group was defined as patients admitted to the ICU in February - July, 2014 with a diagnosis of sepsis from the ED who would have met institutional criteria for a PCT order. We evaluated appropriateness of PCT order, algorithm adherence, antimicrobial duration, CDI incidence, incidence of antimicrobial induced nephrotoxicity, 30-day readmission, and mortality using a quasi-experimental pre-post design. A piggyback cost-effectiveness analysis (CEA) was conducted to assess the impact of utilizing PCT in our population. **Results:** Fifty-one patients were identified in the pre-intervention cohort versus 73 patients in the PCT group. In the PCT group, 63 (86%) had an appropriate initial PCT order and 44/59 (74%) followed the algorithm for antibiotic use adherence. The mean antibiotic duration was 4.9 days in the post-intervention group vs 6.2 days in the pre-intervention group. There was a significant reduction in 30-day readmission rate in the PCT group (5% vs 29%,  $p=0.001$ ). No difference was found in incidence of CDI or mortality. PCT use dominated standard care in the CEA with a decrease in per patient overall treatment costs of \$819 and a gain of 0.0003 quality-adjusted life years. **Conclusion:** Implementation of a PCT-guided treatment algorithm for undifferentiated sepsis was highly cost-effective and significantly decreased readmissions.

### Learning Objectives:

Explain the role of procalcitonin use in critically ill patients.

Identify appropriate treatment measures based on the procalcitonin algorithm.

### Self Assessment Questions:

Which of the following is TRUE regarding procalcitonin?

- A: Procalcitonin is synthesized by thyroid C cells in response to a viral infection
- B: Procalcitonin levels may be falsely elevated in patients with ESRD
- C: Procalcitonin levels should be ordered when the likely cause of infection is unknown
- D: Procalcitonin levels peak after 48 hours of a bacterial infection

Patient BB is a 82 yo male who presents to the ED with persistent fevers. BB is a poor historian and unable to provide an adequate history. The source of infection is currently unknown. Initial lab

- A: Hold antibiotics: PCT level is < 0.5 mcg/L, antibiotics are strongly indicated
- B: Start antibiotics and ignore the PCT level: PCT should not have been ordered
- C: Start antibiotics and order a second PCT level in 6 hours: PCT level is > 0.25 mcg/L
- D: Start antibiotics based on PCT level: PCT level is > 0.25 mcg/L, an

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-723L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## AN EVALUATION OF CRITICAL CARE PHARMACISTS WORK TO ESTABLISH PHARMACY STAFFING NEEDS

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**Background/Purpose:** Determining how many staff members are needed to provide adequate patient care poses a challenge in health care. Pharmacy departments often use crude measures of work volume, such as number of orders or number of orders for a certain drug (ie: vancomycin). Simulation has been used to determine staffing needs in other health care settings and has been used in a limited to assess pharmacy staffing needs. The purpose of this project is to objectively determine staffing needs for intensive care units (ICUs) that admit a variety of patients, including those who require extracorporeal membrane oxygenation (ECMO). This simulation will be used to propose a new pharmacy practice model. **Methods:** This is a single center quality improvement study. The first phase will involve administration of a survey designed to assess the frequency of and time needed to complete clinical tasks commonly completed in the ICU. The survey will be completed by a panel of experienced ICU pharmacists. Survey responses will be completed by February of 2016. In the second phase, survey data will be used to build a simulation model that will allow for estimation of staffing needs. The simulation phase will be completed by March 2016. **Results/Conclusions:** Data collection and analysis are currently underway and will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe a process for designing a simulation model to assess staffing needs

Identify potential barriers to using a simulation for the assessment of staffing needs

### Self Assessment Questions:

What is the primary purpose of a Monte Carlo simulation?

- A: A computer simulation to determine the likelihood of various scenarios
- B: To compute algorithms designed to show non-inferiority of one model
- C: To determine superiority of one survey tool to another
- D: Show differences in random variables

Which of the following statements is correct?

- A: Simulation studies are not accurate in their representation of new staffing models
- B: Simulation studies are a costly way to depict a new staffing model
- C: Simulation studies have been successfully used in different healthcare settings
- D: Simulation studies have never been applied to a healthcare setting

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-724L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATION OF ENOXAPARIN USE IN PEDIATRIC PATIENTS REQUIRING TREATMENT DOSING

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**Purpose:** The American College of Chest Physicians (CHEST) guidelines recommends low molecular weight heparin (LMWH), such as enoxaparin, for treatment of thromboembolism in pediatric patients. Enoxaparin inhibits factor Xa to a greater degree than IIa (thrombin) and potentiates the action of antithrombin III. Due to patient variability in clearance and volume of distribution, anti-Xa levels are monitored in pediatric patients treated with enoxaparin. The primary objective of this study is to evaluate the use of enoxaparin for treatment of thromboembolism in pediatric patients. Other endpoints of the study will include the time for patients to reach a therapeutic level, the number of doses administered to reach a therapeutic level, the number of anti-Xa levels drawn to reach the first therapeutic level, the number of dose changes to reach the first therapeutic level and the dose required to reach the first therapeutic level. **Methods:** A retrospective chart review of children less than 18 years old who received enoxaparin for treatment of thromboembolism while admitted to Children's Hospital of Wisconsin between January 1, 2015 and December 31, 2015 was performed. Enoxaparin data from patient charts was obtained from the electronic health record. The study has been reviewed and approved by the Institutional Review Board as a quality improvement project. Patients included in the study were started on enoxaparin at Children's Hospital of Wisconsin for treatment of thromboembolism. The patients excluded from the study were patients receiving enoxaparin prior to admission and patients discharged or discontinued on enoxaparin prior to reaching a therapeutic level. The data collected may include patient age, patient weight, enoxaparin dose, number of enoxaparin doses administered and anti-Xa levels. **Results/Conclusions:** Data collection is currently in progress and analysis of the study will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the recommended CHEST guidelines for initial treatment dosing of enoxaparin in pediatric patients

Explain the therapeutic management and monitoring of enoxaparin for treatment of thromboembolism in pediatric patients

### Self Assessment Questions:

What is the recommended therapeutic goal for anti-Xa levels in pediatric patients receiving enoxaparin for treatment of thromboembolism?

- A: 0.4-0.8 units/mL
- B: 0.5-1.0 units/mL
- C: 0.5-0.8 units/mL
- D: 0.4-1.0 units/mL

According to the CHEST guidelines, what is the recommended starting dose of enoxaparin for treatment of thromboembolism in pediatric patients greater than 2 months old?

- A: 1 mg/kg subcutaneously every 12 hours
- B: 1.5 mg/kg subcutaneously every 12 hours
- C: 1 mg/kg subcutaneously every 24 hours
- D: 0.5 mg/kg subcutaneously every 12 hours

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number      0121-9999-16-340L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## VALIDATION OF AN EDUCATIONAL VIDEO TO TEACH CHILDREN INHALER TECHNIQUE

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**Purpose:** This study aims to validate the efficacy of an educational video that was developed for use in pediatric asthma patients. **Methods:** We are conducting a single-center, prospective, pre-post study. Patients will be included if they are between eight to 16 years old, admitted to the emergency department or pediatric inpatient unit, and will be discharged on an albuterol meter dose inhaler (MDI). Patients will be excluded if they or the legal guardian declines, does not speak English, or cannot complete the study procedures. Informed consent will be obtained from the patient's legal guardian. The patients will be given a test before and after viewing the five-minute video. The test consists of an age-appropriate written exam evaluating patients' understanding of the learning objectives and an assessment of inhaler technique. All participants will be given a link to the video. A 30-day follow-up phone call will be placed to assess disease control and retention of knowledge. The video and questionnaire were developed by the investigators in conjunction with two pediatric specialists, two certified elementary school teachers, and one pediatric health education specialist. A sample size of 30 patients will be collected to detect a difference in the pre and post video combined assessment. **Results:** Results and conclusions will be presented at the Great Lakes Residency Conference

### Learning Objectives:

Describe the importance of repeated inhaler education in the pediatric asthmatic patients.

Identify the advantages of using video education in pediatric inpatients.

### Self Assessment Questions:

How often should inhaler technique be assessed?

- A: With every prescription refill
- B: Monthly for the first year
- C: At every visit with a health care provider
- D: In all patients who have less than complete disease control

Data has shown video education to be:

- A: An effective means of education delivery in the inpatient setting
- B: More effective than traditional education for pediatric patients
- C: Potentially ineffective in pediatric patients
- D: Data only supports use in the outpatient setting

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number      0121-9999-16-725L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## CMS SEPSIS CORE MEASURE: OPTIMIZING TIME TO ANTIBIOTICS USING LEAN METHODOLOGY

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**Purpose:** The Centers for Medicare and Medicaid Services (CMS) Core Measure bundle for management of severe sepsis and septic shock went into effect in October 2015. This bundle incorporates interventions shown to improve outcomes in this population. One of the major pharmacy-related bundle components includes timely administration of intravenous (IV) antibiotics from severe sepsis or septic shock recognition. Utilization of LEAN methodology within the inpatient pharmacy may reduce time from order entry to antibiotic administration for this population. The purpose of this study is to utilize LEAN methodology to evaluate the department of pharmacy's sepsis workflow and implement process improvement strategies to decrease time from order entry to antibiotic administration. **Methods:** This was an IRB-approved quasi-experimental study conducted at Henry Ford Hospital (HFH) looking at pre- and post-data after implementation of LEAN methodology within the pharmacy workflow. Adults with ICD9/10 codes for severe sepsis or septic shock and those who received a CMS Sepsis Core Measure antibiotic were included. Pre-implementation and post-implementation data was collected from February 2015 to September 2015 and October 2015 to May 2016, respectively. Patients were excluded if they received a first dose of antibiotics in the emergency department or were exempt from the CMS core measure. The primary outcome assessed was the time from order entry to administration of antibiotics. Secondary endpoints include additional pharmacy workflow measures, clinical outcomes, and workflow compliance rates.

**Results and Conclusions:** Preliminary results will be presented and discussed at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the CMS Core Measures related to antibiotic selection and administration in severe sepsis and septic shock.

Explain the role of LEAN quality improvement principles in pharmacy workflow.

### Self Assessment Questions:

What is the expected time period of the CMS Sepsis Core Measure for administration of IV antibiotics to a patient with severe sepsis or septic shock?

- A: Within one hour of hospital admission.
- B: Within three hours of hospital admission.
- C: Within one hour of meeting diagnostic criteria.
- D: Within three hours of meeting diagnostic criteria.

What are the four steps of quality improvement in LEAN methodology?

- A: Plan, Change, Evaluate, Report
- B: Plan, Do, Check, Act
- C: Evaluate, Change, Observe, Report
- D: Plan, Change, Check, Act

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-341L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## CLOSING THE GAP: THE IMPACT OF PHARMACIST INTERVENTION ON FORTY-EIGHT HOUR ICU READMISSIONS

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**Purpose:** To evaluate the impact of comprehensive medication review and pharmacist interventions on readmissions to the intensive care unit within forty-eight hours of transfer to a regular medical floor. **Methods:** This was a single-center, prospective, parallel group, cohort study in adult patients transferred from the medical intensive care unit (MICU) to a regular medical floor (RMF). Subjects meeting inclusion criteria populated a report generated within the electronic medical record, and were randomized to be reviewed by a single pharmacist, or to the current standard of care. All subjects in the intervention arm were followed by a single pharmacist for 48 hours after transfer to a RMF, wherein a detailed medication history was collected, and the medication profile was reviewed daily. After 48 hours of follow up, patients then received the standard of care. Interventions performed by the pharmacist were recorded, and retrospectively evaluated for impact and significance at the conclusion of a three-month study period. Outcomes included differences in 48-hour and overall ICU readmission rates, quantity and significance of interventions, and other factors such as APACHE II score, impacting ICU readmission. **Results:** Preliminary results do not show any differences in forty-eight hour ICU readmission rates between groups. However, a large majority of interventions performed were categorized as safety or optimization of drug therapy. Further statistical analysis is currently being performed for secondary endpoints. **Conclusions:** While there was no statistically significant difference in ICU readmissions between groups, the results of this study fortify the pharmacists role in improving medication safety and optimizing drug therapy. Further studies should be performed to assess the pharmacists impact as part of a multidisciplinary team dedicated to inpatient transitions of care.

### Learning Objectives:

Describe the effect of the "critical care gap" on patient outcomes, namely inpatient mortality rates

Discuss the impact of intensive medication profile review on maintaining patient safety

### Self Assessment Questions:

According to literature, patients readmitted to the intensive care unit (ICU) from a regular medical floor during the same admission are nearly \_\_\_\_\_ times more likely to experience hospital mortality

- A: Two
- B: Three
- C: Four
- D: Ten

Based on the results of this study, medication therapy interventions performed by pharmacists are most likely to impact which function of patient care?

- A: Therapeutic Monitoring
- B: Patient satisfaction
- C: Safety
- D: Length of stay

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-906L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EFFICACY OF SODIUM POLYSTYRENE SULFONATE FOR THE TREATMENT OF ACUTE HYPERKALEMIA IN HOSPITALIZED PATIENTS

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**Purpose:** Sodium polystyrene sulfonate (SPS) was approved in 1958 before the Food and Drug Administration required demonstration of efficacy. Despite questionable efficacy and safety, SPS remains widely used for hyperkalemia with no national guidelines to standardize use. This study will describe SPS use at a 537-bed teaching hospital. The primary outcome, mean reduction in serum potassium, will be compared between subjects who received SPS versus no SPS. Other predefined groups including monotherapy SPS and no intervention of any kind will also be created for comparison. **Methods:** Subjects are eligible for inclusion if they are at least 18 years with a serum potassium of at least 5.5 mEq/L during admission. Subjects with diabetic ketoacidosis or hemolyzed serum potassium values will be excluded. The following variables will be collected: age, gender, weight, history of end stage renal disease on hemodialysis, index potassium, all subsequent serum potassium levels within 48 hours, SPS dose, route and frequency, serum creatinine, administration of other hyperkalemia therapies, and other medications that can impact potassium. To define subgroups, other hyperkalemia interventions include: administration of at least 10 units per dose regular insulin, at least 10 mg per dose albuterol, or a loop diuretic within 24 hours of index potassium, or hemodialysis while admitted. Mean potassium reduction will be compared using the serum potassium closest to 24 hours after the qualifying potassium. Differences in mean potassium reduction between groups will be compared using the Wilcoxon Rank Sum test. Mean potassium reduction will be further analyzed after stratifying by hyperkalemia severity. A time curve trending potassium reduction will be generated.

**Results:** Initial data review showed 3,308 subjects met inclusion criteria and 1,053 received SPS. The mean 24-hour serum potassium reduction for subjects receiving SPS monotherapy was 1.42 mEq/L. Final results will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the current debate regarding efficacy and safety of sodium polystyrene sulfonate.

Describe the patterns of SPS use at the teaching hospital where the study was conducted.

### Self Assessment Questions:

Which of the following poses the greatest risk for SPS related gastrointestinal adverse events:

- A: Renal insufficiency
- B: Postoperative status
- C: Using SPS in 33% sorbitol
- D: History of clostridium difficile

Which of the following best characterizes SPS use as described in previous studies and in this study?

- A: SPS administration is evenly distributed between rectal and oral routes
- B: SPS 60 g is the preferred dose
- C: SPS monotherapy use increases with higher serum potassium levels
- D: SPS is administered more frequently than insulin

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-342L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PHARMACISTS RECEPTION OF AN EDUCATION MODULE ON MEDICARE PART D PLAN PERFORMANCE MEASURES

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Purpose: To characterize participating pharmacists opinions about an education module on Medicare Part D Plan Performance Measures.

Methods: Thirty-three pharmacy locations across two districts within a division of a national pharmacy chain were selected for inclusion in this study. Within each district, pharmacies were ranked according to their EQuIPP(TM) Platform percentage of patients fulfilling the "statin use in diabetes" measure from March-August 2015. Pharmacies were then matched between the districts, and randomized on a 1:1 basis into either an intervention or control group. Pharmacists practicing at 17 intervention pharmacies were educated through a pre-recorded lecture on the Medicare Part D Star ratings program and how to improve performance metrics related to Star ratings. They were then asked to complete an optional post-lecture survey, characterizing their perspectives of the lecture, their opinions of its feasibility to be implemented to a broader range of pharmacies, and their motivation to make changes in their practice subsequent to its viewing. Pharmacists practicing at 16 other pharmacies were placed in the control group and did not receive the lecture. The module was delivered in February 2016. Pharmacists receiving the education were instructed to apply the information learned only at their home store and to not share the information with other pharmacists until the end of the study period.

Results: N/A (in progress). Implications/Conclusions: Pending acceptable post-lecture survey responses, the video lecture or versions similar to it can be shown to a broader range of pharmacies to enhance additional pharmacists knowledge of Star ratings. With increased awareness of Star ratings, pharmacists will hopefully be able to implement changes in their practice sites to improve performance metrics. To determine if performance metrics have been improved as a result of this study, a second phase will examine data from a third-party Star ratings monitoring program, the EQuIPP(TM) platform.

### Learning Objectives:

Identify the significance of Star ratings potential influence on pharmacy reimbursement and/or pharmacy network contracting for various insurance plans.

Express why pharmacists should be educated on Star ratings.

### Self Assessment Questions:

About what percentage of an insurance plans overall Star ratings can be impacted by pharmacists intervention?

- A 10%
- B: 25%
- C: 45%
- D: 90%

It is theorized that pharmacies who positively contribute to a plans Star ratings could:

- A Obtain more reimbursement money per prescription filled from ins
- B Be placed on APhA's pharmacy 'green-zone' list
- C Obtain a \$10,000 benefit from a Medicare Part D-contracted plan
- D Be exempted from CMS's STAR ratings monitoring list for 2 years

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-726L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PHARMACY PRESENCE IN A VETERANS AFFAIRS URGENT CARE CLINIC

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Background: It has been shown that a large proportion of patients seeking same day medical appointments are requesting them for medication renewals or medication concerns. In many healthcare systems, including the Veterans Health Administration, many of these patients seeking assistance turn to an urgent care facility to meet these needs. Throughout the past few years, it has been shown that pharmacists have a significant impact within emergency departments. Within the setting of urgent care, it can be hypothesized that pharmacists could also play a key role in improving wait times, patient safety, and patient quality of care. Purpose: The addition of a pharmacist to the urgent care clinic will aim to streamline the process for both patients and practitioners by delegating certain functions to the pharmacist, thereby freeing other providers to focus on higher acuity and diagnostic concerns, ultimately aiming to improve patient safety and quality of care. Methods: This study is a single center, quality improvement project looking at patients who visited the urgent care clinic at the Battle Creek VA Medical Center. Patients eligible for inclusion in the study were any patient stating medication related issues (refills, renewals, fee-basis prescriptions, etc.) as the primary reason for their visit, patients stating chronic disease state management related concerns as the primary reason for their visit, patients traveling from or recently switching care from an alternate VA facility, patients requiring complex medication reconciliation (complex disease state history, severe or more chronic daily medications, or low health literacy), and/or patients requiring education (medication counseling, disease state education, adherence assessment/counseling, self-monitoring of blood glucose, insulin administration, hypoglycemia management, etc.). Patient data collection occurred every other Tuesday between November 2015 and February 2016. Results/Conclusions: Data collection and analysis are in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the potential impact pharmacists can have within an urgent care setting.

Identify potential patients that may benefit from pharmacist interaction in the urgent care setting.

### Self Assessment Questions:

Which of the following patients seeking urgent care services would be an appropriate candidate to triage to the pharmacist?

- A A 70 yo male stating he fell and hit his head this morning
- B: A 63 yo female presents with complaints of fever/chills, increased
- C: A 58 yo male presents with a chief complaint of acute chest pain
- D: A 57 yo male presents complaining of exhaustion and states he has

Which of the following was identified as a barrier for pharmacist intervention in the study?

- A Urgent care providers were unwilling to allow the pharmacist to be
- B Patients stated they preferred to speak only with the urgent care p
- C The urgent care clinic is able to easily refer less acute concerns to
- D Patients' health literacy levels

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-343L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION AND OPTIMIZATION OF ONCOLOGY WORKFLOW

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**Purpose:** Aurora Health Cares pharmacy model has been ever evolving and these changes have culminated in the creation of three distinct oncology pharmacy service lines: outpatient, inpatient, central order verification (COV). To help better meet the needs of the patient and to ensure continuity across all settings, an update in workflows was desired. Members from each service line convened at the strategic planning meeting to discuss the goals of the oncology pharmacy department as a whole. Apprehensions around workflow inefficiencies were discussed among stakeholders and trends became apparent. The objective of the project is to identify, evaluate, and optimize workflow to each of the service lines. **Methods:** A literature search was conducted for tools to aid in defining and optimizing workflow. Each service line and their workflow was mapped out and evaluated for areas of improvement. Meetings with stakeholders were held to evaluate and improve proposed workflow changes. Previous to project implementation, a baseline survey was sent out to the oncology clinic staff. A list of 39 project improvements was developed with priority placed on IT related projects. Data collection or measurements were individualized to each sub-project. **Results:** Several projects have been completed while some are still pending. Erroneous electronic communications to COV were reduced by 66% after further refining filters in the EHR. An automated schedule report for patients receiving chemotherapy in clinic was created, replacing the previous method which was time and labor intensive. This new process is projected to free up roughly 37 hours per month across the clinics. Chemotherapy agents were evaluated for pertinent laboratory values that could be pulled into the verification screen to reduce the number of clicks by approximately 1,500 clicks/week by pharmacists in order to view the laboratory value. **Conclusions:** Initial projects have shown success; the remainder of projects are pending completion.

### Learning Objectives:

Identify a method to assess for workflow insufficiencies  
List three electronic medical record enhancements to optimize oncology workflow

### Self Assessment Questions:

three electronic medical record enhancements to optimize oncology workflow

- A Survey
- B: Value stream mapping
- C: Defining value
- D: All of the above

What is the value of automating manual tasks?

- A Reducing time and number of clicks
- B Decreasing amount of paper used
- C Employee satisfaction
- D Increasing number of IT jobs

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-727L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## SGLT2 INHIBITORS: AN INVESTIGATION OF DIABETIC KETOACIDOSIS IN PRIMARY LITERATURE

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Sodium-glucose cotransporter 2 (SGLT2) inhibitors are a newer class of antidiabetic agents used in the treatment of type 2 diabetes mellitus (T2DM). By increasing glucose excretion via the kidneys, they improve glucose control but also are associated with several side effects. In May 2015, the US Food and Drug Administration (FDA) released a statement regarding the risk of euglycemic diabetic ketoacidosis (euDKA) in diabetic patients treated with SGLT2 inhibitors. There is currently minimal information regarding risk factors for the development of euDKA. This study is a meta-analysis of existing literature with a primary outcome to identify a potential relationship between SGLT2 inhibitors and DKA in diabetic patients. The secondary outcome is to identify patient-specific factors contributing to the incidence of DKA in diabetic patients treated with SGLT2 inhibitors by analyzing FDA Adverse Event Reporting System (FAERS) data reports and individual case reports. Numerous databases were searched including Medline, EBSCOhost, International Pharmaceutical Abstracts, and clinicaltrials.gov. to identify appropriate primary literature. Search terms included canagliflozin, dapagliflozin, empagliflozin, SGLT2, sodium-glucose cotransporter 2 inhibitor, diabetic ketoacidosis, ketoacidosis, metabolic acidosis, and acidosis. Data collection is ongoing. Primary literature will be analyzed via Cochrane RevMan software using a random effects approach. FAERS data will be analyzed via a disproportionality analysis, and case reports will be analyzed via descriptive statistics.

### Learning Objectives:

Recognize common side effects associated with SGLT2 inhibitors.  
Describe the pathophysiology of euglycemic diabetic ketoacidosis and how it differs from typical diabetic ketoacidosis.

### Self Assessment Questions:

Which of the following is a common side effect associated with SGLT2 inhibitors?

- A Hypertension
- B: Polyuria
- C: Rash
- D: Cough

Diabetic ketoacidosis that occurs with SGLT2 inhibitors is unique in that

- A Blood glucose is only slightly elevated
- B It is not life-threatening
- C Ketones are absent
- D Glucosuria is less pronounced

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-907L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**CIRRHOSIS, THROMBOSIS, FINDING FAXTS ABOUT DOSES: DOSING OF UNFRACTIONATED HEPARIN FOR VENOUS THROMBOEMBOLISM IN CIRRHOSIS**

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Cirrhosis induced coagulopathy increases risk of both bleeding and thrombotic complications. Diminished coagulation factor synthesis and thrombocytopenia potentiate common bleeding complications. Meanwhile, the increased risk of thrombosis is caused by a decrease in circulating anticoagulants (antithrombin III, protein C and S) and a concomitant increase in procoagulant (factor VIII, von Willebrand factor production). Routine laboratory tests often conflict with elevated international normalized ratio (INR) and activated partial thromboplastin time (aPTT) levels versus decreased antithrombin-dependent assays (anti-Xa level). Despite unfractionated heparin (UFH) being a mainstay of thrombosis treatment, dosing strategies and accurate monitoring parameters remain unclear in the setting of cirrhosis. A retrospective cohort analysis will be completed of adult patients with cirrhosis versus non-cirrhotic patients receiving continuous infusion unfractionated heparin (UFH) for the treatment of venous thromboembolism at the University of Michigan Health System (UMHS). Data collection will occur from time of implementation of an institutional, anti-Xa guided UFH nomogram in October 2014 until December 2015. Patients will be included if they have received heparin for the indication of deep vein thrombosis (DVT) or pulmonary embolism (PE) for at least 72 hours and have anti-Xa levels measured after each dose change and at least once daily when levels are therapeutic. Patients will be excluded if they are found to have heparin-induced thrombocytopenia, are pregnant, or received a blood transfusion within 3 days. The endpoints of therapeutic dosing requirements (units/kg/hr) and time to therapeutic anti-Xa will be compared using a Students t-test. A Chi-squared test will be used to evaluate for correlation between therapeutic UFH requirements and status of liver disease (compensated versus decompensated). Incidence of adverse events (thrombosis or bleeding) will also be described. This study has been submitted and is pending approval of the UMHS Institutional Review Board. Results will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Describe the effect of cirrhosis on hemostasis and anticoagulation monitoring parameters  
Identify the barriers to optimal anticoagulation in patients with cirrhosis

**Self Assessment Questions:**

1. Which of the following is true regarding anticoagulation monitoring parameters in patients who have cirrhosis?
- A: A high International Normalized Ratio (INR) value is a result of a
  - B: A low anti-factor Xa (anti-Xa) value is a result of a decrease in circ
  - C: A high anti-factor Xa (anti-Xa) value is a result of an increase in pr
  - D: A and B

Which of the following are concerns for using anticoagulation in cirrhotic patients?

- A: Commonly used anticoagulation parameters are affected by the pr
- B: No specific recommendations exist regarding target anti-Xa levels
- C: There is evidence to support that progression of disease can wors
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-344L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

**REDUCING 30 DAY READMISSIONS IN PATIENTS WITH HEART FAILURE THROUGH PHARMACIST DISCHARGE MEDICATION SERVICES**

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Purpose: Of the 5.1 million people who have heart failure in the United States, one of every four who are admitted to the hospital for a heart failure exacerbation will be readmitted within 30 days. Reducing hospital readmission rates is a national priority as it negatively affects hospital reimbursement and patient quality of life. Studies have shown a positive impact in patients with heart failure when a pharmacist is involved in the discharge process. The main objective of this study is to determine if pharmacist discharge medication services provided to patients with heart failure can reduce 30 day readmissions. Methods: A prospective, single center, study of patients with heart failure discharged from Mayo Clinic Health System - Franciscan Healthcare will be completed from December 1, 2015 to March 15, 2016. The intervention group will receive discharge medication services which include: medication reconciliation, resolution of medication discrepancies, medication counseling using health coaching techniques, and a post discharge phone call. The retrospective comparator group will include patients discharged with heart failure from December 1, 2014 to March 15, 2015 who received standard of care at discharge and instruction completed by nursing staff. The primary outcome to be assessed is hospital readmission within 30 days from primary hospitalization. Secondary outcomes to be assessed will include: the number of emergency department visits within 30 days of discharge, medication discrepancy identification (defined as duplicate therapy, continuation of previously discontinued medication, omissions, wrong dose/formulation, and drug interactions) and resolution, short term goal setting by patients and assessment of short term goal achievement. Pearsons chi-square test will be utilized to evaluate primary and secondary endpoints.

Results/Conclusions: Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Residency Conference.

**Learning Objectives:**

Identify the 5 main communication principles of motivational interviewing  
List 2 medication services pharmacists can provide in the discharge process for patients with chronic diseases.

**Self Assessment Questions:**

- Which of the following is not one of the 5 communication principles of motivational interviewing?
- A: Avoiding arguments
  - B: Expressing empathy
  - C: The righting reflex
  - D: Self-efficacy

According to the CDC, heart failure costs an estimated \_\_\_\_\_ dollars yearly. This includes the cost of healthcare services, medications to treat heart failure, and missed days of work.

- A: 5.1 million
- B: 75 million
- C: 10 billion
- D: 32 billion

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-345L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATION OF A PILOT BENZODIAZEPINE TAPER CLINIC IN VETERAN PATIENTS WITH CONCURRENT OPIOID USE

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**Background:** Opioid pain relievers are implicated in nearly 17,000 overdose deaths in the United States. Thirty-one percent of these deaths involved the concurrent use of benzodiazepines. Co-administration increases the risk for sedation and may increase the euphoria of opioids leading to a higher likelihood for abuse and misuse. A recent medication use evaluation concluded that over 700 Veterans had active outpatient prescriptions for both a benzodiazepine and an opioid at Edward Hines, Jr. VA Hospital. As a result, a pilot benzodiazepine taper clinic and insomnia order set will be implemented in January 2016 in collaboration with primary care and mental health providers to reduce the number of veterans on high dose benzodiazepines and concurrent opioid therapy and to facilitate the use of non-benzodiazepine treatment of insomnia. **Purpose:** The purpose of this quality improvement project is to evaluate potential benefits and barriers to implementing a multidisciplinary benzodiazepine taper clinic.

**Methods:** The project will assess the reduction in high dose benzodiazepines for pilot clinic patients. The magnitude and time to dose reduction(s) will be evaluated. High dose benzodiazepines will be defined as total daily doses of temazepam >20 mg, diazepam >10 mg, clonazepam >1 mg, lorazepam >2 mg, and alprazolam >1 mg. Patients receiving opioids for cancer pain, a benzodiazepine for back spasms in spinal cord patients, hospice patients, and patients with severe mental health disorders will be excluded. Time spent in preparation for clinic visits, patient contact hours, and follow up will be logged. Self-reported patient compliance with treatment plans and patient clinic visit cancellations will be recorded. The project will also track the use of the newly implemented order set for the treatment of insomnia. **Results and Conclusion:** The project is currently in progress and results will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Describe the potential benefits and barriers to reducing concurrent benzodiazepine and opioid use.

Identify non-benzodiazepine, evidence-based treatment options for insomnia.

### Self Assessment Questions:

Co-administration of benzodiazepines and opioids increases the risk of:

- A Sedation
- B: Opioid-induced constipation
- C: Opioid abuse and misuse
- D: Both A. and C.

Which of the following is FDA-approved for the treatment of insomnia:

- A Trazodone
- B Amitriptyline
- C Mirtazapine
- D Doxepin

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-346L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DETERMINING THE CLINICAL UTILITY OF AN ABSOLUTE PROCALCITONIN (PCT) VALUE

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**Purpose:** Procalcitonin (PCT) is used as a biomarker for sepsis due to its high sensitivity and specificity in distinguishing an infectious etiology for sepsis and septic shock. Increased PCT levels have been correlated with higher mortality. PCT ranges have been established to guide antimicrobial therapy; however, there are no data that establish a single PCT value that will determine the likelihood in positive bacterial culture result. This study aims to establish if a single PCT value on the initial clinical presentation can provide positive predictive value of a positive culture result. **Methods:** Retrospective chart review was conducted to evaluate 813 medical intensive care unit (ICU) patients from an existing database collected from April 2014 - December 2014. This study included patients greater than 18 years old, known PCT values, known culture results, suspected site of infection, and documentation of antimicrobial usage. Patients were excluded if they were immunocompromised. Data points collected included patient demographic and clinical information, PCT value, number of PCT assays obtained, confirmed source of infection, result of culture, white blood cell count, ICU length of stay, and hospital length of stay. The primary outcome of this study is to determine the receiver operating curve (ROC) value of a threshold PCT level. Secondary outcomes include: the positive predictive value of a PCT value for a positive microbiologic culture, the negative predictive value of a PCT value for a positive microbiologic culture, the absolute threshold value of PCT for gram-positive infections, and the absolute threshold value of PCT for gram-negative infections. **Results:** Pending **Conclusion:** Pending

### Learning Objectives:

Explain the utility in the use of procalcitonin (PCT) in sepsis

Recall results from previous studies on the use of PCT

### Self Assessment Questions:

Which of the following statements is true regarding the use of procalcitonin (PCT) as a biomarker for sepsis?

- A PCT assays have shown low sensitivity, high specificity
- B: PCT assays have shown high sensitivity, high specificity
- C: PCT assays have shown low sensitivity, low specificity
- D: None of the above statements are true

In previous studies, the use of PCT has been to?

- A Be useful as biomarker for diagnosis of bacteremia and sepsis
- B Decrease duration of antimicrobial use
- C Decrease intensive care unit length of stay
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-347L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF BRAND VERSUS GENERIC TACROLIMUS IN RENAL TRANSPLANTATION

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**Purpose:** At Northwestern Memorial Hospital (NMH), the majority of renal transplant recipients receive tacrolimus and mycophenolate mofetil for immunosuppression therapy. In May 2014, the solid organ transplant program at NMH switched from using brand only to generic only tacrolimus regimens. Currently, there are 6 manufacturers of generic tacrolimus (GT) approved as therapeutically equivalent to brand tacrolimus (BT) by the FDA. Few studies have compared clinical outcomes when using de novo initiation of generic vs brand tacrolimus as part of a maintenance immunosuppression regimen in renal transplant patients. The objective of this study is to determine if GT regimens result in similar therapeutic levels and clinical outcomes when compared to BT regimens in renal transplant patients. **Methods:**

This will be a retrospective, matched (race, weight within ten kilograms, and living vs. cadaveric transplant), cohort study. Renal transplant recipients will be included if they were  $\geq 18$  years old at the time of transplant and received induction therapy with alemtuzumab (intervention group: October 1, 2014 to May 1, 2015 and received GT; control group: January 1, 2008 to December 31, 2013 and received BT). Patients will be excluded if they received a simultaneous transplant of any type, tested positive for HIV or HCV prior to transplantation, received rituximab, or were enrolled in an investigational study affecting immunosuppression selection or tacrolimus trough goals. Data collection will include basic demographics, primary renal disease, tacrolimus levels, incidence of graft failure and graft rejection, tacrolimus toxicity, and patient survival at 6 months. The primary endpoints will be time to two consecutive tacrolimus trough levels within goal range and percentage of tacrolimus trough levels within goal range at 6 months. This study is IRB approved by Northwestern University. **Results:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define and differentiate the following terms: "Pharmaceutical Equivalence", "Bioequivalence", and "Therapeutic Equivalence".

Describe factors that could affect dosing of tacrolimus in order to target specific goal trough levels.

### Self Assessment Questions:

Which of the following medications would you expect to significantly affect the trough level of tacrolimus if added to a patient's medication regimen?

- A Eplerenone
- B: Fluconazole
- C: Levofloxacin
- D: Levetiracetam

Which term is used to describe two medications that contain the same active ingredient, are the same dosage form, are taken via the same route of administration, and are the same strength?

- A Bioequivalent
- B Therapeutically Equivalent
- C Pharmaceutically Equivalent
- D Commercially Equivalent

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-348L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF E-PRESCRIBING ERRORS IN AN OUTPATIENT PHARMACY WITHIN A FOUR-HOSPITAL COMMUNITY HEALTH SYSTEM

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**Purpose:** E-prescribing was a substantial step in the enhancement of patient safety practices by allowing prescribers to electronically send prescriptions to a pharmacy from the point-of-care. Although meant to streamline workflow and decrease medication errors, e-prescribing has created a new dimension of errors related to system design and user knowledge. The primary objective of this project was to identify and quantify the types of e-prescribing errors in an outpatient pharmacy in order to determine underlying causes and develop mechanisms to reduce errors. **Methods:** This was a quality improvement project, in a single outpatient pharmacy within a four-hospital community health system. All e-prescriptions sent to the pharmacy via the health systems electronic medical record (EMR) in one month's time will be evaluated. Errors contained within the e-prescription will be identified retrospectively through the health systems e-prescribing network and prescription processing system. All data will be documented and analyzed in a data collection tool that has been pre-populated with the most common types of errors including inappropriate medication, dose, directions, and quantity. Outcomes to be evaluated include quantity and classification of e-prescribing errors. The results will help facilitate system-based and/or individual interventions. Analysis of results will be presented to pharmacy administration and EMR managers to develop system advancements that can help avoid errors. **Results and Conclusion:** Data collection and analysis is in progress with results to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify potential benefits of electronic prescribing in an outpatient pharmacy setting.

Identify factors that contribute to electronic prescribing errors.

### Self Assessment Questions:

Which of the following is a potential benefit of electronic prescribing?

- A Improved workflow
- B: Clarification of e-prescription inaccuracies
- C: System failures
- D: Delays in the arrival of e-prescriptions

Electronic prescribing has created a new dimension of errors, which of the following is an underlying factor?

- A Accurate e-prescriptions
- B Prescriber handwriting
- C System designs
- D User expertise

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-728L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## UTILIZING A PHARMACY/PROVIDER COLLABORATIVE PROTOCOL TO OPTIMIZE PNEUMONIA TREATMENT IN THE ICU

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**Purpose/Background:** Bacterial pneumonia is one of the most common infectious reasons for admission to the hospital. Treatment of respiratory infections can vary from five days to twenty one days. In the absence of definitive microbiological data indicating an infection, providers are required to rely on laboratory values and the clinical exam to assess the patients possible infection and improvement. Literature surrounding community acquired and health care associated pneumonia show that longer antimicrobial therapy does not necessarily improve outcomes. When patients are showing clinical signs of recovery, discontinuing antibiotic coverage did not affect mortality, however did reduce length of stay and reduced recurrence of multi-drug resistance organisms. The purpose of this project is to evaluate the benefit of a standard of care pharmacy/provider pneumonia protocol as seen by reduction in days of antibiotic therapy, 30 day re-admissions and overall length of stay. **Methods:** This is a 2:1 retrospective cohort study. Utilizing the pneumonia guidelines, current literature and the antibiogram at St. Francis Hospital, a protocol has been developed to help facilitate treatment of pneumonia. Inclusion criteria for the study included patients admitted to the acute intensive care unit with a diagnosis of pneumonia or sepsis associated with pneumonia. Live education and instruction was completed by ICU and ED pharmacists participating in the protocol. On day 1 blood cultures, sputum/respiratory cultures, procalcitonin, legionella antigen and MRSA nasal swab are ordered by the ED/ICU providers or pharmacists to assist in therapy evaluation. As patients become clinically stable, based upon pre-defined criteria, antibiotic stop dates and de-escalation therapy will be entered in the electronic medical record (EMR) and documented by physicians or pharmacists. This protocol is the current standard of practice in the ICU. **Results:** Collection and analysis of the data is ongoing. Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Identify the clinical and laboratory criteria utilized in diagnosing and monitoring bacterial pneumonia.

Discuss the literature regarding inpatient HCAP and CAP length of therapy, risk of resistance and clinical success.

### Self Assessment Questions:

In addition to the presence of a fever, purulent tracheal secretions, and leukocytosis, a clinical pneumonia is defined by:

- A: New or progressive radiographic infiltrate
- B: Procalcitonin > 0.1
- C: Elevated BUN
- D: Hypoxia, requiring supplemental oxygen

In health-care associated pneumonia, longer courses of treatment (7 vs 14 days) were associated with:

- A: Improved outcomes
- B: Decreased length of stay
- C: Increased risk of developing MDR organism
- D: Microbiological eradication

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-349L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF ADHERENCE TO OSTEOPOROSIS SCREENING RECOMMENDATIONS IN WOMEN VETERANS

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**Purpose:** Osteoporosis is the most common form of low bone-mineral density in women and can be prevented with proper screening and drug treatments. Low bone-mineral density (BMD) increases a woman's risk of major osteoporotic fracture. Per the National Osteoporosis Foundation guidelines, all post-menopausal women 65 years or older should be screened with a Dual X-ray Absorptiometry (DXA) scan for baseline bone-mineral density. Evaluating the compliance with the National Osteoporosis Foundation recommended screening guidelines can help to assess if patients are receiving appropriate preventative care to decrease the physical, emotional and financial burden caused by major osteoporotic fracture. **Methods:** This quality assurance project is a retrospective chart review. The Veterans Affairs computerized patient record system (CPRS) will be utilized to review the charts of female patients 65 years or older established in the Cincinnati VA Medical Center at least twelve months who meet the inclusion criteria. CPRS will be reviewed to assess for completed DXA scans for those who meet criteria for osteoporosis screening. The percentage of patients who were screened according to recommended guidelines will be calculated. T-Scores will be used to determine if the patients have evidence of decreased bone-mineral density, with a T-score of -2.5 or below diagnostic for osteoporosis. Of those patients appropriately screened, the percent that were then treated appropriately according to the National Osteoporosis Foundation guidelines will be calculated. No patient identifiers will be collected during the chart review process.

**Results and Conclusions:** Data collection is currently in progress and results will be shared at the Great Lakes Conference.

### Learning Objectives:

Review the National Osteoporosis Foundation guidelines for osteoporosis screening.

Identify a T-score that is diagnostic for osteoporosis.

### Self Assessment Questions:

At what age does the National Osteoporosis Foundation recommend bone mineral density screening in women without additional risk factors for osteoporosis?

- A: 60
- B: 65
- C: 55
- D: All postmenopausal women should be screened for osteoporosis.

Which of the following patients has osteoporosis?

- A: Patient MC: T-score -1.8
- B: Patient LB: T-score -2.0
- C: Patient KT: T-score -2.8
- D: Patient RP: T-score +0.3

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-350L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPLEMENTATION OF A 340B CONTRACT PHARMACY TO LEVERAGE PHARMACY SERVICES OF AN ACADEMIC MEDICAL CENTER

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The aim of this project is to improve coordination of care for Swedish American Hospital (SAH) oncology patients, extend UW Health pharmacy services to these patients, and evaluate the financial impact of improved access to limited distribution medications. Methods for achieving the overall project purpose include financial analysis of feasibility for both organizations involved, completion of legal and regulatory requirements to establish UW Health as a 340B contract pharmacy to SAH, and establishment of operational workflows to support the delivery of prescription oral oncolytics to patients from the time of physician ordering to prescription delivery and follow up. After health system integration between UW Health and SAH, a contract outlining the agreement specifics was developed between departments of pharmacy and approved by organizational leadership. Additionally, several legal and regulatory requirements were met to establish UW Health as an eligible provider of prescription medications to the patients of Illinois. Operationally, workflows were developed to support specialty pharmacy management at Swedish American Regional Cancer Center (SA RCC) after the point of prescribing, mitigation of prior authorizations for specialty oral oncology medications by UW Health prior authorization coordinators was performed, dispensing workflows were developed through the UW Health oncology pharmacy, and 340B program and contractual compliance was addressed on an ongoing basis. In addition, education of SA RCC providers, UW Health prior authorization coordinators, UW Health oncology pharmacy staff, and most importantly, patients, was performed to ensure streamlined access to necessary life saving or life-prolonging medications through the UW Health - Swedish American Hospital 340B contract pharmacy agreement. Results will be shared after implementation and data collection has occurred. They will focus on oral oncolytic prescription capture, improved care coordination through workflows developed, and retained financial resources.

### Learning Objectives:

State the necessary legal and regulatory steps that must be considered when registering as a 340B contract pharmacy in another state

Describe the operational aspects of a 340B contract pharmacy designed to dispense specialty medications

### Self Assessment Questions:

- When dispensing 340B prescriptions to an out-of-state patient population through a contract pharmacy agreement, what legal requirements must be addressed?
  - PDMP registration only
  - PDMP registration and consideration of Medicaid patients
  - PDMP registration, consideration of Medicaid patients, pharmacy /
  - PDMP registration, consideration of Medicaid patients, pharmacy /
- Which operational aspect of a 340B contract pharmacy filling specialty medications can be driven by technicians to ensure cost-effective use of resources and timely delivery of information to provi
  - Prior authorization coordination
  - Telephone counseling of medication side effects
  - Contract development between covered entity and contract pharm
  - Development of oral oncolytic treatment plans

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-729L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ENHANCEMENT OF MEDS-TO-GO PROGRAM IN A COMMUNITY HOSPITAL

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Background: Mercy Health Muskegon currently offers a Meds-To-Go service to patients being discharged. This service provides counseling at the bedside and new discharge medications distributed by the outpatient pharmacy at the Hackley Campus. Healthcare reimbursement is moving away from fee-for-service (quantity) towards reimbursement for outcomes (quality). Health and Human Services hopes to redirect 30% of Medicare fee-for-service payment towards outcome driven reimbursement by the end of 2016 and make it 50% by the end of 2018. Hospitals need to find innovative ways to improve the quality of care and reduce readmission rates in order to get compensated for the care they are providing. One way to improve the quality of care is to ensure patients get their discharge medications filled. Purpose: To enhance the current Meds-To-Go process. Current utilization of the program is limited by a lack of time to enroll patients and limited awareness of the program. Enhancements from this project will be used to expand the program to other campus sites. Methods: A new Meds-To-Go pharmacy technician (MTG tech) role was created within the outpatient pharmacy. The MTG tech attends daily nursing care conferences on the inpatient hospital units to help assist with discharge medication planning and enrolls patients in the program. Upon delivery of discharge medications and counseling by a pharmacist, a brief satisfaction survey is provided to the patient in order to identify potential areas for improvement. Data was collected at baseline and two months after initiating the MTG tech. Utilization of the program was assessed by number of prescriptions filled, number of patients, and floor of the hospital. Other data collected includes general medication indications, 30-day readmission rates, and cost difference of Group Purchasing Order (GPO) pricing vs 340B. Results: Pending Conclusion: Pending

### Learning Objectives:

Recognize the potential benefits of a Meds-To-Go program

Identify potential barriers to making changes to the Meds-To-Go program

### Self Assessment Questions:

Which of the following is a potential benefit of making the Meds-To-Go program more accessible to patients?

- Reduction in readmission rates
- Improved patient compliance with new medications
- Increased patient satisfaction
- All of the above

Which of the following is a/are potential barrier(s) of increasing number of prescriptions being filled using the Meds-To-Go process?

- Increasing volume of prescriptions without increasing staffing with
- Concern regarding delay in discharge
- Increased e-prescribing
- All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-730L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**SUB-DISSOCIATIVE KETAMINE USE IN THE EMERGENCY DEPARTMENT FOR TREATMENT OF SUSPECTED ACUTE NEPHROLITHIASIS; THE SKANS TRIAL**

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**Background:** Historically, ketamine has been used for procedural sedation and rapid sequence intubation by emergency department physicians and anesthesiologists. Ketamine is typically dosed at 1-2 mg/kg and induces anesthesia 1-2 minutes after injection. The N-methyl-D-aspartate (NDMA) receptor is a ligand-gated channel for the excitatory neurotransmitter glutamate. This receptor activation has been thought to increase signals and impulses, which leads to hyperalgesic effects. Ketamine provides analgesia similar to morphine or fentanyl but with lower respiratory depression. Analgesic doses of ketamine range from 0.25-1 mg/kg, with current literature recommending doses of 0.15 - 0.3 mg/kg, and have been used in fracture management burns, and traumatic amputation. Recently, the ED physicians at Mercy Health Muskegon have begun using ketamine for various pain syndromes. **Purpose:** Prospectively evaluate the effectiveness of ketamine for acute nephrolithiasis associated pain. **Methods:** Inclusion criteria includes patients aged 18 - 70 years with suspected nephrolithiasis who have already received standard doses of ketorolac for pain control with documented baseline pain scores. This baseline pain score will be compared to post-ketamine administration pain scores. Patients will receive ketamine dosed at 0.3 mg/kg IV once, with a repeat dose available after 30 additional minutes if still complaining of pain. Study investigators will record pain scores at 0, 30, 60, 90, and 120 minutes after ketamine administration using the 11-point verbal pain scale, in addition to the patients vital signs and any adverse effects. After 90 minutes, if still experiencing pain, management will be at the discretion of the provider. **Results/Conclusion:** Pending.

**Learning Objectives:**

Identify the mechanism by which ketamine provides analgesia  
Recognize the dose at which ketamine can be used for analgesia

**Self Assessment Questions:**

What is the primary neurotransmitter affected by ketamine?

- A Serotonin
- B: Glutamate
- C: Dopamine
- D: Acetylcholine

What is the proposed analgesic dose of ketamine?

- A 1 - 2 mg/kg
- B 1 - 2 mcg/kg
- C 0.15 - 0.3 mg/kg
- D 0.15 - 0.3 mcg/kg

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-351L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**THE IMPACT OF A PHARMACY TECHNICIAN ON THE ACCURACY OF A PEDIATRIC MEDICATION HISTORY AT 24 HOURS POST-ADMISSION**

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**Purpose:** Obtaining an accurate medication history is often difficult and as a result, preventable medication errors continue to be problematic. In June 2014, a 24 hour medication history review task was piloted at Helen DeVos Childrens Hospital which requires registered nurses to verify the accuracy of documented home medications with the patients caregivers. It was hypothesized that when revisions were required 24 hours post-admission, pharmacy technicians were not being consulted by nursing as mandated per hospital protocol. As a result, this study was conducted in order to determine if pharmacy technicians were being consulted and their impact on the accuracy of pediatric medication histories when revisions are required 24 hours post-admission. **Methods:** A retrospective chart review was conducted on patients admitted to the pediatric intensive care unit (PICU) who required a revision to their medication history 24 hours post-admission between June 2014 and August 2015. The primary objective was to assess the impact of pharmacy technicians on the accuracy of these medication histories. Secondary objectives included assessment of when the admission and 24 hour post-admission medication histories were conducted, credentials of the personnel who updated the information when a revision was required, and the number and types of medication-related errors identified. **Results:** There were 1,301 medication histories documented in the PICU, 6% (n=78) of which were included in this study that required an update 24 hours post-admission. Of those medication histories, only 16.7% (n=13) were accurately updated. A pharmacy technician was consulted for 28.2% (n=22) of medication histories requiring a revision, of which 50% (n=11) of them were accurately updated. However, when a technician was not consulted, only 3.6% (n=2) of the medication histories were accurately updated (p <0.001). **Conclusion:** When revisions are required 24 hours post-admission, medication histories were accurately updated more frequently when a pharmacy technician was consulted.

**Learning Objectives:**

Identify potential barriers to obtaining an accurate pediatric medication history upon admission  
Describe the importance of pharmacy technician involvement in documenting an accurate medication history

**Self Assessment Questions:**

Obtaining an accurate pediatric medication history can be difficult. Which of the following is NOT a barrier in the reconciliation process?

- A Variation in medication formulations
- B: Reliance on caregivers due to their inability to effectively communicate
- C: Pharmacy technician involvement
- D: Weight-based dosing

Pharmacy involvement in the medication reconciliation process has been shown to reduce all of the following, EXCEPT:

- A Adverse drug reactions
- B Medication accuracy
- C Unintentional medication related patient harm
- D Medication related errors

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-908L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF CONTINUOUS INTRAVENOUS INSULIN ORDER SETS IN THE SETTING OF HYPERGLYCEMIC EMERGENCY

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**Purpose:** Glycemic control using intravenous (IV) insulin infusions is an important component of the treatment of hyperglycemic emergencies (HE). Literature supports the use of standardized protocols for infusion titration; however, comparisons of protocols are limited. The purpose of this study is to compare the safety and efficacy of two protocols for initiating and titrating continuous IV insulin in the setting of HE. **Methods:** A retrospective chart review was conducted including adults admitted from August 1, 2013 to August 1, 2015 who were treated for at least four hours with one of three IV insulin order sets, representing two methods of IV insulin titration. Patients were stratified by the admitting diagnosis. The primary safety endpoint was number of hypoglycemic events. The primary efficacy endpoints were time to goal blood glucose and time to anion gap closure. Secondary endpoints included protocol deviation, use of an initial bolus or meal correction, hospital and ICU/PCU length of stay, and location of infusion initiation. **Preliminary Results:** A total of 273 patients were evaluated for inclusion in the study. Seventy three patients were excluded for not meeting infusion duration or age criteria. Of the 200 remaining patients, 50% (n= 100) had insulin infusion titrations guided by a calculator method (Group 1) and 50% (n= 100) used a method modeled after the American Diabetes Associations (ADA) Consensus Statement on Hyperglycemic Crises in Adult Patients with Diabetes (Group 2). A preliminary analysis shows in approximately 80% (n=159) of studied insulin infusion orders, laboratory verified HEs were present. Hypoglycemic events occurred in 26% of patients in Group 1 and 28% of patients in Group 2. Time to blood glucose <200 mg/dL was 6.5 hours in the Group 1 and 8.5 hours in Group 2. **Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define the criteria for resolution of hyperglycemic emergency.  
Discuss differences in safety and efficacy outcomes between two methods of IV insulin titration.

### Self Assessment Questions:

The ADA consensus statement would recommend what change to insulin infusion rate for a blood glucose of 340 mg/dL in a patient with a blood glucose of 350 mg/dL the previous hour?

- A: Maintain the current rate
- B: Double the current rate
- C: Bolus the patient with 10 units and maintain the current rate
- D: Bolus the patient with 10 units and double the current rate

Which of the following is an appropriate outcome measurement used to determine the cessation of diabetic ketoacidosis?

- A: Blood glucose < 250 mg/dL
- B: Serum bicarbonate  $\geq$  20 mEq/L
- C: Anion gap  $\leq$  12 mEq/L
- D: Urine ketones < 20 mg/dL

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-352L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ASSESSMENT OF VENOUS THROMBOEMBOLISM TREATMENT IN CANCER PATIENTS ON LOW MOLECULAR WEIGHT HEPARIN AND DIRECT ORAL ANTICOAGULANTS

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The National Comprehensive Cancer Network (NCCN) recommends LMWH for VTE treatment in cancer patients. Measuring inhibition of factor Xa can assess the anticoagulant effect of LMWH but routine anti-Xa monitoring in cancer patients is not recommended due to limited data correlating anti-Xa levels and outcomes. Many cancer patients are also prescribed warfarin or a Direct Oral Anticoagulants (DOAC) for VTE treatment. DOACs are not recommended by NCCN because their safety and efficacy in cancer patients has not been compared to LMWH in large trials. The purpose of this study is to compare the safety and efficacy of DOACs to LMWH and warfarin and assess the relationship of anti-Xa activity monitoring and outcomes in cancer patients taking LMWH. The primary outcome is recurrence of VTE and secondary outcomes include number of bleeding events and any potential barriers to access anticoagulation therapy. This study is a retrospective, cohort study in which we will analyze VTE treatment in cancer patients at the University of Illinois Hospital and Health Sciences System (UIH). Patient will be included if they are > 18 years old, have a diagnosis of cancer and a prescription for treatment doses of LMWH (with and without anti Xa-monitoring), DOAC or warfarin (target INR 2-3) for VTE treatment for at least 1 month. Preliminary analysis of 47 patients revealed 2 patients (8.3% ) in the anti-Xa monitored arm and 2 patients (8.7%) in the anti-Xa unmonitored arm had a recurrent VTE. Both patients in the monitored arm recently had a reduction in the LMWH dose due to elevated anti-Xa levels which suggests monitoring anti-Xa levels are not always associated with positive outcomes. Further data collection and analysis, including outcome data on DOACs compared to LMWH and warfarin, is ongoing and results will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List VTE treatment recommendations for patients with malignancy  
Describe the available data describing DOACs for VTE treatment in patients with malignancy

### Self Assessment Questions:

Which of the following statements is true regarding National Comprehensive Cancer Network (NCCN) recommendations for VTE treatment in patients with malignancy?

- A: LMWH and warfarin are both recommended as first-line treatment
- B: LMWH is recommended as first-line treatment based on the CLOT
- C: LMWH and warfarin are both recommended as first-line treatment
- D: LMWH is recommended as first-line treatment based on the CLOT

Available data for DOACs compared to warfarin in patients with malignancy reveal what?

- A: DOACs are associated with significantly less VTE recurrence
- B: DOACs are associated with significantly less VTE recurrence
- C: There is no significant difference in VTE recurrence or major bleed
- D: DOACs are associated with more VTE recurrence and rates of

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-353L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF ADHERENCE, SAFETY, AND EFFICACY OF WARFARIN VERSUS NEW ORAL ANTICOAGULANTS IN PATIENTS ENROLLED IN A NON-PROFIT HEALTH PLAN

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**Purpose:** Anticoagulants are widely used in the prevention or treatment of deep vein thrombosis and for stroke prophylaxis in atrial fibrillation. Warfarin, a vitamin K antagonist, has been the mainstay of therapy. With the emergence of new oral anticoagulants (NOAC) that require less stringent monitoring, it remains unclear whether these agents may be preferable for patients. The purpose of this study is to examine patient adherence between warfarin and NOACs and compare outcomes in regards to safety and efficacy. Additionally, for patients newly started on warfarin and discharged from the hospital, the impact of a pharmacist-managed anticoagulation clinic will be examined. **Methods:** A retrospective chart review including health care claims data was conducted to identify patients on warfarin, apixiban, dabigatran, or rivaroxaban from 2012 to 2014 with Sparrow Physicians Health Plan (PHP) insurance. Prescription fill history was collected from a PHP database. Adherence was measured based on proportion of days covered (PDC) and verified through chart review. Predictors of adherence were determined based upon a priori patient factors. A subgroup analysis was performed to evaluate for compliance based on a diagnosis of either atrial fibrillation or deep vein thrombosis. Patient copay amount with warfarin versus the NOACs was calculated to determine if cost was correlated with compliance. Medication safety was analyzed through the number and severity of bleeding events, while efficacy was measured by the number of strokes and/or blood clots that developed despite anticoagulation. Additionally, for patients that were newly discharged from Sparrow Hospital on warfarin, a complimentary pharmacist-led anticoagulation clinic is available to assist patients to optimize their regimen. Adherence and optimization of therapy were compared between those who enrolled in the pharmacist-run clinic versus provider-based follow-up. **Results/Conclusion:** Outcomes will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss differences between novel oral anticoagulants and warfarin, including mechanism of action, dosing, and indications.

Describe factors affecting adherence of warfarin and novel oral anticoagulants

### Self Assessment Questions:

Which oral anticoagulant works as a direct thrombin inhibitor?

- A Warfarin
- B: Dabigatran
- C: Apixaban
- D: Rivaroxaban

Which of the following factors is most likely to have a negative impact on adherence for NOACs?

- A Cost
- B Frequent laboratory monitoring
- C Multiple dose adjustments
- D Dietary restrictions

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-354L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY STEWARDSHIP REVIEW AND INTERVENTION

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**Purpose:** Outpatient parenteral antimicrobial therapy (OPAT) allows patients to receive intravenous antimicrobial therapy outside of a hospital, thus reducing risk of healthcare-associated infections and, cost for the patient and health system, and improving patient satisfaction. While national practice guidelines exist to assist in the safe and effective employment of OPAT, variability in management of OPAT practices has been demonstrated. At Froedtert Hospital, utilization of OPAT does not require infectious diseases (ID) consult. An ID trained practitioner review is necessary to ensure proper patient selection and appropriateness of a proposed medication regimen for outpatient use. A successful outpatient treatment plan can prevent hospital readmissions or adverse events while providing optimal therapy. The purpose of this study is to describe the effect of an antimicrobial stewardship (AMS) pharmacist intervention for patients receiving OPAT upon hospital discharge. **Methods:** This is a pre-post quasi-experimental analysis of AMS review of adult patients discharged from the hospital on parenteral antimicrobials without a concomitant ID consult. The primary outcomes are the percentage of patients with orders placed for appropriate outpatient laboratory monitoring per institutional recommendations and the percentage of patients discharged on the appropriate antimicrobial dose for indication and patient-specific factors. The secondary outcomes include: percentage of patients discharged with appropriate overall therapy, 30-day all-cause mortality, 30-day infection-related readmission, 30-day infection recurrence, and cost avoidance due to AMS pharmacist intervention. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe outpatient parenteral antimicrobial therapy (OPAT) and highlight its role in the employment of antimicrobial therapy outside of the hospital setting.

Discuss the effect of an antimicrobial stewardship pharmacist intervention for patients receiving OPAT upon hospital discharge.

### Self Assessment Questions:

What characteristics of a drug make it ideal for outpatient parenteral antimicrobial therapy (OPAT)?

- A Mechanism of action, low pricing
- B: Good stability, long half-life
- C: Benign side effects profile, broad spectrum
- D: Infrequent monitoring, narrow spectrum

Where can an infectious disease pharmacist make an impact when reviewing patients being discharged on OPAT from the hospital?

- A Patient safety
- B Appropriate diagnosis
- C Clinical efficacy
- D A & c

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-355L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## USE OF ICATIBANT FOR ANGIOTENSIN CONVERTING ENZYME-INHIBITOR INDUCED ANGIOEDEMA

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**Purpose:** Icatibant is a bradykinin B2 receptor antagonist approved for acute symptoms of hereditary angioedema. The objective of this study is to evaluate the efficacy of icatibant for the treatment of angiotensin converting enzyme (ACE)-inhibitor induced angioedema as compared to supportive care. **Methods:** The study group consists of patients treated for ace-inhibitor induced angioedema (AIIA) with icatibant. The control group includes intensive care unit (ICU) patients with AIIA receiving supportive care only. Supportive care is defined as allergy treatment including antihistamines, corticosteroids, fresh frozen plasma, and/or epinephrine. Inclusion criteria were patients of all ages with a diagnosis of "angioedema" who received icatibant or were admitted to the ICU. Exclusion criteria were patients: treated with ecallantide or C1 esterase inhibitors; with reactions with a known cause that was not AIIA or unknown cause which could not be explained by ace-inhibitor use. Study group subjects were identified through a report of icatibant usage. Matched control subjects were identified via medical records report of patients with a discharge diagnosis of angioedema. The primary efficacy endpoint is time to resolution of angioedema symptoms. Secondary endpoints include number of symptoms, length of stay (LOS) in hospital and ICU, and cost of treatment. The institutional review board approved this study. Preliminary results: Thirteen patients have been included. The mean (range) ICU LOS was 5.9 (1-27) days and hospital LOS was 7.8 (1-27) days. Time to symptom resolution was < 24 hours for 2 (15.4%) patients, 24-48 hours for 4 (30.8%) patients, 48-72 hours for 2 (15.4%) patients, and five days or greater for 5 (38.5%) patients.

**Conclusions:** Preliminary results of patients treated with icatibant indicate potential benefit with treatment. Comparison with control group will determine significance of the impact of icatibant on AIIA treatment.

### Learning Objectives:

List the risk factors for angioedema reactions.

Discuss the mechanism of action of icatibant and why it may be beneficial for the treatment of AIIA.

### Self Assessment Questions:

BC is a 57 yo AA male who presents to the ED with swelling of his tongue and throat. His symptoms began 2 hours after taking his ramipril 2.5 mg dose. His PMH is significant for HTN, CHF, DM, and h/o

- A Age
- B: Sex
- C: Race
- D: Comorbidities

Which of the following is true?

- A Kinin hydrolysis causes angioedema symptoms
- B Carboxypeptidase N inactivates bradykinin
- C Bradykinin is potent vasoconstrictor
- D Complement system activation by kallidin best explains the mecha

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-356L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## MONITORING UNFRACTIONATED HEPARIN (UFH) INFUSIONS WITH ANTI-FACTOR XA (ANTI-XA) LEVELS COMPARED TO ACTIVATED PARTIAL THROMBOPLASTIN TIME (APTT)

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**Purpose:** Unfractionated heparin (UFH) infusions have traditionally been monitored utilizing activated partial thromboplastin time (aPTT). Recent studies suggest monitoring UFH infusions with anti-factor Xa (anti-Xa) levels produces better clinical outcomes. This included achieving therapeutic anticoagulation more rapidly, having more levels within the therapeutic range, and reducing the number of monitoring tests and dosage adjustments. Riverview Health began monitoring heparin infusions with anti-Xa levels in November 2015. This research project will compare clinical endpoints when monitoring with anti-Xa vs aPTT. **Methods:** This is a single-center, retrospective study in a 156-bed institution. Patients will be included if they received UFH infusion per institutional protocols for greater than or equal to 24 hours. The primary objective of this study is to evaluate the percent of patients who achieved target therapeutic anticoagulation levels in  $\leq 24$  hours using the new anti-Xa protocol, compared to a matched control group using the aPTT methodology. Secondary objectives will include evaluating the number of sub- and supra-therapeutic levels, number of titrations, and accuracy of utilizing the protocol. **Results & Conclusion:** Data analysis is currently in progress. Results and conclusion will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Outline the clinical outcomes of monitoring UFH infusions with anti-Xa levels.

Review the safety of monitoring UFH infusions when utilizing the anti-Xa protocols.

### Self Assessment Questions:

What is one advantage of using anti-Xa levels to monitor unfractionated heparin infusions over aPTT levels, which improve clinical outcomes.

- A The turn around time for an anti-Xa level is faster compared to an
- B: The anti-Xa lab reagent is less expensive than an aPTT reagent, t
- C: Many protocols are available to provide dosage adjustments.
- D: Anti-Xa level is a more direct test for heparin because it measures

Which of the following does not play a role when assessing the safety of monitoring heparin infusions.

- A Sub- and Supra-therapeutic levels and titration adjustments
- B Concurrent use of anticoagulants
- C Weight
- D Renal function

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-357L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **IMPACT OF PROCALCITONIN WITH CLINICAL PHARMACIST INTERVENTION ON ANTIBIOTIC DURATION FOR SEVERE SEPSIS AND SEPTIC SHOCK**

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**Purpose:** The purpose of this study is to evaluate the impact of the availability of a procalcitonin assay on the duration of antibiotic therapy in patients with severe sepsis or septic shock. While antibiotic therapy is one of the keystones for the treatment of sepsis, the optimal duration of antibiotic therapy remains unclear. Current practice at Rush University Medical Center (RUMC) is to discontinue antibiotics based on clinical resolution with the assistance of a clinical pharmacist. Procalcitonin may be able to provide objective data to support therapeutic decision making. **Methods:** This is a retrospective observational cohort study of patients admitted to the RUMC MICU from April 1, 2014 to December 31, 2014. Inclusion criteria included: age  $\geq 18$  years old and diagnosis of severe sepsis or septic shock. Exclusion criteria included: diagnosis of endocarditis or osteomyelitis. The study period was divided into two halves for the two study arms. From April 1, 2014 to July 31, 2014, procalcitonin assays in addition to clinical pharmacist interventions were available to guide antibiotic therapy; from August 1, 2014 to December 31, 2014, antibiotic stewardship was performed by the clinical pharmacist alone. Patients from the two four-month periods were compared in this study. **Results/Conclusion:** The primary outcome of this study is the duration of antibiotic therapy. Secondary outcomes include ICU length of stay and hospital length of stay, 30-day mortality, and antibiotic free days. Preliminary data demonstrates that the duration of antibiotics with the procalcitonin assay available was 3.543.8 days compared to 3.033.5 days with pharmacist intervention only ( $p$ -value = 0.042). We hypothesize that the final results will confirm this finding and that none of the secondary outcomes will differ significantly between the two groups. Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe potential clinical uses for procalcitonin levels  
Identify potential limitations of procalcitonin levels in clinical use

### **Self Assessment Questions:**

What is not a potential use for procalcitonin levels?

- A Differentiating a viral versus bacterial pneumonia
- B: Guiding the end of antibiotic therapy in sepsis
- C: Guiding the narrowing of antibiotic therapy
- D: Reducing antibiotic exposure

Which of the following biomarkers decreases the fastest after the resolution of infection?

- A C-reactive protein
- B Procalcitonin
- C White blood cell count
- D Erythrocyte sedimentation rate

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-358L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **IMPACT OF ANTIMICROBIAL STEWARDSHIP PHARMACIST INTERVENTION USING REAL-TIME RAPID PATHOGEN IDENTIFICATION VIA MALDI-TOF MS ON TIME TO APPROPRIATE THERAPY FOR BLOOD STREAM INFECTIONS**

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**PURPOSE:** Blood stream infections continue to be a cause of significant morbidity and mortality, and timely administration of antimicrobial therapy is critical to treating these patients. Due to the current landscape of multi-drug resistant organisms and relative paucity of new agents, antimicrobial stewardship has come to the fore to preserve existing antimicrobial utility. Matrix-assisted laser desorption ionization time of flight (MALDI-TOF) technology utilizes mass spectrometry (MS) to provide rapid identification of isolated organisms. Our aim is to combine rapid identification with infectious diseases-trained clinical pharmacist efforts to improve appropriate antimicrobial use, including judicious de-escalation, for patients with blood stream infections. **METHODS:** This is a single-center, quasi-experimental study analyzing the impact of clinical pharmacist intervention on appropriate antimicrobial use when combined with rapid pathogen identification by MALDI-TOF MS. Adult patients with positive blood culture results will be considered for inclusion. The primary outcome is time to appropriate antimicrobial therapy, defined as time from blood culture collection to time of administration of appropriate therapy, which is further defined as coverage of likely or identified pathogens, de-escalation, and discontinuation of antimicrobials due to contamination or unnecessary coverage. Secondary outcomes include 30-day all-cause mortality, hospital and intensive care unit length of stay, time to effective antimicrobial therapy (time from collection to administration of first antimicrobial with known susceptibility per microbiology report), microbiological clearance, recurrent bacteremia, and 30-day readmission. A dedicated pharmacist will receive real-time notifications of blood culture pathogens identified with MALDI-TOF MS via pager. Should a change to the current antimicrobial regimen be recommended following review of the medication profile and pertinent clinical information, then the patients physician will be contacted and provided with a proposed intervention. Acceptance or refusal will be documented accordingly. These patients will be compared to a historical cohort. **Results/Conclusions:** To be presented at Great Lakes Pharmacy Residency Conference

### **Learning Objectives:**

Describe the outcomes of existing literature on the effect of pharmacist intervention combined with rapid pathogen identification technology (eg. MALDI-TOF MS) on antimicrobial stewardship and time to optimal therapy.  
Recognize how rapid pathogen identification technology can assist the clinical pharmacist in antimicrobial stewardship efforts.

### **Self Assessment Questions:**

Which of the following is true regarding outcomes of prospective, pharmacist interventions along with MALDI-TOF MS rapid pathogen identification?

- A Reduction of unnecessary antimicrobials
- B: Decrease in time to effective and optimal therapy
- C: Healthcare cost reductions
- D: All of the above

Use of rapid pathogen identification technology (eg. MALDI-TOF MS) can assist the pharmacist in making which of the following interventions?

- A Antimicrobial de-escalation as a result of faster pathogen identification
- B Provide rationale for expanding antimicrobial coverage based on culture
- C Definitive therapy recommendations based on organism sensitivity
- D A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-731L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**ASSESSMENT OF CLINICAL OUTCOMES FOLLOWING IMPLEMENTATION OF A DAILY SEDATION INTERRUPTION PROTOCOL IN THE INTENSIVE CARE UNITS AT A COMMUNITY TEACHING HOSPITAL**

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Purpose: Deep sedation with continuous infusion sedative agents may lead to a prolonged duration of mechanical ventilation and intensive care unit days. Contemporary literature supports the practice of daily sedation interruption (DSI) as it may improve patient outcomes including decreased mechanical ventilation days, intensive care unit days, and utilization of sedative agents. The objective of this study is to assess these patient outcomes following the development and implementation of a daily sedation interruption protocol in the intensive care units at Swedish Covenant Hospital. Methods: This study is a single-center comparative study, utilizing a pre- and post-implementation design. A DSI protocol was developed and approved by the Pharmacy and Therapeutics Committee. The protocol included a standardized time to conduct and document the DSI procedure. Copies of the protocol and education were provided to nursing staff and ICU fellow physicians. Patients admitted to the intensive care units with documentation of receiving continuous sedative agents were assessed for eligibility. Study population included patients 18 years and older mechanically ventilated and receiving continuous infusion sedative agents for greater than 24 hours. Patients were excluded for: cardiovascular surgery, hospice, alcohol withdrawal, and elevated intracranial pressure. Data were collected via retrospective chart review. Pre-implementation data from August to October, 2015 will be compared to post-implementation data from December, 2015 to February, 2016. Primary outcomes of this study included days of ventilation and days of intensive care units and hospital stay. Secondary outcomes included total units of sedative agents dispensed and adherence to the DSI protocol. Results: Pre-implementation data collection has been completed. Post-implementation data collection is in progress, data analysis and final results will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Explain the benefits of conducting daily sedation interruption  
Review monitoring parameters when conducting daily sedation interruption

**Self Assessment Questions:**

Which of the following is a benefit of conducting daily sedation interruption in mechanically ventilated patients?

- A: Decreased duration of mechanical ventilation
- B: Less patient monitoring
- C: Increased amount of sedative agents
- D: Increased length of ICU admission

Which of the following suggests intolerance during daily sedation interruption?

- A: Decreased SAS score
- B: Diaphoresis
- C: Increased oxygen saturation
- D: Decreased respiratory rate

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-359L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**DEMONSTRATE THE IMPACT OF MALDI-TOF IN REGARDS TO ANTIBIOTIC DE-ESCALATION, PATIENT OUTCOMES, AND COST**

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Purpose: Reduction in both mortality and hospital related costs have been reported for bacteremia patients with early identification of the causative organism. New technology, such as the Matrix-Assisted Laser Desorption Ionization - Time of Flight (MALDI-TOF) mass spectrometry, provides rapid identification of pathogens based on DNA "fingerprints". With this key information available 24-48 hours earlier than with previous laboratory methods, clinicians are able to select appropriate antibiotic therapy sooner. Pre- and post-MALDI-TOF implementation data were evaluated to determine the impact of this technology on antibiotic stewardship efforts. Primary outcomes included time from culture collection to organism identification, time to de-escalation/optimal antibiotic therapy, mean antibiotic days, length of stay, survival until discharge, and average antibiotic drug cost per bacteremia patient. Secondary outcomes included the rate of restarting or escalating antibiotic therapy and the re-admission rate to Swedish Covenant Hospital. Methods: In this retrospective study electronic medical records for patients with bacteremia were utilized for data collection. The historical control group data from November 2014 to January 2015 were compared to post-MALDI-TOF implementation group data from December 2015 to February 2016. Data will be analyzed using a t-test, a Mann-Whitney U test, or a chi-square test. Results: In the historical control group, for 52 bacteremia patients, the average time to de-escalation/optimal antibiotic therapy was 4.15 days, the mean antibiotic days was 19.42 days, the hospital length of stay averaged 14.8 days, survival until discharge was 86.5%, and average antibiotic drug cost per patient was \$656.30. As post-MALDI-TOF implementation group data collection is in progress, final results will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Explain how rapid pathogen identification can improve patient outcomes in bacteremia patients  
Review how MALDI-TOF results can be incorporated into daily practice in order to support antibiotic stewardship

**Self Assessment Questions:**

Compared to traditional methods, MALDI-TOF technology is able to reduce the time to organism identification by (select best answer):

- A: 180 minutes
- B: 5 hours
- C: 1.5 days
- D: 3 days

Which one of the following applies to the use of MALDI-TOF in bacteremia patients?

- A: Increases time to identification of organisms
- B: Lengthens hospital length of stay
- C: Increases survival until discharge
- D: Increases healthcare expenditures

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-360L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **PRESCRIPTION FILL HISTORY AS A SURROGATE FOR HEART FAILURE READMISSION**

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**Purpose:** Medication adherence is a key component in heart failure (HF) management. Low medication refill adherence has been associated with a three-fold higher incidence of hospitalization in HF patients compared to those who are highly adherent. The University of Chicago Medicine (UCM) offers an interdisciplinary intervention to reduce readmissions in the HF population. However, the system does not currently evaluate patients medication adherence after discharge. The primary objective of this study is to identify the association between delayed prescription fill after hospital discharge and the composite of 30-day Emergency Department (ED) visits and hospital readmissions. **Methods:** This is a retrospective, observational, cohort study. Adult patients enrolled in the interdisciplinary intervention at UCM between January 1, 2015 and September 1, 2015 were included. Patients who died during the index hospitalization, discharged to a facility or discharged on hospice were excluded. The primary end point is the composite of ED visits and hospital readmissions within 30 days of discharge. The result of the patients who filled their prescription within 6 days after hospital discharge will be compared to the result of patients who filled beyond 6 days. The secondary outcomes are diuretic fill rate upon prescription pick up and composite of ED visits and hospital readmission within 60 days. Chi square or Fischer-Exact will be used to assess the primary endpoint. Simple linear regression will be used to analyze the relationship between the delayed prescription pick up and the primary outcome. Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference 2016.

### **Learning Objectives:**

Identify predictors for poor prognosis in patients with heart failure  
Recognize pharmacists interventions in 4-CHF Pathway at the University of Chicago Medicine to reduce hospital readmission

### **Self Assessment Questions:**

Which of the following variables are associated with poor prognosis in heart failure patients?

- A Low systolic blood pressure
- B: High BUN
- C: Advanced age
- D: All of the above

Which of the following 4-CHF Pathway interventions is accomplished by a pharmacist at UCM?

- A Assess patients using MoCA and reinforce follow up appointments
- B Provide nutrition education
- C Obtain medication history and provide medication education
- D Set up post-discharge cardiology appointment

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-732L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **EFFECTS OF COMBINATION DIURETIC THERAPY WITH TOLVAPTAN IN PATIENTS WITH CLASS III OR CLASS IV HEART FAILURE AND DIURETIC RESISTANCE**

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**Purpose:** Loop diuretics are the foundation of symptomatic treatment for acute decompensated heart failure (ADHF). Loop diuretics can cause serum electrolyte imbalances, a decrease in renal function, and with chronic use, structural changes to the kidney that contribute to the clinical phenomenon of diuretic resistance. Tolvaptan, a selective vasopressin V2 receptor antagonist, did not show a decrease in all-cause mortality in the largest multi-center EVEREST-Outcomes trial, conducted in heart failure patients. The purpose of the study will be to show that tolvaptan may have additive diuretic properties in patients with heart failure and diuretic resistance. **Methods:** This was a retrospective cohort study at Northwestern Memorial Hospital occurring from August 2015 through December 2015. Patients with NYHA stage II or stage IV heart failure received tolvaptan therapy with concomitant guideline directed medical therapy (GDMT) compared to patients who were treated only with GDMT. Patients 18 years of age and older who received tolvaptan and met the definition of diuretic resistance, a loop diuretic equivalent to  $\geq 40$  mg of furosemide, combination therapy with a loop diuretic and a thiazide diuretic or combination therapy with a loop diuretic and an aldosterone antagonist, will be included. Patients will be excluded from the study if they have received tolvaptan therapy as continuation therapy upon admission or have a clinical diagnosis of cirrhosis. The primary outcome will be to identify a statistically significant reduction in body weight in patients who received tolvaptan exhibiting diuretic resistance. Secondary outcomes encompass re-admission to the hospital within 60 days, hospital length of stay, and safety parameters that include, but are not limited to, changes in serum creatinine, serum sodium and potassium, and side effects attributed to tolvaptan therapy. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Define the mechanism of action of tolvaptan that aides in diuretic activity of the medication.

State the consequences and side effects of chronic loop diuretic usage in the heart failure population.

### **Self Assessment Questions:**

Tolvaptan exerts its mechanism of action through which of the following receptors?

- A Aldosterone
- B: Vasopressin V2 Receptor
- C: Na<sup>+</sup>/K<sup>+</sup>/2Cl<sup>-</sup> co-transporter
- D: Na<sup>+</sup>/Cl<sup>-</sup> symporter

The following are consequences of chronic loop diuretic therapy EXCEPT:

- A Hypertrophy of the epithelial cells in the distal tubules
- B Electrolyte imbalances
- C Diuretic resistance
- D Hyperkalemia

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-361L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT AND EVALUATION OF A PHARMACIST-LED VANCOMYCIN MONITORING SERVICE FOR HIGH RISK PATIENTS AT A TERTIARY CARE TEACHING HOSPITAL WITH LIMITED CLINICAL PHARMACY STAFF

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**Purpose** Certain patient populations treated with vancomycin are at higher risk for toxicity and suboptimal dosing. These populations include the elderly, patients at weight extremes, and those with renal dysfunction. Suboptimal dosing may lead to the emergence of vancomycin-resistant bacteria, longer length of stay, and increased hospital costs. Our primary outcome of is to determine if the implementation of a pharmacist-led vancomycin monitoring service for "high-risk" patients will increase the proportion of patients who receive an initial "optimal" regimen. Secondary outcomes will assess the percentage of pharmacist recommendations accepted, percentage of vancomycin concentrations at goal, and incidence of nephrotoxicity. **Methods** This quality improvement study is approved by the Institutional Review Board. The prospective and retrospective cohorts of patients will be identified through automated daily pharmacy reports; during the prospective part of the study, physicians may contact the clinical pharmacist to request dosing assistance. Patients will be included if they are at least 18 years old and have at least one "high risk" factor (age of at least 75 years, SCr at least 1.5 mg per dL, and body weight at least 100 kg or less than or equal to 40 kg). Excluded patients include if vancomycin is administered for less than 24 hours, received only in the ED, or used for surgical prophylaxis. Optimal dosing is in accordance with the ASHP, IDSA, and SIDP consensus statement and is defined as at least 30 mg per kg per day, at least 15 mg per kg per dose, or in accordance to our nomogram. Pharmacists will provide verbal and written documentation of recommendations in the electronic medical record. Data collected includes weight, age, gender, serum creatinine, creatinine clearance, vancomycin dosing orders, notes entered, changed vancomycin orders, and vancomycin troughs.

**Results/Conclusion** Results and conclusions will be presented at Great Lakes Residency Conference

### Learning Objectives:

List the pharmacokinetic effects of obesity  
Recognize risk factors for vancomycin nephrotoxicity

### Self Assessment Questions:

How does obesity effect vancomycin pharmacokinetics?

- A: Half-life may increase
- B: Volume of distribution may decrease
- C: Total vancomycin clearance (L/hr) may decrease
- D: Central dosing compartment may increase

QC is a 65 yo AA male being treated with vancomycin 1250 mg IVPB q8h for cellulitis. He is currently on day 3 of therapy with a trough of 22.6 mcg/mL with a goal of 10-15 mcg/mL. He is not on any other

- A: Vancomycin > 4g/day
- B: High trough levels
- C: Duration of therapy
- D: Concomitant nephrotoxic drugs

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-362L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ASSESSMENT AND IMPLEMENTATION OF AN INPATIENT ANTIBIOTIC TIME OUT IN A TERTIARY CARE MEDICAL CENTER

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**Purpose:** Antibiotics are often started empirically in patients while culture results are pending. The use of a broad spectrum regimen increases the risk of antimicrobial resistant pathogens along with other complications. In November 2014, the Centers for Medicare & Medicaid Services (CMS) drafted Conditions of Participation that require an inpatient process to assure antimicrobial evaluation after 48 hours of therapy. This included draft standard 1.C.12: The hospital has a formal procedure for all practitioners to review the appropriateness of any antibiotics prescribed after 48 hours from the initial orders (e.g., antibiotic time out) The objectives of this project are to assess baseline provider compliance with the CMS standard, establish a minimum standard for assessment of empiric antimicrobial therapy, and implement and measure the impact of an electronic health record (EHR) tool designed to trigger antibiotic review in compliance with the measure. **Methods:** A comprehensive, retrospective review of inpatient antibiotic use was conducted across all Aurora Health Care hospitals. One acute care floor and one intensive care unit were selected from each site. Antibiotic use was evaluated on one day, and use was looked at both ten days before and ten days after on either side of the day assessed. Some of the methods assessed were: the source of antibiotic indication (i.e. MD note), if cultures were documented as being looked at by a provider in the permanent medical record, and at what hour after empiric therapy started the documentation took place. **Results:** The baseline assessment found that out of the 366 patients assessed on a single day 50% (183/366) of patients were on antibiotics. About 75.8% of patients had documentation that therapy was assessed within 72 hours in compliance with the CMS draft standard. Results and conclusions post EHR build will be presented at the Great Lakes Pharmacy Resident

### Learning Objectives:

Identify the benefits of empiric antimicrobial therapy review.  
Recognize barriers to electronic health record implementation.

### Self Assessment Questions:

Which of the following may be benefits of empiric antimicrobial therapy review?

- A: Decreased incidence of microbial resistance
- B: Assessment of appropriate antimicrobial spectrum based on culture
- C: Decreased incidence of Clostridium difficile
- D: All of the above

Which of the following are barriers to electronic health record implementation?

- A: Lack of targeted alerts to providers
- B: Determining appropriate permanent medical record documentation
- C: Determining baseline pharmacist monitoring requirements
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-702L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## HOW HAVE THE 2013 ACC/AHA GUIDELINES IMPACTED STATIN AND NON-STATIN UTILIZATION IN A MEDICARE POPULATION?

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**Background:** The 2013 American College of Cardiology and American Heart Association (ACC/AHA) Joint Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults represented a paradigm shift in the treatment of dyslipidemia. The ACC/AHA guidelines abandoned treatment to LDL-C goals and likely expanded the number of Americans eligible for statin therapy compared with previous guidelines. It is estimated that nearly half of the U.S. population between 40 and 75 years old would fall into one of the four statin benefit groups outlined in the ACC/AHA guidelines. The real world impact of the ACC/AHA guidelines on U.S. cholesterol medication utilization is unknown. **Objective:** The primary objective of this study is to determine if there has been a change in utilization of cholesterol lowering medications in a Medicare Advantage population since the release of the 2013 ACC/AHA guidelines. Secondary objectives include: determining if the characteristics of customers receiving prescriptions for statins have changed; identifying if the intensity of statins being used have changed; and determining the amount of time that passed since the release of the guidelines before a significant change in utilization occurred. **Methods:** This retrospective study will include all Cigna-HealthSpring MAPD customers with one or more pharmacy claims for a cholesterol lowering medication (CLM) during 2012-2015. Use of CLMs will be measured by the ratio of customers with at least one claim for a CLM per 1000 customers. Medications will be stratified as "statins" and "non-statins." Sub-group analyses will identify any differences in utilization among statin intensity groups. Customers will be stratified by age, gender, diabetes, and low-income subsidy. Drug utilization and customer demographics will be compared to the baseline period of 2012 and 2013 using Chi-square for trend. **Results/Conclusions:** Study is ongoing. Conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define the four major statin benefit groups outlined in the 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol.

Classify statins into the appropriate statin intensity group.

### Self Assessment Questions:

Which of the following is a statin benefit group defined by 2013 ACC/AHA Guidelines?

- A: Individuals with clinical atherosclerotic cardiovascular disease (ASCVD)
- B: Individuals with primary elevations of LDL-C  $\geq$  100 mg/dL
- C: Individuals greater than 75 years old with diabetes
- D: A & C only

Which of the following is considered a high intensity statin?

- A: Rosuvastatin 20mg daily
- B: Atorvastatin 20mg daily
- C: Atorvastatin 40mg daily
- D: Both A & C are considered high intensity statins

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-733L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## IMPACT OF PHARMACIST DRIVEN INTERVENTION ON THE PRESCRIBING PATTERNS OF UNNECESSARY DOUBLE ANAEROBIC COVERAGE IN A COMMUNITY HOSPITAL SETTING

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**Background:** As apart of the growing effort to curb inappropriate prescribing of antimicrobials and combat emerging bacterial resistance, antimicrobial stewardship programs have used pharmacist driven interventions to facilitate optimal prescribing practices. A core element of many stewardship programs involves the cessation of unnecessary double anaerobic coverage (DAC). The consensus of the Infectious Disease Society of American and the Surgical Infection Society is that there are few appropriate indications for metronidazole in combination with another anti-anaerobic agent, with the exception of Clostridium difficile colitis. Unnecessary double anaerobic coverage puts patients at risk for adverse drug reactions, drug-drug interactions, development of resistant bacterial infections and adds an additional cost burden to both patients and hospitals. **Purpose:** The primary objective of this study was to assess the impact pharmacist driven interventions on the number of patients receiving unnecessary double anaerobic coverage.

**Methods:** This single center retrospective cohort study compared the number of patients receiving DAC prior to and after implementation of pharmacist-driven interventions. Patients 18 years or older who received at least one dose metronidazole in combination with another anti-anaerobic agent between September to October 2015 and February to March 2016 were included in the study. Patients who were being treated for or for which there was a clinical suspicion of Clostridium difficile colitis were excluded from the study. Pharmacist intervention consisted of physician education and pharmacist audit and feedback. Data was collected using the electronic medical record and included the number of patients receiving DAC, number of treatment days of DAC, number of avoidable metronidazole doses dispensed and the avoidable cost to the patient and hospital. The prescribing service and indication for which anti-anaerobic therapy was prescribed was also analyzed. **Results and Conclusion:** Data collection is currently in process. Results and conclusions will be presented at the 2016 Great Lakes Residency Conference.

### Learning Objectives:

Discuss potential benefits of pharmacist driven interventions on antimicrobial prescribing practices

Identify appropriate empiric treatment options for anaerobic infections

### Self Assessment Questions:

According to IDSA guidelines, which of the following is an appropriate option for the empiric treatment of a community acquired intra-abdominal infection?

- A: Imipenem-cilastatin + Metronidazole
- B: Ciprofloxacin + Metronidazole
- C: Piperacillin-tazobactam + Metronidazole
- D: Cefoxitin + Metronidazole

Which of the following is a potential benefit of pharmacist audit and feedback on the prescribing of dual anti-anaerobic therapy?

- A: Cost savings
- B: Reduction in patient antimicrobial exposure
- C: Increase in C.diff infections
- D: A and B

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-363L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## ENSURING ONGOING REMS COMPLIANCE IN THE INPATIENT SETTING

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Risk Evaluation and mitigation strategies (REMS) are a collection of programs required by the Food and Drug Administration (FDA) to ensure that the benefits of using medications with specific safety concerns outweigh the risks. The purpose of this project is to establish pharmacy compliance with REMS programs throughout a health care system for medications used in the inpatient setting, and to implement processes that assure continued REMS compliance in the future. Ensuring REMS compliance is a risk management strategy that could potentially enhance patient safety, streamline workflow, and ensure preparedness for potential audits. Prior to the implementation of this project, formal standards for handling REMS had not been established. A gap analysis was performed to identify areas of non compliance with REMS requirements as well as opportunities to enhance patient safety through alerting providers of REMS requirements and rationales. Various strategies were implemented in order to achieve compliance with all REMS medications currently included on the inpatient formulary. Creation of comprehensive reference documents that detail pharmacist workflow and monitoring responsibilities is expected to establish consistency in handling REMS requirements throughout the system. In addition, information for systematically evaluating and implementing new REMS requirements was developed, and is expected to ensure continued compliance with new REMS programs and requirements as they arise. By identifying and correcting gaps in REMS compliance, creating formal references for the appropriate monitoring of REMS medications, and implementing a systematic evaluation guide for new REMS programs requirements, inpatient pharmacist will be ensuring safe and appropriate use of REMS medications now and in the future.

### Learning Objectives:

Define the purpose of Risk Evaluation and Mitigation Strategies

Identify one rationale for the importance of REMS compliance in the inpatient setting

### Self Assessment Questions:

The purpose of Risk Evaluation and Mitigation Strategies is best defined as a program to:

- A: Ensure financial success of medications whose development was
- B: Minimize risk when prescribing and dispensing medications with p
- C: Evaluate the prescribing and dispensing patterns of certain medicat
- D: Evaluate post-marketing safety data in order to assess safety whe

One rationale for the importance of ensuring REMS compliance in the inpatient setting is to:

- A: Gather data to support the elimination of certain medications from
- B: Avoid participation in audits from companies that manufacture RE
- C: Ensure the safe use of medications with potentially serious side ef
- D: Allow every pharmacist to interpret REMS requirements based on

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-909L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## AMBULATORY PHARMACY SERVICES DASHBOARD: MEASUREMENT OF QUALITY

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Background: Pharmacists' roles in patient care are continuing to expand from the traditional tasks of dispensing medications and providing basic medication counseling. Pharmacists collaborate with other health professionals to improve patient health-related outcomes. Pharmacists are qualified to educate patients on lifestyle modifications and recommend pharmacologic treatments. Having patients meet with a pharmacist for education will allow patients to achieve treatment goals. This is due to having more knowledge about their disease state and a greater understanding of the importance of making necessary lifestyle changes and adhering to medication regimens. Randomized controlled trials designed to study the effects of pharmacist services on patient outcomes have demonstrated efficacy in improving patient outcomes. In a systematic review from thirty-two trials (most of the pharmacists clinical services were provided in ambulatory care settings), twenty-seven support the hypothesis that pharmacist administered education, counseling, drug-use review, and other disease management services given to patients improves patient outcomes. At Mercy Health, ambulatory care pharmacists are in 16 practice sites as well as two anticoagulation clinics. Data is not readily available for the pharmacists at these sites to help determine opportunities for pharmacist to better care manage patients and for assessing patient outcomes. Purpose: To develop an ambulatory pharmacy services dashboard to track pharmacist contributions to the maintenance of patient health. Methods: Data was electronically captured from patients with more than one visit with a pharmacist through an electronic registry.

Data collected: Hemoglobin A1c, blood pressure, body mass index, angiotensin-converting-enzyme or HMGCo-A reductase inhibitor without contraindication and international normalized ratio (INR). Assessments include, determining monthly and quarterly averages, and ranges for patient lab values and compliances. Results and Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the role pharmacists play in maintenance of patient health

List benefits associated with having pharmacists as part of the ambulatory care team

### Self Assessment Questions:

In which of the following ways can pharmacist play a role in maintenance of patient health?

- A: Diagnose and treat common diseases
- B: Provide patient education and drug-use reviews
- C: Increasing medication compliance and healthcare costs
- D: Improving patient outcomes and accuracy of diagnoses

Which of the following are observed when a pharmacist is an active member of the ambulatory care team?

- A: Improved patient outcomes
- B: Increased complexity of medication therapy
- C: Higher healthcare costs
- D: More accurate diagnoses

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-734L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## HIT ME WITH YOUR BEST SHOT: PHARMACIST INVOLVEMENT IN HEPARIN-INDUCED THROMBOCYTOPENIA CLINICAL ASSESSMENT AND LABORATORY TESTING

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**Background:** Heparin-induced thrombocytopenia (HIT) is a rare immune mediated complication of heparin therapy. The 4T score is a validated risk stratification tool that is used to determine the likelihood of HIT. A low 4T score can rule out a diagnosis of HIT thus eliminating the need for further HIT laboratory testing and use of costly non-heparin anticoagulants. The purpose of this project is to establish pharmacist involvement in HIT assessment to reduce the number of laboratory tests in low risk patients and as result reduce unnecessary costs associated with laboratory tests and subsequent use of high-cost non-heparin anticoagulants. **Methods:** A chart review of patients with HIT laboratory tests ordered between 07/01/2014 through 06/30/2015 was performed to assess institutional HIT guideline adherence and to determine drug cost with non-heparin anticoagulants. A paging system was established to alert the pharmacist when a HIT laboratory test is ordered. The pharmacist calculated a 4T score, intervened on inappropriately ordered laboratory tests and documented intervention outcomes in the electronic health record. Pre and post intervention data will be compared using a chi-square. **Results:** Three-hundred and five HIT laboratory tests were ordered between 07/01/2014 and 06/30/2015. Fifty-one laboratory tests were ordered on patients who never received unfractionated or low molecular weight heparin. Early data collection suggests that many laboratory tests are ordered on low-risk patients in which HIT testing is not recommended, and that the addition of pharmacist involvement in clinical assessment can reduce inappropriate ordering. **Conclusions:** Pharmacist involvement in clinical assessment of HIT laboratory tests may result in a reduction of inappropriate laboratory tests and potential cost savings related to a reduction in the use of non-heparin anticoagulants.

### Learning Objectives:

Describe the predictive value of the 4T score  
Discuss how to determine when HIT laboratory testing is appropriate

### Self Assessment Questions:

What is the negative predictive value of the 4T score for low risk (0-3 points) patients?

- A: 75%
- B: 82%
- C: 67%
- D: 98%

When would it be appropriate to check a serotonin-release assay in a patient with suspected HIT?

- A: 4T Score of 2 and no ELISA
- B: 4T Score of 4 and a positive ELISA
- C: 4T Score of 5 and a negative ELISA
- D: 4T Score of 8 and ELISA is in process

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-735L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF AN ADVANCED PHARMACY PRACTICE EXPERIENCE (APPE) STUDENT-RUN MEDS 2 BEDS AND DISCHARGE COUNSELING PROGRAM ON QUALITY OF CARE

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**Purpose:** As healthcare progresses toward pay-for-performance reimbursement models, focus is placed on the patient as a consumer. Healthcare systems must adapt by initiating innovative programs and services. The University of Louisville Hospital (ULH) has responded by implementing a Meds 2 Beds program, integrating clinical services with dispensing and medication delivery to improve transitions of care. The purpose of this study is to evaluate the programs impact on outcomes relevant to patients, healthcare providers, pharmacists, and administrators. **Methods:** This observational, retrospective chart review evaluated the effectiveness of the ULH Meds 2 Beds program from May 1, 2014 through December 1, 2015. Patients who participated in the program were identified through a pharmacist documentation database and matched with controls that did not participate in the program, identified based on International Classification of Diseases Ninth revision (ICD-9) coding. Patients were included if they were discharged from a medical/surgical floor of ULH and at least 18 years old. Patients were excluded if not discharged to home, unable to be matched to a control, previously included in study, pregnant, or incarcerated. The primary outcome was 30-day hospital readmission rates. Secondary outcomes were 30-day emergency department (ED) visits, patient satisfaction, and financial impact on the ULH outpatient pharmacy. **Results:** Preliminary results show an all-cause 30 day readmission rate of 9.1% (n = 208) for patients participating in the Meds 2 Beds program. In comparison, the 2014 all-cause readmission rates nationwide and for ULH were 16.9% and 15.4%, respectively. In the same patient group, the rate of ED visits at 30 days was 11.5%. Preliminary financial analysis demonstrates an average profit of \$21.02 per prescription with 3.2 prescriptions per patient (n = 308), total profits exceeding \$21,300. Further data analysis is pending. **Conclusions:** Will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify medication related factors contributing to patient readmissions and strategies to address these issues.  
Discuss the potential role of the pharmacist in the discharge transition of care, barriers to this role, and approaches to overcome these barriers.

### Self Assessment Questions:

Which of the following is NOT cited as an example of a medication related issue at discharge specific to the patient?

- A: Patient is unable to drive to the pharmacy to pick up clopidogrel.
- B: Cephalexin is taken for three days of a seven day course because
- C: No follow up visit is scheduled for a patient's INR monitoring after
- D: Aspirin is not taken at discharge because patient thinks "it's just a

Which of the following is NOT considered to be a barrier to pharmacist inclusion in discharge transitions of care?

- A: Pharmacist training is not well-suited for this activity
- B: Allocation of staffing resources
- C: Lack of pharmacist coverage on evenings and weekends
- D: Multi-disciplinary communication barriers

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-736L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **SUPPORTING TRANSITIONS OF CARE: IMPLEMENTATION AND UTILIZATION OF AN INPATIENT PHARMACIST-LED DIABETES EDUCATION PROGRAM**

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**Purpose:** According to the 2015 American Diabetes Association Standards of Care and the Joint Commission, diabetes self-management education is an integral component of diabetes care for all patients being managed by healthcare providers. There is limited data presently available that demonstrates the benefits of a pharmacist-led program on patients admitted to the hospital for new-onset or poorly-managed type 1 and type 2 diabetes. Over the past decade, well documented pharmacist-assisted interventions in an outpatient setting have greatly impacted diabetes management. Although inpatient diabetes education programs have been suggested in recent years, there is limited evidence of the benefits of utilizing pharmacists as the primary source for a patient's diabetes management and education. **Methods:** A prospective, non-randomized, pre-post intervention pilot study has been conducted in the 443-bed community teaching hospital of St. Joseph Mercy Oakland. The purpose of the study was to assess the impact of an inpatient pharmacist-led education program on patients admitted to the hospital with new-onset or poorly controlled diabetes and to ensure adequate follow-up of patients after being discharged. A previously validated "diabetes knowledge" test was administered to the patients with their consent before and after an education session with an inpatient pharmacist. The primary outcome was to assess the improvement of the patient's knowledge of diabetes self-management after being educated by an inpatient pharmacist based on the change in test scores from baseline. To further assess improvement in diabetes self-management, secondary outcomes included assessing the change in A1C readings from baseline to 3 months post-intervention and tracking the number of referrals to an outpatient diabetes education program. **Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Discuss why inpatient pharmacists are an appropriate member of the healthcare team to provide essential diabetes survival skills to hospitalized patients.

Identify the need for pharmacists to provide transitions of care services to high-risk patient populations with chronic disease states such as diabetes.

### **Self Assessment Questions:**

What are examples of organizations that support the implementation of inpatient diabetes self-management education?

- A: The American Diabetes Association
- B: The Food & Drug Administration
- C: The Joint Commission
- D: A & C

Which of the following is a proposed benefit of pharmacists assisting in the transitions of care component of hospitalized patients with diabetes?

- A: Increase in hemoglobin A1C values.
- B: Increase in hospital re-admissions.
- C: Increase in diabetes self-management knowledge.
- D: Decrease in referrals to an outpatient diabetes education program

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-364L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **POTENTIAL IMPACT OF A PHARMACIST-DRIVEN PROTOCOL TO IMPROVE STAPHYLOCOCCAL BACTEREMIA CARE**

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**Purpose:** Staphylococcus aureus bacteremia (SAB) is one of the most common bloodstream infections and causes increased morbidity, mortality, and healthcare costs. The Infectious Diseases Society of America (IDSA) recommends a bundled approach for the management of SAB, including early initiation of antibiotics, repeat blood cultures, early source control, appropriate duration and de-escalation of antibiotics, and an echocardiogram when endocarditis is suspected. Operational barriers can lead to delays in compliance with the bundle components in these patients. A pharmacist-driven protocol was developed for patients with Gram positive cocci bacteremia to initiate antibiotics, order repeat blood cultures, and de-escalate antibiotics to improve compliance with IDSA bundle recommendations. This study is to evaluate the potential impact of the protocol when applied to patients with staphylococcal bacteremia. **Methods:** This is an IRB approved retrospective, chart review of patients with positive blood culture results for MRSA, methicillin susceptible Staphylococcus aureus (MSSA), or coagulase negative Staphylococcus aureus (CoNS). All patients with staphylococcal bacteremia in August 2015 are being assessed to determine the potential impact of applying the pharmacist-driven protocol to this population compared to their historic results. Protocol assumptions were defined for data of interest including time to appropriate antibiotics, rate of repeat blood culture, time to de-escalation, and duration of therapy. The primary outcome is to compare the actual time to initiation of vancomycin or daptomycin to the time allotted for initiation as defined in the proposed protocol for patients not already receiving these antibiotics and Gram positive cocci results on Gram stain. Secondary outcomes include the rate of repeat blood cultures and time to discontinuation or de-escalation of antibiotics as appropriate. **Results/Conclusion:** Data collection is currently in progress. Results and conclusion will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe the IDSA bundled approach for treating a patient with a SAB infection.

Identify potential benefits of instituting a pharmacist-driven protocol for patients with SAB infections.

### **Self Assessment Questions:**

The IDSA bundled approach for the management of SAB includes which of the following?

- A: Initiation of antibiotics after cultures and susceptibilities result
- B: Repeat blood cultures should be obtained a week after the initial s
- C: Antibiotics should be changed to antistaphylococcal beta lactam w
- D: Six weeks of vancomycin is appropriate for an uncomplicated bloo

Which of the following would be an expected advantage of timely initiation of antibiotics as part of a pharmacist-driven protocol for SAB care?

- A: Increased mortality rates, infection related length of stay, and heal
- B: Decreased mortality rates, infection related length of stay, and hee
- C: Decreased mortality rates, and infection related length of stay with
- D: No change in mortality rates, infection related length of stay, and t

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-365L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PREVALENCE OF VENOUS THROMBOEMBOLISMS IN ECMO PATIENTS RECEIVING BIVALIRUDIN COMPARED WITH HEPARIN

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**Purpose:** Extracorporeal membrane oxygenation (ECMO) is used for circulatory and/or respiratory support. Anticoagulation is needed to maintain patency of the circuit while avoiding bleeding and thromboembolic patient complications. Unfractionated heparin remains the most commonly used anticoagulant, but requires adequate antithrombin (AT) to antagonize thrombin. Consumption of AT and therefore, the necessary monitoring and replacement is costly. In September 2013, a bivalirudin protocol became the standard of care at Indiana University Health Methodist Hospital's ECMO program. Our experience has demonstrated more consistent aPTT values in therapeutic range while preventing low AT and thrombocytopenia. Bivalirudin is a reversible direct thrombin inhibitor with a rapid onset and short half-life of 25 minutes. It is eliminated predominantly through proteolytic cleavage, an advantage for patients with impaired hepatic and renal functions. Limited case reports have suggested bivalirudins pharmacologic profile may lead to rapid proteolytic cleavage, inactivation, and increased risk of venous thromboembolisms (VTE). The aims of this study are to compare the prevalence of VTE between ECMO patients receiving bivalirudin versus heparin and identify potential variables that contribute to development of VTE. **Methods:** The study included patients 18 years and older, treated with veno-venous (VV) or arterial-venous (AV) ECMO, who received heparin or bivalirudin for more than 24 hours. Patients were excluded if they were pregnant, incarcerated, had a history of VTE within 3 months, active cancer, or treated with a heparin/bivalirudin crossover. Patients who received heparin were then matched to a cohort of patients who received bivalirudin. The following data was retrospectively collected and analyzed: demographics, receipt of steroids for more than 7 days, percent of activated partial thromboplastin time (aPTT) or activated clotting time (ACT) within goal therapeutic range, VTE location, and onset to VTE and DVT prophylaxis. **Results/Conclusions:** Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the proposed mechanism by which bivalirudin may increase the risk of venous thromboembolisms in ECMO patients

Describe the impact of the results on future ECMO treatment with bivalirudin and strategies to overcome it

### Self Assessment Questions:

What is the proposed mechanism by which bivalirudin may increase the risk of venous thromboembolisms?

- A Long half-life and hepatic metabolism
- B: Short half-life and proteolytic cleavage
- C: Long half-life and proteolytic cleavage
- D: Short half-life and renal elimination

Which of the following risk factors have been associated with venous thromboembolisms?

- A Obesity, pregnancy, and vasopressin
- B Surgery, prolonged bed rest, and active cancer
- C BMI < 30, subtherapeutic aPTT levels, and pregnancy
- D Prolonged bed rest, regular ambulation, and active cancer

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-366L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF CHROMOGENIC FACTOR X LEVELS IN THE TRANSITION FROM ARGATROBAN TO WARFARIN

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Heparin-induced thrombocytopenia (HIT) type-II is a prothrombotic complication of heparin therapy. Argatroban, a synthetic direct thrombin inhibitor, is utilized for the prevention or treatment of thrombosis in patients with HIT. Notably, argatroban artificially elevates international normalized ratio (INR), complicating the ability to obtain accurate measurements in patients transitioning from argatroban to warfarin. In previously published literature, chromogenic factor X (CFX) levels were a viable alternative to INR monitoring. However, we hypothesize there is significant discordance between CFX level and therapeutic INR in patients at the University of Michigan Health System treated concomitantly with argatroban and warfarin compared to previous studies. This was an observational cohort study conducted as a single-center, retrospective chart analysis and was approved by the University of Michigan Institutional Review Board. The study included patients admitted to the University of Michigan Health System between January 2010 and October 2015 who were transitioned from argatroban to warfarin, with measured CFX levels. Patients were grouped into cohorts based on the presence of hepatic impairment; total bilirubin greater than 1.5 mg/dL or a documented diagnosis of cirrhosis. The primary objective was to evaluate the use of the CFX assay in predicting therapeutic INR, in patients with or without hepatic impairment, transitioning from argatroban to warfarin. Sensitivity, specificity, positive predictive value, and negative predictive value of the CFX level and the corresponding INR were evaluated. Receiver operating characteristic curve was constructed to illustrate various cutoff levels of CFX.

Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the Chest guideline recommendations for transitioning patients with HIT to warfarin from argatroban

Review previously published studies regarding CFX and INR to monitor patients on argatroban and warfarin

### Self Assessment Questions:

In cases of confirmed HIT, the Chest guideline recommends warfarin be overlapped with a nonheparin anticoagulant once platelets have recovered (usually at least \_\_\_\_ x 109/L), for a minimum of \_\_\_\_ da

- A 200; 4 days
- B: 150; 5 days
- C: 250; 5 days
- D: greater than 50; 4 days

The prospective observational study by Arpino et al., concluded the chromogenic factor X level of \_\_\_\_ or \_\_\_\_ is a reliable predictor that the INR will be therapeutic (INR > 2) when argatroban therapy

- A 45%; less
- B 45%; greater
- C 35%; greater
- D 35%; less

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-367L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INTERNAL PRODUCTIVITY MEASUREMENT & COMPREHENSIVE ANALYSIS OF HEALTH SYSTEM PHARMACY SERVICES

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Purpose: Health system pharmacy administrators currently face a significant challenge to provide high quality pharmacy services in an era of rising drug costs and decreasing profit margins. To meet these expectations, administrators often seek out external benchmarking information from vendors or consultants to aide in determining the appropriateness of allocated departmental resources. Although external benchmarking can help to identify opportunities for cost reduction and quality improvement, the significant variability in pharmacy services across a group of organizations may lead to inappropriate assessments. Currently, there is no standard for internally or externally measuring health system pharmacy productivity. While many organizations have attempted to use workload ratios or basic labor statistics, these metrics do not account for activities related to pharmacist-provided patient care or other clinical pharmacy services. An optimal productivity model would incorporate the activities of all department staff to allow for accurate measurement of staff activities, changes in workload volume, and overall success of the department in meeting strategic goals. The primary objective of this project was to develop an internal productivity monitoring tool to quantify departmental productivity and identify potential areas for improvement. Methods:

A review of all current pharmacy department services was conducted to identify reportable metrics for each core pharmacy service. Documentation procedures were then developed for pharmacy services identified as lacking a reportable metric. After defining a source of data for each service, baseline data was collected and evaluated using common pharmacy productivity ratios. Based on an analysis of available internal data, a workload factor and internal goal were assigned for each metric. Finally, a standardized and sustainable process for evaluating individual metrics for core pharmacy services and overall departmental productivity was implemented. Results/Conclusion: Data collection and analysis are in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the benefits and limitations of internal productivity monitoring  
Identify various productivity measures within a pharmacy department

### Self Assessment Questions:

Which of the following is a benefit of internal productivity monitoring?

- A Provides an accurate comparison of one department to similar departments
- B: It is a well established and standardized process
- C: Identifies specific areas for opportunity within a department
- D: Implementation requires minimal effort

Which of the following pharmacy processes should be included in internal productivity monitoring of a health system pharmacy department?

- A Drug Distribution
- B Order Management
- C Clinical Involvement
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-737L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF CIPROFLOXACIN VERSUS LEVOFLOXACIN AND RATE OF BREAKTHROUGH INFECTION IN HEMATOPOIETIC STEM CELL TRANSPLANT PATIENTS

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Purpose: Effective antimicrobial prophylaxis is essential for the hematopoietic stem cell transplant (HSCT) population, as infection is a major complication post-transplant. According to ASBMT guidelines, quinolone prophylaxis is indicated in patients with neutropenia expected to last at least 7 days, and this population should be screened for development of multi-drug resistant infections. Prior literature has not directly compared ciprofloxacin to levofloxacin in the HSCT population, and have only discussed rates of bacteremia and febrile neutropenia. Ciprofloxacin was recently replaced by levofloxacin as the preferred agent on the Northwestern Memorial Hospital (NMH) formulary. The study objective is to compare differences in rate of breakthrough infections for ciprofloxacin versus levofloxacin prophylaxis in a stem cell transplant population; with a focus on development of multi-drug resistant infections. Methods: This is a retrospective, cohort study comparing patients that received ciprofloxacin prophylaxis vs. levofloxacin prophylaxis for HSCT at NMH. Autologous transplant recipients are matched with the following inclusion criteria: patients age 18 or older, received HSCT, received fluoroquinolone prophylaxis during initial hospitalization for stem cell transplant, and during the study period noted below. Consecutive patients treated between 1/1/2013-12/31/2014 (ciprofloxacin) and 1/1/2015-12/31/2015 (levofloxacin) are included. Patients with documented fluoroquinolone allergy are excluded. The primary endpoint of the study is all microbiologically documented infections for patients receiving fluoroquinolone prophylaxis. Secondary endpoints include: rate of multidrug-resistant infection, rates of *Clostridium difficile*, colonization with Methicillin-Resistant *Staphylococcus Aureus* and Vancomycin-Resistant Enterococci, febrile neutropenia, time to engraftment, and length of hospitalization. This study was IRB approved by Northwestern University. Results: Results and conclusions will be discussed at the Great Lakes Residency Conference.

### Learning Objectives:

Describe a recommended regimen according to ASBMT guidelines for prevention of bacterial infections in hematopoietic stem cell transplant patients

List potential risks hematopoietic stem cell transplant patients have for development of bacterial infections

### Self Assessment Questions:

According to ASBMT guidelines which antibacterial drug regimen is recommended for prophylaxis in a patient with anticipated neutropenia for greater than 7 days?

- A Amoxicillin-clavulanate
- B: Levofloxacin
- C: Cefepime
- D: Sulfamethoxazole-trimethoprim

What are potential risks hematopoietic stem cell transplant patients have for development of bacterial infections?

- A Damage to GI mucosa from chemotherapy
- B Elevated white blood cell count
- C Short-term central venous access
- D Short hospital stay

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-368L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFICACY OF A COMPUTER CLINICAL DECISION SUPPORT SYSTEM FOR REDUCING THE RISK OF SUDDEN CARDIAC DEATH

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**Purpose:** Torsade de pointes (TdP) is a life-threatening cardiac arrhythmia associated with prolongation of the heart rate corrected QT (QTc) interval >500ms. Over 100 widely used medications of various pharmacological categories (antiarrhythmics, antipsychotics, antibiotics, many others) are associated with prolongation of the QTc interval. This project aims to examine the effectiveness of a computer alert clinical decision support system (CDSS) for identifying patients at high risk for QTc interval prolongation for reducing the risk of sudden cardiac death in hospitalized patients. Previous research has found that implementation of the CDSS, incorporating a validated risk score for QTc interval prolongation, was associated with a decreased risk of a QTc interval prolongation and the prescribing of noncardiac QTc prolonging interval-medications in patients in cardiac critical care units. This project will build upon these surrogate findings to determine whether the computer alert CDSS for QTc interval prolongation reduces the incidence of the serious clinical endpoint of sudden cardiac death. **Methods:** This project is a retrospective study using a pre-post design. All patients from the Cardiac Care Units (CCUs) at Methodist Hospital admitted over a 1 year period prior and 1 year period following implementation of the computer alert CDSS will be included in study if not meeting exclusion criteria (cardiac arrest on admission, <18 years of age, discharge from unit in <24 hours, no daily electrocardiograms or continue cardiac rhythm monitoring, or completely paced ventricular rhythms). Data will be collected retrospectively through medical record review. The primary outcome measures of this study are the adjusted odds ratios for sudden cardiac death and ventricular tachycardia following implementation of the computer alert CDSS. **Results and Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the independent risk factors for QTc interval prolongation  
Discuss the findings of previous studies evaluating the computer alert CDSS

### Self Assessment Questions:

Which of the following has been identified as an independent risk factor for QTc prolongation?

- A: Male sex
- B: Left ventricular dysfunction
- C: Serum potassium >4.5 mEq/L
- D: Admitting QTc <400ms

Which of the following is an outcome associated with the use of the computer alert CDSS as previously evaluated by Tisdale, et al?

- A: Reduced prescribing of noncardiac QTc prolonging medications
- B: Reduced risk of myocardial infarction
- C: Reduced risk of QTc interval prolongation
- D: A and C

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-910L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF TARGETED EDUCATION ON THE ACCURACY OF PHARMACIST INTERVENTION DOCUMENTATION

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**Purpose:** Amidst rising health care costs and decreasing reimbursement in health-system settings, economic justification of clinical pharmacy services is more critical than ever. Several studies have demonstrated the benefit of pharmacist-specific education initiatives in increasing the frequency of intervention documentation, but have not measured the initiatives impact on documentation accuracy. The purpose of this study is to assess the impact of a pharmacist-targeted education initiative on the accuracy and economic impact of clinical intervention documentation. **Methods:** This study has been approved by the University of Chicago Institutional Review Board. Clinical pharmacy interventions documented as "Clarify Drug Order" by pharmacists at the University of Chicago Medical Center from November 2015 through January 2016 were analyzed. Appropriateness of interventions was determined through evaluation of each respective intervention description, or lack thereof, using criteria pre-defined by the institutions pharmacy department. In February 2016, a pharmacist-targeted education initiative composed of staff presentation, email communication, and a department newsletter article was utilized to describe appropriate use of the "Clarify Drug Order" category. Improvement in "Clarify Drug Order" documentation will be re-evaluated for the months of March 2016- May 2016. The effectiveness of this education initiative will be determined using statistical process control chart methodology. As pharmacist interventions may be more accurately documented in non-"Clarify Drug Order" categories with greater or lesser assigned pharmacoeconomic values following the education initiative, effect on pharmacoeconomic impact of all pharmacist interventions will also be determined.

### Learning Objectives:

Review aspects of the current healthcare climate necessitating the need for the justification of clinical pharmacy services.

Describe strategies used by health systems to economically justify clinical pharmacy services.

### Self Assessment Questions:

Which of the following is a challenge faced by pharmacy leadership when justifying clinical pharmacy services?

- A: Lack of unique clinical knowledge possessed by pharmacists
- B: Declining healthcare reimbursement and increasing cost containment
- C: Increased dependence on technology
- D: Regulatory and compliance standards

Which of the following outcomes is most commonly employed to justify the economic impact of clinical pharmacy services?

- A: Humanistic outcomes
- B: Clinical outcomes
- C: Cost avoidance outcomes
- D: Patient satisfaction outcomes

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-738L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## INFLUENCE OF BETA-LACTAM INFUSION STRATEGY ON ACUTE KIDNEY INJURY

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**PURPOSE:** The beta-lactam antibiotics are commonly used in the inpatient setting due to their bactericidal utility in a variety of gram-positive and gram-negative infections. Beta-lactams exhibit time dependent killing, therefore bactericidal activity is primarily dependent on the time that the free drug concentration remains above the minimum inhibitory concentration (MIC) of the targeted organism. Agents in this class are typically dosed as intermittent boluses. Extended beta-lactam infusions have been promoted as a strategy to optimize the percent of the dosing interval that the concentration of free drug remains above the MIC, thereby potentially improving efficacy. Nephrotoxicity is a known adverse effect of beta-lactam antibiotics. It has been demonstrated that vancomycin increases incidence of acute kidney injury (AKI) when combined with beta-lactams; however, there is limited literature available evaluating nephrotoxicity in extended beta-lactam infusions alone or in combination with vancomycin. Thus, the purpose of this study was to assess the incidence of AKI based on beta-lactam infusion strategy.

**METHODS:** This was a retrospective, single academic medical center cohort comparison study approved by the Institutional Review Board. Adult patients admitted from July 2006 through September 2015 who received piperacillin-tazobactam, cefepime, or meropenem as monotherapy or in combination with vancomycin for greater than 48 hours were included. Patients were excluded for pre-existing renal dysfunction, pregnancy or breastfeeding, or receipt of a beta-lactam for less than 48 hours. The following data were extracted from our institutions Center for Clinical and Translation Science Enterprise Data Trust for analysis: patient demographics, location and length of stay, medical diagnoses, vital signs, laboratory values, microbiology data, antibiotic regimen (including duration and infusion strategy), concomitant nephrotoxins administered, method of renal replacement therapy, and infectious diseases service consultation. **RESULTS/CONCLUSION:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the rationale and evidence for the practice of prolonged beta-lactam infusions.

Describe the mechanism of nephrotoxicity associated with beta-lactams

### Self Assessment Questions:

Which of the following parameters is the bactericidal activity of beta-lactams dependent upon?

- A Peak concentration/MIC
- B: Auc/mic
- C: Time > MIC
- D: Post-antibiotic effect

Which of the following physiologic markers of renal function are used as criteria for the RIFLE classification of acute renal failure?

- A Serum creatinine, fractional excretion of sodium
- B Serum creatinine, urine output
- C Serum creatinine, blood urea nitrogen
- D Urine output, blood urea nitrogen

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-739L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CLINICAL AND ECONOMIC IMPACT OF MULTIPLEX PCR TESTING AND AUTOMATIC ID CONSULTATION IN PATIENTS WITH BACTEREMIA

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Bacteremia is a leading cause of death in hospitalized patients. While blood cultures require incubation of 72 hours or more, multiplex polymerase chain reaction (PCR) tests have shown enhanced sensitivity for fastidious organisms and decreased time to pathogen and resistance pattern identification. Similarly, Infectious Disease (ID) consultation has demonstrated benefit in selection of appropriate empiric antibiotics, as well as a reduction in in-hospital mortality and length of stay. This study aims to analyze a protocol requiring routine PCR evaluation in conjunction with ID consultation for cases of bacteremia to determine whether these components together will have a positive impact on clinical and economic outcomes. It is a retrospective observational cohort study conducted in a 433-bed tertiary care center. Data collected includes: patient age, gender, renal function, comorbidities, hospital length of stay, intensive care unit (ICU) length of stay, time to blood sample collection, time to gram stain result, time to speciation, pathogen identified, time to first antimicrobial, and time to ID consultation. The primary outcome of interest is all-cause mortality, while secondary endpoints will address hospital and ICU length of stay, 30-day hospital readmission rate, total hospital cost per case, time to speciation of the organism, and time to initiation of effective antimicrobial therapy. The study consists of two arms of data ranging from January 2014 thru December 2015. The first arm will look at patient cases of bacteremia treated prior to PCR/ID consultation policy implementation, and the second arm will assess occurrences of bacteremia identified via PCR following policy implementation. A subgroup analysis will evaluate policy impact on both gram-positive and gram-negative bacteremia cases. Data collection is still in progress, and results will be completed for presentation at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss multiplex polymerase chain reaction (PCR) technology and its current uses.

Identify benefits of rapid pathogen identification in combination with an automatic Infectious Disease consultation policy.

### Self Assessment Questions:

If a culture reports that a patient has an ESBL K. pneumoniae bacteremia, which triggers would you expect to be flagged on the Blood Culture Identification PCR test report? I. Enterococcus II. Enterob

- A Iii
- B: Ii, Iii
- C: Ii, Iii, Iv
- D: I, Iv

MR is a 45 year old female patient admitted to the Emergency Department with sepsis. She has a past medical history significant for hypertension and atrial fibrillation with no personal history of res

- A Nothing, continue MR's current antimicrobial therapy
- B Discontinue vancomycin therapy
- C Wait to make any changes until blood cultures are finalized
- D Discontinue antimicrobial therapy altogether

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-740L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PROPER ALLERGY REPORTING OF ANTIBIOTICS FOR INPATIENTS ON A ROUTINE MEDICAL FLOOR

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**Purpose:** Penicillin is the most commonly reported allergy with up to 15% to 20% of patients admitted into the hospital claiming to be allergic, when in truth the allergy prevalence is closer to 1% to 10%. Penicillins are often times the drug of choice due to their safety, narrow spectrum, and lower cost. The purpose of this study is to assess the over reporting of penicillin allergies by directing health care professionals to enter the patients reaction prior to initiating antibiotic therapy. This will ideally reduce inappropriate and broad antibiotic use. **Methodology:**

This single-centered study includes patients 18 years and older on a routine medical floor. A daily electronic report is printed that identifies patients with a reported penicillin allergy. A thorough review is performed to identify which patients need intervention in penicillin reporting, which includes patients who do not have an allergic reaction recorded. Further investigation is done through an interview to determine if it is a childhood allergy, adverse reaction, misreported allergy or if a true allergy. Other data collected: when the reaction occurred, age of the patient when reaction occurred, how the reaction was treated, where on the body the reaction occurred and if the patient has any recall on previous exposure to cephalosporins. Once the findings are collected from the interview, the data is entered into the patients chart. During this process, there is planned education for the nurses to distinguish what is considered a true penicillin allergy. Additionally, information-technology will update the electronic software to mandate a drug reaction added when entering an allergy. The healthcare professional that enters the allergy will then be required to document the specific reaction. **Results and Conclusion** To be presented at the 2016 Great Lakes Pharmacy

### Learning Objectives:

Recognize the difference between an adverse reaction and a true allergy  
Identify the importance of accurately documenting a patients allergy .

### Self Assessment Questions:

65 year old female in the hospital is diagnosed with a MSSA skin infection. The patient has a listed allergy to penicillins. The reaction to the penicillin is determined to be a rash that occurred wh

- A Meropenem
- B: Cefazolin
- C: Vancomycin
- D: Ciprofloxacin

What type of reaction is considered a mild reaction?

- A Angioedema
- B Hives
- C Itching
- D Wheezing

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-741L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PRESCRIBING CASCADES: THE FREQUENCY OF ANTI-GOUT MEDICATIONS IN PATIENTS TAKING THIAZIDE DIURETICS

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**Purpose** A prescribing cascade occurs when a drug is prescribed to treat an adverse drug effect (ADE) from another drug with the belief that a new medical condition has developed. Thiazide diuretics decrease the bodys ability to excrete urate by increasing renal reabsorption. Accumulation of serum urate often leads to a misdiagnosis of gout and subsequent prescribing of anti-gout therapy. We are trying to identify if the cascade is occurring in which patients are being prescribed a thiazide diuretic then being subsequently prescribed an anti-gout medication within our health system. **Methods** Prior to data collection, IRB approval was obtained from the Institutional Review Board in order to complete a retrospective cohort review. Gundersen Health Systems electronic health record was utilized to identify two cohorts of patients, the study group and the control group. The study group was comprised of outpatients that have been prescribed a thiazide diuretic (hydrochlorothiazide, chlorothiazide, chlorthalidone, indapamide). The control group was comprised of outpatients that have not been prescribed a thiazide diuretic. They were matched with the study group based off of risk factors for gout using propensity scores incorporating the characteristics of age, race, gender, BMI, diagnosis of diabetes, hypertension, hyperlipidemia, cardiovascular disease, chronic kidney disease, and alcohol use. The primary outcome measure is if the patient is prescribed an anti-gout medication (allopurinol, colchicine, febuxistat). **Results** The study group consisted of 550 patients, 39 of which were prescribed an anti-gout medication. The control group consisted of 550 patients, 40 of which were prescribed an anti-gout medication. Preliminary results suggest that the thiazide diuretic/ anti-gout medication prescribing cascade is not occurring within out institution.

### Learning Objectives:

Define a prescribing cascade and identify common cascades.  
Identify inappropriate prescribing practices surrounding the thiazide diuretic/ anti-gout medication prescribing cascade.

### Self Assessment Questions:

Which of the following is a common prescribing cascade?

- A Angiotensin receptor blocker to an antitussive agent
- B: Antipsychotic agents to a cholinergic agents
- C: Non-steroidal anti-inflammatory drug to an antihypertensive agent
- D: Thiazide diuretic to an antidiabetic agent

A 77-year-old male patient is newly diagnosed with hypertension. He has a past medical history of gout, diabetes mellitus type II, obesity, and alcohol abuse. Which of the following anti-hypertensive

- A Metoprolol 12.5 mg twice daily
- B Hydrochlorothiazide 25 mg every morning
- C Lisinopril 10 mg daily
- D Furosemide 20 mg every morning

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-742L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INCIDENCE OF NEPHROTOXICITY AND NEUROTOXICITY IN PATIENTS TREATED WITH POLYMYXIN ANTIMICROBIALS

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**BACKGROUND:** The increasing prevalence of multi-drug resistant (MDR) gram-negative bacterial pathogens is one of the most significant challenges facing the modern healthcare system. Treatment of infections caused by MDR organisms is inherently difficult and complicated by the lack of novel antimicrobials in drug development. This environment has revived the polymyxins as salvage therapy for MDR gram-negative infections. However, despite clinical use beginning in the 1950s, accurate characterization of the pharmacokinetic and adverse event profiles of these agents has only recently begun. Data from modern use suggest that there are important pharmacokinetic differences between the systemic polymyxins, polymyxin B and colistimethate sodium. Additional data on the relative rates of toxicity with these agents are necessary to determine antimicrobial selection in clinical practice. **PURPOSE:** The purpose of this study was to evaluate the incidence of nephrotoxicity and neurotoxicity in patients treated with intravenous polymyxin B compared to colistimethate sodium. **METHODS:** This was a retrospective evaluation of adult patients treated with either intravenous polymyxin B or colistimethate sodium for at least 48 hours between July 1, 2006 and September 30, 2015 at an academic medical center and associated community hospital. Pregnant or breastfeeding women were excluded. Patients receiving renal replacement therapy at baseline and those with Glasgow Coma Scale score less than eight were excluded from nephrotoxicity and neurotoxicity analyses, respectively. Study data were obtained retrospectively from our institutions Center for Clinical and Translational Science Enterprise Data Trust and analyzed using R statistical software (version 2.12). Data collected included demographics, admission and discharge dates, comorbid conditions, severity of illness using the Charson Comorbidity Index, serum creatinine, blood urea nitrogen, albumin, bilirubin, concomitant anti-infectives, and nephrotoxins. The electronic medical record was reviewed to obtain missing values and data on neurotoxicity. **RESULTS/CONCLUSIONS:** Results and conclusions to be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Identify the key pharmacokinetic differences between polymyxin B and colistimethate sodium.

Describe the spectrum of antibacterial coverage provided by the polymyxins.

### Self Assessment Questions:

Which property of colistimethate sodium causes the greatest degree of variability in the attainment of therapeutic levels?

- A: Volume of distribution
- B: Administration as a prodrug
- C: Degree of protein binding
- D: Drug-drug interactions

The polymyxins are effective against which of the following pairs of bacterial pathogens?

- A: *Proteus mirabilis* and *Serratia marcescens*
- B: *Pseudomonas* spp and *Staphylococcus aureus*
- C: *Morganella morganii* and *Burkholderia cepacia*
- D: *Pseudomonas aeruginosa* and Carbapenem-resistant Enterobacterales

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-369L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INTEGRATION AND EVALUATION OF PHARMACY PRIOR AUTHORIZATION SERVICES AT AN ACADEMIC HEALTH SYSTEM

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**Purpose:** The purpose of this project is to integrate pharmacy prior authorization services and measure the impact of PA services on satisfaction, efficiency, and workload. **Methods:** The workflow processes for four separate pharmacy prior authorization (PA) workgroups at the University of Wisconsin Health (UW Health) were evaluated. The lead investigator directly observed and documented workflows in process maps and a comparison chart to evaluate four PA workgroups. A project committee was established with representation from pharmacy leadership, PA workgroups, and pharmacy informatics. This committee reviewed documented workflows to identify opportunities for centralization and standardization across the PA workgroups. Consensus was gained from the project committee to transition to a referral module within the electronic health record (EHR) to standardize PA referral, communications between care teams and PA staff, and maintenance of PA documentation. In addition to the referral module, the project team decided to incorporate a centralized referral pathway for care providers. Prior to implementation of the referral module within our EHR, surveys were disseminated to evaluate pharmacy personnel, registered nurse (RN), or other referral source satisfaction of current PA workgroups. Workload and productivity of select PA workgroups were also evaluated by self-reported data. Following implementation of the EHR referral module and centralized referral pathway, select PA workgroup workload and productivity metrics will be collected as well as dissemination of a survey to estimate the impact on efficiency and satisfaction, respectively. A second component of this project was the expansion of our pharmacy PA services into four additional primary clinics over a period of a month. By comparing self-reported clinic time spent on completing PAs with estimated PA workgroup time, the lead investigator was able to estimate clinic time savings and cost savings associated with the transfer of PA responsibilities. **Results/Conclusions:** Results & conclusions will be presented at the conference.

### Learning Objectives:

Describe the benefits of standardized documentation for prior authorization (PA) workgroups and creating a centralized PA referral pathway

Explain the benefits of transitioning prior authorization responsibilities in ambulatory clinics from RNs to a centralized, technician staffed model

### Self Assessment Questions:

Which of the following was a targeted improvement for standardizing documentation and centralizing the PA referral pathway?

- A: Improved visibility of documentation
- B: Simplify submission of PA referrals
- C: Consolidation of PA workgroups
- D: A and B

Which of the following are perceived benefits of transitioning prior authorization responsibilities to pharmacy technicians from clinic staff such as registered nurses?

- A: Decreased salary costs
- B: Increased time for clinic staff to dedicate to direct patient care
- C: Decrease prescription capture
- D: A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-743L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## A RETROSPECTIVE EVALUATION OF A PHARMACIST-LED SAFETY INITIATIVE TO ASSESS THE APPROPRIATENESS OF FIBRATE DISCONTINUATION WHEN USED IN COMBINATION WITH STATINS

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**PURPOSE:** Due to the continued lack of evidence regarding the ability of fibrates to improve overall mortality and the increased risk of adverse effects when combined with statins, the Veterans Affairs National Pharmacy Benefits Management Services advised for sites to evaluate the appropriateness of statin and fibrate dual therapy. It was recommended for sites to use the most cost effective products and/or reduce the usage of statin-fibrate combinations where clinically appropriate. In November 2014, the pharmacy service at the Jesse Brown Veteran Affairs Medical Center (JBVAMC) conducted a review of patients on statin and fibrate therapy to determine the appropriateness of combination therapy. The purpose of this study was to evaluate whether the discontinuation of fibrate therapy resulted in maintenance of triglyceride levels below an acceptable threshold as supported by current guidelines. **METHODS:** This was a retrospective, electronic chart review of outpatients taking combination statin and fibrate therapy during the pharmacist-led safety initiative. Data were collected from September 28, 2013 to September 28, 2015. Baseline datum was the most recent lab prior to fibrate discontinuation. Endpoint datum was the most recent lab completed at least 4 weeks after fibrate discontinuation. The primary endpoint is the percentage of patients with triglycerides less than 500 mg/dL prior to fibrate discontinuation compared to the percentage of patients with triglycerides less than 500 mg/dL after fibrate discontinuation. Secondary endpoints such as, worsened triglycerides, fibrate re-initiation, incidence of pancreatitis and myopathy change in statin therapy, adherence with follow-up labs, average time to lab follow-up, and cost savings were evaluated. **RESULTS/CONCLUSION:** Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the drug interaction and potential adverse drug reactions that may occur with concomitant use of statin and fibrate therapy.  
Describe clinical trials that have evaluated the use of fibrates and explain their results.

### Self Assessment Questions:

Major safety concerns regarding the use of combination statin/fibrate therapy include:

- A: Increased risk of myopathy and rhabdomyolysis
- B: Increased statin elimination due to gemfibrozil inhibition of hepatic
- C: Increased risk of pancreatitis as fibrates reduce the risk of gallstones
- D: All of the above

Clinical trials that evaluated the use of fibrates have demonstrated which of the following:

- A: The FIELD study indicated that fenofibrate did not significantly reduce
- B: The FIELD study did not show a significant increase of adverse drug
- C: The investigators of the ACCORD trial concluded that the statin/fibrate
- D: Answers A and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-370L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EPIDEMIOLOGICAL ASSESSMENT OF THE ASSOCIATION BETWEEN ANTIBIOTIC CONSUMPTION AND CLOSTRIDIUM DIFFICILE INCIDENCE AT AN ACADEMIC MEDICAL CENTER

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**Purpose:** Healthcare Facility-Onset Clostridium difficile infection (HO CDI), or CDI diagnosed beyond the first 3 calendar days following admission, is a major source of infectious disease-related morbidity and mortality in the U.S. One particularly important and modifiable risk factor for CDI is exposure to antimicrobial agents. Virtually all antibiotics have been associated with the development of CDI, and even single doses of antibiotics can increase a patient's risk of developing symptomatic CDI. According to estimates from the Centers for Disease Control and Prevention (CDC), 30 to 50% of antibiotic use in the hospital setting is inappropriate, representing a substantial source of preventable risk. At the hospital level, a 10% increase in antimicrobial usage has been associated with a 2.1 per 10,000 patient-days increase in CDI incidence though many questions remained unanswered. The objective of the present study is to characterize the association between antibiotic consumption and the incidence of HO CDIs at the hospital level.

**Methods:** A single-center, retrospective, ecologic study was conducted to evaluate the relationship between antibiotic consumption, measured in days of therapy (DOTs), and the incidence of HO CDI at an academic medical center from January 2012 through September 2015. CDC National Healthcare Safety Network definitions for CDI and antibiotic consumption were used. Data collection included antibiotic DOTs, patient days, and HO CDI events at the hospital unit level, tabulated in monthly increments. Temporal trends within the hospital were evaluated, and correlation coefficients (overall and intraclass) were calculated to identify associations between HO CDI and specific antimicrobial agents. Data analysis was conducted using STATA 14 (College Station, TX) to determine the strength of any association. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Express the percentage of antibiotic use in the hospital setting that is considered inappropriate, according to CDC estimates.  
Define Healthcare Facility-Onset Clostridium difficile infection.

### Self Assessment Questions:

According to CDC estimates, what percentage of antibiotic use in the hospital is inappropriate?

- A: <1%
- B: 10%
- C: 30-50%
- D: 100%

Healthcare Facility-Onset Clostridium difficile infection is an infection that occurs greater than \_\_\_\_\_ calendar days after admission.

- A: 1
- B: 2
- C: 3
- D: 4

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-744L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PHARMACIST-MANAGED RIVAROXABAN CLINIC FOR OUTPATIENT TREATMENT OF VENOUS THROMBOEMBOLISM

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**Purpose:** To describe the implementation, work flow, and clinical outcomes of a pharmacist-managed clinic for the outpatient treatment of venous thromboembolism (VTE) using rivaroxaban. **Methods:** The clot clinic is a pharmacist-managed low-risk venous thromboembolism (VTE) clinic originally initiated by emergency department (ED) physicians as a fellowship research project. A collaborative practice agreement outlining specific protocols and prescribing authority allows pharmacists to independently treat patients with low-risk VTEs with rivaroxaban as outpatients. Prior to each clinic appointment, the pharmacist reviews the patient's medical record to analyze VTE diagnosis, laboratory data, and complete medication list. A variety of laboratory tests can be ordered per protocol at the pharmacist's discretion. During the visit, the pharmacist asks a series of questions regarding current symptoms and performs a focused physical exam to evaluate the patient's progress on rivaroxaban. Medication adherence is formally evaluated using the Modified Morisky Adherence Scale. Patients are counseled on laboratory results, medication use and adherence, side effects, drug interactions, lifestyle modifications, smoking cessation, and other issues related to rivaroxaban as they arise. Pharmacists make adjustments to duration of therapy based on location and nature of clot, history of thrombosis, and in some cases, D-dimer concentrations. A unique contribution to clinic services provided by the pharmacist includes assistance with navigating insurance-related issues such as prior authorizations, patient assistance programs, and other sources of sustainable funding to ensure completion of therapy.

Outcomes regarding the number of anticoagulation treatment related complications are being evaluated to assess the difference between outpatient treatment of VTE in a pharmacist-managed clinic versus standard of care by a primary care provider. **Conclusion:** The pharmacist-managed clot clinic was established to manage VTEs using rivaroxaban in the outpatient setting. Outcomes data collection is ongoing.

### Learning Objectives:

Describe the unique contributions of a pharmacist in a rivaroxaban-focused venous thromboembolism clinic

Discuss factors used to determine length of anticoagulation therapy for treatment of low-risk venous thromboembolism

### Self Assessment Questions:

Which of the following best describes the role(s) of a pharmacist as a provider in a rivaroxaban-focused venous thromboembolism clinic?

- A: Counsel on medications and lifestyle
- B: Screen for barriers to adherence
- C: Secure sustainable sources of funding
- D: All of the above

Which statement best describes the role of a D-dimer in determining the duration of therapy for VTE treatment?

- A: All patients with a D-dimer < 0.05 mcg/mL should stop anticoagulation
- B: Due to lack of sensitivity, D-dimers do not play a role in duration of therapy
- C: Monthly D-dimers are the best determinant of duration of anticoagulation
- D: Patients with elevated D-dimers after completion of anticoagulation should be re-evaluated

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-371L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE RUSH UNIVERSITY MEDICAL CENTER (RUMC) EMPIRIC GENTAMICIN DOSING NOMOGRAM IN NEONATES ADMITTED TO THE NEONATAL INTENSIVE CARE UNIT (NICU)

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Aminoglycosides continue to be the drug of choice in neonates with suspected or confirmed sepsis or meningitis. Early achievement of goal serum gentamicin levels has been associated with improved outcomes in patients. Limited data is available regarding appropriate population related variables that should be incorporated in aminoglycoside dosing for neonates. Neonates have an increased volume of distribution and decreased renal function that leads to a longer aminoglycoside half-life. Furthermore, a high inter-individual variation in neonatal pharmacokinetics exists and multiple variables such as birth weight (BW), gestational age (GA), and post menstrual age (PMA) affect gentamicin dosing. Although several different regimens are cited in literature, no consensus on a preferred method to attain goal serum levels is established. The RUMC empiric gentamicin dosing nomogram primarily utilizes BW and post conceptual age (PCA). The primary objective of this study is to evaluate the ability of the RUMC empiric gentamicin dosing nomogram to obtain therapeutic serum gentamicin levels obtained. Secondary objectives include the identification of variables that may result in subtherapeutic or supratherapeutic serum gentamicin levels in this population. In addition to these variables, patient specific pharmacokinetic parameters will be determined to recommend future improvements to the current nomogram. A retrospective, single center review of 200 NICU gentamicin occurrences with both a gentamicin peak and trough obtained was performed. Occurrences were evaluated for associated demographic data, Apgar scores, serum creatinine, urine output, gentamicin dose and interval, indication, serum drug levels, and variables known to affect neonatal renal function including selected medications and neonatal/maternal diagnoses.

### Learning Objectives:

Describe patient specific pharmacokinetics in the neonatal population that affect aminoglycoside dosing strategies.

Identify both maternal and neonatal variables that may impact neonatal renal function.

### Self Assessment Questions:

Which of the following changes in pharmacokinetic parameters affect gentamicin dosing in neonates?

- A: Decreased volume of distribution
- B: Decreased clearance
- C: Increased volume of distribution
- D: B and C

Which of the following variable may adversely affect neonatal renal function?

- A: Indomethacin use for the treatment of PDA
- B: Oligohydramnios
- C: High Apgar Scores at 5 minutes of life
- D: A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-372L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING THE IMPACT OF AN AUGMENTED COMPREHENSIVE MEDICATION REVIEW PAIRED WITH PILL ORGANIZER SERVICE ON HEALTH CARE UTILIZATION

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**Purpose:** The primary aim of this quality assurance project is to evaluate the impact of a comprehensive medication review and assessment paired with a pill organizer service on health care utilization for high risk patients identified by a care management team. **Methods:** Community-dwelling patients who have demonstrated high health care utilization, as defined by (1) primary care visits, (2) urgent care visits, (3) emergency department (ED) visits, (4) hospitalizations, and (5) any combination thereof (e.g., patient visits ED and gets hospitalized), and a lack of responsiveness to nursing-based interventions will be identified for recruitment to a pharmacy-based risk reduction referral service. Members of the health care team (e.g., nurse care managers, clinical pharmacists, providers, etc.) will refer identified patients to the medication review and pill organizer service. The pharmacy will contact referred patients by telephone and offer to complete a comprehensive medication review and assessment (CMR/A), free of charge, in addition to filling the pill organizers. The pharmacy will synchronize the medications for identified patients and will offer delivery of the pill organizers to facilitate medication adherence. Health care utilization variables will be tracked for all patients for one year (6 months prior to contact and 6 months after intervention), and outcomes will be compared between the patients who opted for this service and the patients who declined to participate. **Results:** To be determined. **Conclusions:** The implementation of this service to a targeted population of high risk patients may demonstrate a cost saving to the system by increasing medication adherence and decreasing health care utilization. Findings of this project may support further broadening of patient qualifications and expansion to other pharmacy sites.

### Learning Objectives:

Recognize patients that are high utilizers of the healthcare system  
Identify the impact of pharmacist intervention on healthcare utilization

### Self Assessment Questions:

Which of the following is not considered a component of a high utilizer of the healthcare system?

- A: Hospitalizations
- B: Emergency Department visits
- C: Pharmacy visits for prescription pick-up
- D: Urgent care visits

Which of the following is not recognized as a valuable service performed by the pharmacist or pharmacy?

- A: Diagnosis of underlying disease
- B: Pre-filled medication box
- C: Medication synchronization
- D: Medication reconciliation

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-745L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF THE CURRENT MONITORING PROCESS FOR PATIENTS RECEIVING DIRECT ORAL ANTICOAGULANTS (DOACS) AND ITS IMPACT AT THE CINCINNATI VETERANS AFFAIRS MEDICAL CENTER (CVAMC)

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**Purpose:** The CVAMC implemented an internal monitoring program for patients on DOACs (dabigatran, rivaroxaban, and apixaban). Currently, patients have initial follow-up labs and phone appointments scheduled 2 weeks after initiation, 1 month if the patient originally received the medication from a non-VA pharmacy, and at 3, 6, or 12 month intervals thereafter depending on patients clinical status. The duration is determined by the clinical pharmacist reviewing the consult. The primary objective is to determine the impact of our monitoring program on workload and resource utilization and determine the frequency and types of interventions made by the anticoagulation clinic staff.

**Methods:** This is a quality improvement project which utilizes retrospective chart review. Currently, there are approximately 200 patients approved for DOACs at the CVAMC. Assuming a margin of error of 5% with a 95% confidence interval, a minimum of 133 patients would need to be sampled. Up to a total of 135 patients will attempt to be evaluated (45 patients per group). The review period will be between February 2012 and July 2015. Patients must have had an approved consult for a DOAC, at least 1 successful, documented telephone follow up encounter, and at least one filled DOAC medication at the CVAMC. To assess the primary goal, a chart review will be conducted to collect information such as adverse drug reactions, adherence to therapy, and frequency of follow-up time. Additionally, workload data will be captured from clinic staff to evaluate resources used. Results will be used to determine if changes should be made to the existing program at the CVAMC. **Results and Conclusion:** Data collection in progress. Results and conclusion will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify current monitoring strategies for DOAC therapy at the Cincinnati VA Medical Center  
Review the current eligibility process for receiving DOAC therapy at the Cincinnati VA Medical Center

### Self Assessment Questions:

Based on current practices at the CVAMC, when do patients typically have their first phone follow-up appointment after being approved for a DOAC?

- A: 2 weeks after medication initiation
- B: 3 months after medication initiation
- C: 6 months after medication initiation
- D: 12 months after medication initiation

JD is a 79 y.o. WM who is currently on warfarin for atrial fibrillation. He can no longer make frequent anticoagulation clinic visits for INR checks and is requesting a DOAC. JD has impaired renal fun

- A: Dabigatran
- B: Rivaroxaban
- C: Apixaban
- D: Edoxaban

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-373L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## USE OF ANTIFIBRINOLYTICS IN PEDIATRIC SCOLIOSIS SURGERY

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**Background:** Spinal fusion surgery in pediatric patients with scoliosis has potential for significant amounts of blood loss. Transfusions are sometimes necessary perioperatively and postoperatively. Antifibrinolytic agents such as tranexamic acid (TXA) and ε-aminocaproic acid (EACA) have been studied due to their mechanism of inhibiting the fibrinolytic process and therefore potentially reducing blood loss. TXA and EACA could also potentially reduce transfusion requirements. **Specific Objectives:** The aim of this study was to determine if there is any significant difference in perioperative or postoperative blood loss with the use of TXA or EACA compared to receiving no antifibrinolytic therapy (NAF). Secondary objectives included investigating any difference in transfusion requirements, length of stay, or blood loss laboratory parameters. While outcomes in both the TXA group and the EACA group will be compared to NAF for determination of efficacy, the outcomes in the TXA and EACA groups will also be compared to determine if superiority exists between the two medications. The safety of TXA and EACA was also assessed by adverse events reported postoperatively. **Methods:** In this retrospective analysis, three therapy groups (TXA vs. EACA vs. NAF) were compared based on historical usage of each agent. Data was collected from January 2010 to August 2015, with patients receiving EACA from November 2011 to June 2013 and patients receiving TXA from June 2013 to August 2015. There are 124 patients expected to be included for analysis (NAF=50; TXA=37; EACA=37). Student's t-tests will be performed on all continuous data to determine if there is a significant difference in perioperative or postoperative blood loss. A regression analysis will be performed to minimize confounding variables. A two-tailed p level of 0.05 will be considered statistically significant. **Results and Conclusions:** Data collection and analysis is currently pending but will be presented at the Great Lakes Pharmacy Resident Conference 2016.

### Learning Objectives:

Explain the role of TXA and EACA for reduction of perioperative and postoperative blood loss

State the risks of transfusion therapy

### Self Assessment Questions:

Tranexamic acid (TXA) and ε-aminocaproic acid (EACA) both bind to, and thus inhibit, which part of the fibrinolytic pathway?

- A: Plasminogen
- B: Fibrin
- C: Plasmin
- D: Thrombin

Which of the following is not a risk of transfusion therapy?

- A: Trali
- B: Infection
- C: Iron Overload
- D: Hyponatremia

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-374L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## PHARMACIST-LED TRANSITIONAL CARE PROGRAM ON 30-DAY READMISSIONS, MEDICATION APPROPRIATENESS, AND PATIENT SATISFACTION WITHIN A COMMUNITY HOSPITAL

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**Purpose:** Transitions of care (TOC) is the movement of patients between healthcare locations or providers as conditions and care needs change. During TOC pharmacists may impact patient care and reduce medication related adverse events. Pharmacists play a critical role in reducing medication errors, increasing medication adherence, and providing patient education. The purpose of this study is to assess the effectiveness of a transitional care program utilizing interventions of transitional care pharmacists on 30-day readmission rates, medication appropriateness, and patient satisfaction in patients at Franciscan St. Margaret Health in Hammond, IN. **Method:** This study approved by the Institutional Review Board is a retrospective chart review of patients receiving pharmacist-led TOC services in patients 18 years of age or older with qualifying high risk diagnoses. TOC pharmacists performed admission medication history, admission medication reconciliation, clinical management throughout hospitalization, discharge medication reconciliation, counseling, and post discharge follow-up call to assess medication appropriateness. Electronic health records provided documentation of TOC interventions, patient demographics, and readmission rates. Patient satisfaction scores were gathered from the Hospital Consumer Assessment of Healthcare Providers and Systems Survey (HCAHPS) scores. A comparison of readmission rates and HCAHPS scores pre- and post-TOC pilot program implementation (August-September 2015) was conducted by investigators. **Results:** 122 patients were included during the study period. Pharmacists performed an average of four interventions per patient. Average HCAHPS scores for understanding the purpose of taking medications at discharge increased from 54% to 60% and decreased from 84% to 75% for staff discussing help needed when leaving the hospital. Readmission rates will be presented at the Great Lakes Pharmacy Residency Conference. **Conclusions:** The initial results of the TOC pilot program recognize opportunities for pharmacists to expand the continuity of transitional care services to assist in the management of chronic disease states by increasing access to care.

### Learning Objectives:

Identify the impact of transitional care pharmacists services in a community hospital

Describe interventions made by transitional care pharmacists to improve medication appropriateness

### Self Assessment Questions:

Based on available literature, what service during transitions of care may pharmacists perform to reduce 30-day readmission rates?

- A: Designing follow-up care plan
- B: Performing medication reconciliation
- C: Contacting Primary Care Physician prior to discharge
- D: Providing resources post-discharge for patient assistance program

Based on current study results, most pharmacists interventions occurred at what point of care?

- A: Admission medication history
- B: Admission medication reconciliation
- C: Discharge medication reconciliation
- D: Post discharge follow-up call

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number      0121-9999-16-375L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATION OF INTRAVENOUS PHENYTOIN AND FOSPHENYTOIN LOADING DOSES IN OBESE PATIENTS

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Weight-based intravenous (I.V.) loading doses of phenytoin and fosphenytoin are frequently used for initial therapy in the management of seizure. Intravenous loading doses of phenytoin 10 to 20 mg/kg or fosphenytoin 10 to 20 mg phenytoin equivalents (PE)/kg are typically used in practice. Limited data are available to guide initial loading doses in obese patients. The objective of this study is to determine phenytoin serum concentrations following I.V. phenytoin or fosphenytoin loading doses among obese patients compared to non-obese patients. This is a retrospective, single-center, cohort study. Patients who are over the age of 18 years and have received I.V. phenytoin or fosphenytoin loading doses will be included in the study. Patients will be stratified by body mass index (BMI) into obese (BMI  $\geq$  30 kg/m<sup>2</sup>) and non-obese (BMI < 30 kg/m<sup>2</sup>) groups. The primary outcome will be the percentage of patients achieving a therapeutic total or free phenytoin serum concentration, 10 to 20 mg/L or 1 to 2 mg/L, respectively. Secondary outcomes will include the incidence of hypotension, cardiac arrhythmia, central nervous system depression, and nystagmus. Demographic and clinical parameters (e.g., labs, medication administration history) will be recorded via an automated process and manual chart review. Statistical analysis utilizing a Student's t-test, chi-squared test, and ANOVA will be performed to compare primary and secondary outcomes between obese and non-obese patients. Multivariate logistic regression will identify clinical parameters associated with therapeutic drug levels or adverse effects.

### Learning Objectives:

Define the recommended therapeutic range for free phenytoin serum concentrations.

Identify an adverse effect related to an increasing the phenytoin infusion rate above the maximum recommended rate.

### Self Assessment Questions:

What is the recommended therapeutic range for free phenytoin serum concentrations?

- A 5 - 10 mg/L
- B: 10 - 20 mg/L
- C: 1 - 2 mg/L
- D: 100 - 200 mg/L

What is an adverse effect related to an increasing the phenytoin infusion rate above the maximum recommended rate?

- A Encephalopathy
- B Hypotension
- C Gastrointestinal pain
- D Tremor

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-376L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFICACY OF VANCOMYCIN VERSUS METRONIDAZOLE FOR THE TREATMENT OF CLOSTRIDIUM DIFFICILE INFECTIONS IN A VETERAN POPULATION

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Background: Clostridium difficile (CD) is a gram-positive anaerobic organism often implicated in antibiotic-associated diarrhea and colitis. Clostridium difficile infections (CDI) account for 15-25% of nosocomial antibiotic-associated infections and can result in significant morbidity and mortality. The Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America published the clinical practice guidelines for CDI in 2010. Per these guidelines, initial treatment of a CDI is dependent on severity stratification. Initial infections defined as mild/moderate are treated with oral metronidazole, while infections that meet criteria to be considered severe are treated with oral vancomycin. A recent study provided evidence suggesting vancomycin be the preferred treatment for all CDI severities, not just severe infections, as recommended in current guidelines. The purpose of this study is to compare the efficacy of vancomycin to metronidazole for the treatment of CDIs in a Veteran population. Methods: This study is a retrospective, electronic chart review of patients who received oral metronidazole or vancomycin for the treatment of a CDI between Jan 1, 2003 and Dec 31, 2014. A diagnosis of a CDI was defined as a documented physician diagnosis per medical record in addition to a positive CD EIA or PCR. Microbiology reports were utilized to determine positive CD isolates and only patients experiencing their first CDI were included. Clinical cure and recurrence rates were determined for all included patients. This study also evaluated clinical cure and recurrence rates in subpopulations, including patients on concomitant proton pump inhibitors or immunosuppressants and patients stratified by CDI severity. Results/Conclusions: Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss current guideline recommendations for the treatment of C. difficile infections

Classify the severity of C. difficile infections as either mild/moderate, severe, or severe complicated

### Self Assessment Questions:

Per IDSA guidelines, what is the recommended antibiotic treatment for mild/moderate C. difficile infections?

- A Oral Vancomycin
- B: Oral Fidaxomicin
- C: Oral Metronidazole
- D: IV metronidazole

What is the CDI severity of a patient with a WBC of 20,000 cell/uL, serum creatinine >1.5x baseline, and no other significant sequelae?

- A Mild/moderate
- B Severe
- C Severe, complicated
- D Shock

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-377L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF STRIP PACKAGING VERSUS PILL BOXES ON CHANGE IN MEDICATION ADHERENCE RATES

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**Purpose:** Medication non-adherence, which averages only 50% in developed countries, is a world-wide issue associated with decreased health outcomes and increased healthcare costs. While multiple interventions to improve adherence have been described, head-to-head comparisons have not been widely published. The primary objective of this study is to compare the effects on medication adherence of an adherence packager to pill boxes. Secondary objectives include determining specific patient populations benefiting most from packaging interventions, evaluating the effects of each packaging intervention on changes in adherence before and after implementation, and determining if either intervention increases patient satisfaction. The results of this study will guide adherence packaging enrollment offers at Cleveland Clinic to efficiently achieve improved adherence, improved clinical outcomes, and decreased healthcare costs. **Methods:** A prospective randomized trial will be conducted at Cleveland Clinic Home Delivery Pharmacy. Participants will be randomized to receive either a pill box or an adherence package every 28 days. All participants will receive regular telephone follow up from study personnel twice per month to provide education and to assess adherence using a modified Morisky Medication Adherence Scale. Adherence will also be assessed at the end of the study by calculating proportion of days covered using pharmacy refill records. To determine characteristics of Cleveland Clinics patient population associated with poor medication adherence, a retrospective analysis will be completed using data from Cleveland Clinic pharmacies. Factors assessed include patient age, gender, race, marital status, zip code, comorbid conditions, frequency of medication dosing, and number of chronic medications. Results from this retrospective analysis will be used to help identify patients in the future who may benefit most from adherence interventions available at Cleveland Clinic Pharmacies. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident

### Learning Objectives:

List the five main factors that can influence medication non-adherence  
Recognize how medication non-adherence affects both patients and healthcare systems

### Self Assessment Questions:

Which of the following factors influence medication non-adherence?

- A Patient-, Therapy-, Condition-, Social and Economic-, and Healthc
- B: Patient-, and Therapy-related factors only
- C: Patient-, Therapy-, and Social and Economic-related factors
- D: Social and Economic- and Therapy-related factors

Which of the following statements regarding medication non-adherence is true?

- A Medication non-adherence averages <25% in developed countries
- B Medication non-adherence is associated with decreased health ou
- C Medication non-adherence is associated with decreased healthcar
- D Medication non-adherence only affects patients, not healthcare sy

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-746L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF FACILITY-SPECIFIC RISK FACTORS FOR CLOSTRIDIUM DIFFICILE INFECTION RATES AND IMPLEMENTATION OF STRATEGIES FOR INFECTION RATE REDUCTION

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**Purpose:** Clostridium difficile infection (CDI) is a major cause of infectious diarrhea in healthcare facilities and is associated with increased lengths of stay as well as financial burden. Antibiotic selector and use of proton-pump inhibitors can play a role in the risk of CDI and subsequent reoccurrence. The objective of this study is to evaluate facility-specific risk factors for CDIs and to implement strategies for reduction of infection rates through the recognition of these risk factors as well as health hygiene education to multi-disciplinary staff. **Methods:** This study was submitted to the Institutional Review Board for approval. A retrospective chart review has been performed for patients with an ICD-9-CM diagnosis code for Clostridium difficile as determined by the hospital database between January 2015 and June 2015. Use and duration of antimicrobial agents and proton-pump inhibitors was reviewed. Data is currently being assessed to determine appropriateness of use. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the role of antibiotic and proton-pump inhibitor use in the risk of Clostridium difficile infection and subsequent reoccurrence  
Identify facility-specific risk factors for Clostridium difficile infections for the purpose of implementing strategies for infection rate reduction

### Self Assessment Questions:

According to the current SHEA-IDSA guidelines, Clostridium difficile infections account for \_\_\_\_\_ percent of cases of antibiotic-associated diarrhea.

- A 5-10
- B: 10-20
- C: 20-30
- D: 30-40

Which of the following is a modifiable risk factor for the development of CDI?

- A Advanced age
- B Exposure to antimicrobial agents
- C Gender
- D Ethnicity

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-378L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ADVERSE EFFECTS ASSOCIATED WITH THE USE OF INTRAVENOUS HYDRALAZINE VS. LABETALOL FOR ACUTE MANAGEMENT OF HYPERTENSION

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**Purpose:** In the emergency department, intravenous antihypertensive therapy should ideally be reserved for situations where rapid control of blood pressure is required (e.g. post-thrombolytic administration.) Major guidelines offer little guidance as to the proper management of acute hypertension in the inpatient setting, and more data is needed. In these situations, labetalol and hydralazine are often among the most commonly used agents. Some existing data suggests that the response to hydralazine may vary significantly between patients, with some failing to achieve adequate blood pressure control and others developing hypotension. Hydralazine also has a longer time to onset compared to labetalol and a variable duration of effect. This research aims to provide additional data which may assist in choosing the optimal antihypertensive for management of acutely hypertensive patients. The primary outcome of this retrospective observational study compares the incidence of hypotension associated with the use of intravenous bolus hydralazine versus labetalol. Secondary outcomes will attempt to identify patients at increased risk for developing hypotension, with groups stratified by baseline systolic blood pressure, initial and cumulative dosing, concomitant use of other antihypertensives and agents associated with hypotension. Secondary outcomes will also assess the incidence of other adverse effects, symptoms of hypotension, and interventions required. **Methods:** This single-center, retrospective, observational cohort study will enroll 583 patients for 80% power to achieve a significance level of 0.05 for the primary outcome comparing the incidence of hypotension between the labetalol and hydralazine groups. Adult ICU patients, with the exception of surgical and trauma ICU patients, will be screened for inclusion based on pharmacy charges for intravenous hydralazine or labetalol. Vital signs, basic lab values, medications administered, interventions made for hypotension, demographics, length of stay, and mortality data will be collected for analysis. This study is approved by our local institutional review board.

**Results and conclusions:** Pending completion of data collection and analysis.

### Learning Objectives:

Identify patients appropriate for intravenous antihypertensive therapy.  
Explain pharmacokinetic differences between labetalol and hydralazine

### Self Assessment Questions:

Which of the following patients should receive intravenous antihypertensive therapy?

- A 36 year old male presenting to the emergency department with b/c
- B: 62 year old female with blood pressure 169/94 mmHg who is non-
- C: 59 year old male with acute ischemic stroke who received alteplase
- D: 19 year old female with open femur fracture following a motor vehi

Which of the following options is most likely to result in the fastest blood pressure lowering?

- A Oral labetalol
- B Intravenous labetalol
- C Oral hydralazine
- D Intravenous hydralazine

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-747L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF A "PHARMACIST TO DOSE VANCOMYCIN" PROTOCOL AT AN ACADEMIC MEDICAL CENTER

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**Purpose:** Previous studies have demonstrated reductions in the inappropriate utilization of vancomycin with the use of pharmacy dosing protocols. To ensure therapeutic efficacy while minimizing potential toxicity, such as acute kidney injury (AKI), a "Pharmacist to Dose Vancomycin" protocol was implemented in June 2014 at Loyola University Medical Center. This protocol allows pharmacists to dose, adjust and monitor vancomycin therapy. This study aims to assess the efficacy of the "Pharmacist to Dose Vancomycin" protocol on reducing the occurrence of supratherapeutic vancomycin troughs. **Methods:**

This is a retrospective cohort of patients aged 18 years and older who received vancomycin during their hospital admission. Patients are included if they have received at least two doses of vancomycin and had at least one vancomycin trough. The two groups included those who received vancomycin before the "pharmacist to dose vancomycin" protocol implementation and those who received vancomycin after the implementation. Patients were excluded if they were transferred from an outside hospital already on vancomycin therapy, had AKI upon initiation of vancomycin, had end stage renal disease (ESRD) or renal replacement therapies. The primary outcome is the number of vancomycin troughs greater than 20 mg/L. Secondary outcomes include number of vancomycin troughs greater than 15-20 mg/L, incidence of AKI, mg/kg/dose of vancomycin, number of vancomycin levels drawn, number of initial vancomycin troughs within the protocol goal of 10-15 mg/L, and the time from placement of consult to first pharmacist action. Additionally, results will include a subgroup analysis of the clearance of bacteremia. **Results/Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the potential adverse effects of supratherapeutic vancomycin levels

Identify risk factors for developing nephrotoxicity while receiving intravenous vancomycin.

### Self Assessment Questions:

Risk factors associated with vancomycin related nephrotoxicity include which of the following:

- A Duration of vancomycin therapy
- B: Prematurity at birth
- C: Concurrent topical vancomycin therapy
- D: Gender

Supratherapeutic vancomycin troughs are associated with:

- A Hepatotoxicity
- B Nephrotoxicity
- C Cardiotoxicity
- D Neurotoxicity

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-748L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING THE EFFICACY OF MORPHINE PROTOCOLS TO TREAT NEONATAL ABSTINENCE SYNDROME FOR A LEVEL TWO NURSERY IN A RURAL COMMUNITY HOSPITAL

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**Purpose:** In December, 2014, the protocol for Neonatal Abstinence Syndrome (NAS) at Ephraim McDowell Regional Medical Center (EMRMC) was updated from 0.04mg/kg/dose of morphine every 4 hours to 0.06mg/kg/dose of morphine every 3 hours in effort to improve patient outcomes. The primary goals of NAS protocols are to decrease length of stay and time on replacement drug. The purpose of this study is to evaluate the improvement in these primary goals with the current EMRMC NAS protocol in comparison to the earlier protocol. **Methods:** This study was submitted to the Institutional Review Board for approval. A retrospective chart review will be performed on all neonatal patients born from January 1st, 2014 and December 31st, 2015, diagnosed with NAS that received morphine. Patients will be sorted into two groups, Group 1 will consist of patients who received morphine prior to protocol changes (0.04mg/kg/dose of morphine every 4 hours) that occurred in December of 2014. Group 2 will include those who received morphine after protocol changes (0.06mg/kg/dose of morphine every 3 hours). Data collected will include gender, length of stay, total amount of morphine administered, the initial and peak doses of morphine, gestational age, birth weight, premature/full-term status, maternal drug exposure, number of prenatal care visits, discharge disposition, concurrent diseases/conditions for the neonate, duration of treatment for NAS, and Finnegan scores during admission (initial, peak, and at discharge). All data will be kept confidential, secure and only accessible to the primary investigator. Patient identifiers will be excluded from all presentation materials. Data collected will be reviewed and compared between the groups to determine any impact changes in the NAS protocol has had on length of stay and morphine requirements.

**Results and Conclusions:** To be presented at the Great Lakes Pharmacology Resident Conference.

### Learning Objectives:

Identify morphine regimens for neonatal abstinence syndrome (NAS).  
Recognize how withdrawal severity is quantified in neonates, as well as the importance of reducing length of stay (LOS) for neonates suffering from drug withdrawal.

### Self Assessment Questions:

What is the NAS scoring system recognized by the American Academy of Pediatrics as the most comprehensive system for evaluating NAS symptoms?

- A Lipsitz Tool
- B: Neonatal Withdrawal Inventory
- C: Finnegan Scoring Tool
- D: Ostreao System

Which of the following morphine for NAS protocols are evaluated in this project?

- A Morphine 0.02mg/kg/dose Q6h
- B Morphine 0.04mg/kg/dose Q4h
- C Morphine 0.05mg/kg/dose Q2h
- D Morphine 0.06mg/kg/dose Q4h

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-379L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF CHEMOTHERAPY ADMINISTRATION NEAR THE END OF LIFE

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**Purpose:** The population of patients living with cancer continues to grow as cancer incidence increases and death rates decline. Thus, quality of life and comprehensive care throughout the trajectory of the disease have become a major emphasis within the overall care for the cancer patient. The National Comprehensive Cancer Network (NCCN), Commission on Cancer (CoC), and the American Society of Clinical Oncology (ASCO) have published guidelines to help care teams provide optimal end-of-life care. In 2013, ASCO published a standard specifically evaluating chemotherapy administration within the last two weeks of life, suggesting a benchmark standard of less than ten percent. However, higher rates have been demonstrated in several studies. The purpose of this study is to compare the frequency of biotherapy/chemotherapy administration two and four weeks prior to death at the University of Cincinnati Medical Center (UCMC) to previous literature and guideline recommendations. **Methods:** Single-center, retrospective chart-review including patients at least 18 years of age, deceased, received chemotherapy/biotherapy treatment at a UCMC inpatient or infusion suite for a malignant disorder in 2014, received chemotherapy/biotherapy within one year of death, and had a Beacon chemotherapy/biotherapy treatment plan for a malignant disorder. Patients who received oral chemotherapy only, and whose date of death was unable to be determined will be excluded from this study. The frequency of chemotherapy/biotherapy administration two and four weeks prior to death will be compared to literature and guideline recommendations using a chi-square test. Secondary endpoints include describing the goals of care, treatment line, and performance status for patients who received chemotherapy/biotherapy near the end of life, as well as describing the frequency of palliative care plans with full dose chemotherapy/biotherapy and reduced dose chemotherapy/biotherapy. Descriptive statistics will be used to evaluate these secondary endpoints. **Results/Conclusions:** Data collection and analysis are ongoing.

### Learning Objectives:

Define palliative care and discuss its role in comprehensive cancer care  
Review end of life guideline recommendations regarding chemotherapy/biotherapy.

### Self Assessment Questions:

Which of the following statements is correct regarding the role of palliative care in comprehensive cancer care?

- A Addresses issues related to patient suffering
- B: Should be initiated within two weeks prior to death
- C: Focus is based on hospice care
- D: Implemented to have a negative impact on quality of life

Recommendations for end of life care include which of the following?

- A Reduction in chemotherapy administration within the last two weeks
- B Consideration for chemotherapy discontinuation with an estimated
- C Referral to hospice with an estimated life expectancy of months to
- D Initiating palliative care services with an estimated life expectancy

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-380L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE EFFECT OF HEPARINIZATION ON OUTCOMES OF THERAPEUTIC HYPOTHERMIA

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Therapeutic hypothermia is the standard of care in unresponsive survivors of cardiac arrest and is supported by the American Heart Association guidelines for post-cardiac arrest care. At the Detroit Medical Center (DMC), therapeutic hypothermia is routinely used in unresponsive survivors of cardiac arrest in an effort to improve neurologic outcomes. Survivors of cardiac arrest often have evidence of systemic coagulopathy leading to microvascular thrombosis and organ dysfunction. Previous studies indicate that anticoagulation could potentially increase survival in post-cardiac arrest patients. The objective of this study is to determine if patients who received anticoagulation with IV unfractionated heparin during therapeutic hypothermia had more favorable outcomes than patients who did not receive heparin therapy. This is a retrospective chart review of patients who received therapeutic hypothermia protocol at Detroit Receiving Hospital and Harper University Hospital from September 2009 through September 2015. Clinical outcomes, as measured by Cerebral Performance Category (CPC) at discharge, will be compared between patients who received IV heparin post-cardiac arrest during therapeutic hypothermia and those who did not receive heparin. A CPC score of 1 or 2 will be considered a favorable outcome, whereas a CPC score of 3, 4, or 5 will be considered unfavorable. Other data being collected includes age, gender, comorbidities, initial rhythm, in-hospital versus out-of-hospital arrest, aPTT within the first 24 hours of heparinization, anticoagulation prior to admission, down time, and post-arrest serum lactate. Data collection is currently in progress for the 329 patients included in the study. The results and conclusions are scheduled to be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the pathophysiology related to cardiac arrest and post-cardiac arrest syndrome

Discuss previous and current literature involving the effects of anticoagulation on outcomes in post-cardiac arrest patients

### Self Assessment Questions:

1. According to the 2015 American Heart Association guidelines for post-cardiac arrest care, all comatose adult patients with return of spontaneous circulation (ROSC) after cardiac arrest should have

- A: 32°C
- B: 33°C
- C: 36°C
- D: 32°C to 36°C

2. Cerebral Performance Category (CPC) score is often used to measure neurological outcomes of post-cardiac arrest patients. Which of the following describes a patient with a CPC score of 2?

- A: A patient with minimal neurological deficits and able to work
- B: A patient with severe disability, requiring assistance for daily living
- C: A patient who has moderate cerebral disability, but able to work in
- D: A patient in a coma

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-381L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PHARMACIST LED IMPLEMENTATION OF A BASAL-BOLUS INSULIN PROTOCOL FOR THE MANAGEMENT OF DIABETES MELLITUS AND INPATIENT HYPERGLYCEMIA IN A COMMUNITY TEACHING HOSPITAL

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Purpose: Less than optimal glycemic control is frequent in hospitalized patients. Although sliding scale insulin (SSI) regimens are prescribed for many patients, they have been shown to be less effective than a basal-bolus insulin strategy. The American Association of Clinical Endocrinologists (AACE), American Diabetes Association (ADA), and The Endocrine Society (TES) all strongly discourage the use of SSI. Currently, there is no protocol for the management of inpatient hyperglycemia at St. Joseph Mercy Oakland (SJMO), and hyperglycemia is often managed with oral agents and SSI. The purpose of this study is to implement, and assess the safety and efficacy of, a basal-bolus insulin protocol for the management of inpatient hyperglycemia associated with diabetes mellitus in a non-critical care setting. Methods: This is a prospective interventional study which will comprise of patients with a diagnosis of diabetes and/or inpatient hyperglycemia. The control group will consist of academic medicine patients treated according to current practice at SJMO. The intervention group will consist of academic medicine patients managed with the basal-bolus insulin protocol. The blood glucose data for each patient will be collected at least four times daily, before each meal and at bedtime, and every 4-6 hours for patients who are NPO or receiving continuous enteral feedings. The blood glucose goal range includes a fasting/pre-meal BG of < 140 mg/dL and a random BG reading of < 180 mg/dL. Blood glucose control will be assessed through point of care (POC) blood glucose readings. The number of hypoglycemic events (defined as BG of < 70 mg/dL), and the number of severe hypoglycemic events (defined as < 40 mg/dL) will be collected. Barriers to the implementation of such protocol will also be gathered. Results and Conclusions: Study is currently ongoing and data collection and analysis will follow.

### Learning Objectives:

Identify barriers to implementing a new protocol for the inpatient management of hyperglycemia in a community teaching hospital.

List the patient characteristics which are used to determine the Total Daily Dose (TDD) of insulin required for an insulin naive patient.

### Self Assessment Questions:

Which of the following are barriers to the implementation of a basal-bolus insulin protocol for management of inpatient hyperglycemia:

- A: Improper omission of insulin doses
- B: Timing of meals
- C: Fear of hypoglycemia
- D: All of the above

All of the following are patient characteristics used to determine an insulin naive patient's TDD except:

- A: Gfr
- B: Hemoglobin A1C
- C: Age
- D: Weight

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-382L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION AND IMPLEMENTATION OF WEIGHING PRACTICES AT A COMMUNITY HEALTH SYSTEM TO IMPROVE COMPLIANCE TO BEST PRACTICE GUIDELINES

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**Purpose** Patient safety organizations, such as the Institute for Safe Medication Practices (ISMP), the Pennsylvania Patient Safety Authority (PA PSA), and ECRI Institute emphasize the importance of obtaining and documenting accurate patient weights. Clinical decision making often requires assessment of patient weights to guide therapy in situations such as medication dosing, fluid management, and calculation of renal function. Inaccurately obtaining, documenting, or communicating patient weight can lead to potential dosing errors. These errors may be preventable with the adoption of specific prevention and mitigation strategies. Organizations including ISMP, PA PSA, ECRI Institute, the Royal College of Nursing (RCN), the National Institute for Health and Care Excellence (NICE), and the Oncology Nursing Society (ONS) describe best practices regarding the management of patient weights. The purpose of this project is to review weight-related best practices and assess current practices at a community health system in order to identify areas for improvement and implement processes for increased compliance with best practice guidelines. **Methods** This quality improvement project is exempt from review from the Institutional Review Board. To develop a list of best practices, a targeted review of published best practices from several patient safety organizations was conducted. Best practices were compiled, categorized into topics, and redundancies were removed. Current practices and policies regarding patient weights were evaluated. A gap analysis was performed to assess the compliance of best practices and identify areas for improvement. Data involving an existing EMR alert regarding weight was reviewed for trends to identify further areas for improvement. Data was analyzed using descriptive statistics. A multidisciplinary taskforce was assembled to review the best practices and alert data to develop and implement strategies to improve compliance with the identified best practices. **Conclusion** A summary of results and conclusions will be presented at the 2016 Great Lakes Residency Conference.

### Learning Objectives:

Describe types of errors involving inaccurate patient weights  
Review strategies to increase the ability to maintain accurate patient weights

### Self Assessment Questions:

Dosing errors involving inaccurate patient weights can occur due to:

- A Incorrect estimated weight
- B: Confusion between pounds and kilograms
- C: Mix-up between ideal and actual body weight
- D: All of the above

Which of the following strategies can be employed to reduce errors when documenting patient weights?

- A Obtain alternative scales (e.g. cart scales) to weigh patients who are unable to stand
- B Lock scales to weigh in kilograms only
- C Implement weight-based dose alerts in the order entry system
- D Remove high-alert medications from clinical areas

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-911L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPROVING ANTIMICROBIAL STEWARDSHIP EFFICIENCY: IMPLEMENTATION OF AN ALERT-BASED CLINICAL DECISION SUPPORT SYSTEM

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**Purpose:** National organizations advocate for the development of antimicrobial stewardship (AMS) initiatives with clinical decision support systems (CDSS). The current AMS practice at UW Health is to evaluate all patients on antimicrobials. UW Health pursued the development of CDSS within its own electronic health record (EHR), Epic. The CDSS scoring tool is designed to prioritize patients that may require monitoring by the AMS team. This project aims to improve AMS pharmacist work efficiency while maintaining high-quality patient interventions through the development and implementation of a patient scoring tool within Epic. **Methods:** This is a single-center, prospective study conducted at UW Health evaluating pre- and post-implementation of the scoring tool between September 2015 and June 2016. A focus group consisting of infectious diseases physicians and pharmacists reviewed common safety errors related to antimicrobials through University Health Consortium Patient Safety Net (PSN)/Datix software. The scoring tool was developed using PSN reports, literature review and clinical practice experience. Each rule was validated for precision and accuracy in Epic, measuring the percentage it fired appropriately and inappropriately given a patient's clinical scenario. The primary outcomes are precision and accuracy of the scoring tool. Secondary outcomes include work efficiency and interventions. **Preliminary Results:** One hundred forty eight rules were built focused on monitoring (62%), optimization (10%), therapy duplication (8%) and interactions (7%). Scoring tool refinement for accuracy and precision is in progress. The 5-day pre-implementation mean work efficiency was 1.07 minutes per patient. The AMS pharmacist identified 123 interventions communicated to physicians and pharmacists. Ninety-three percent of formal recommendations (n=62) were accepted with or without modification. **Conclusion:** UW Health is developing, implementing, and refining a CDSS scoring tool in Epic by creating rules based on our patient safety database, national guidelines, and previous experience. Final results will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the core strategies of health system antimicrobial stewardship programs.  
Discuss the impact of a clinical decision support system on antimicrobial stewardship initiatives.

### Self Assessment Questions:

Proactive core strategies for antimicrobial stewardship programs include

- A Prospective audit with intervention and feedback and formulary review
- B: Requirement of ID consult service for all infections and antimicrobials
- C: Prospective audit with intervention and feedback and requirement of ID consult service for all infections
- D: Antimicrobial cycling and requirement of ID consult service for all infections

Implementation of clinical decision support system to support antimicrobial stewardship initiatives is associated with

- A Increased adherence to antimicrobial guidelines and protocols
- B Improvement in antimicrobial susceptibility rates
- C Increased antimicrobial utilization and cost
- D A and B

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-749L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF SMOKING CESSATION OUTCOMES IN THE PATIENT ALIGNED CARE TEAM AND SMOKING CESSATION CLINIC

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**Purpose:** Smoking is the number one preventable cause of death in the United States. The transdermal nicotine patch is one of the first-line pharmacotherapies for smoking cessation and has been shown to double quit rates. Combining behavioral support and medications can further increase success rates. Currently, prescribing of the nicotine patch is open to all Patient Aligned Care Team (PACT) providers at Jesse Brown Veterans Affairs Medical Center (JBVAMC). Additional smoking cessation support includes the smoking cessation clinic (SCC) where patients are seen individually for focused smoking cessation interventions by the pharmacist and in a group for counseling by the psychologist. The use of the nicotine patch and smoking cessation outcomes have not been compared between PACT and SCC. The purpose of the study is to evaluate the impact of nicotine patch utilization in the PACT clinic compared to the specialty SCC at JBVAMC. The primary objective of this study is to determine the efficacy of the nicotine patch for smoking cessation in the PACT clinic compared with the specialty SCC. Additional objectives include comparing time to smoking cessation, follow up, and methods of referral from the provider to the SCC or PACT pharmacist. **Methods:** This study will be a retrospective, electronic chart review of patients newly initiated on nicotine patch at JBVAMC. Patients who received an initial prescription for transdermal nicotine patch at JBVAMC between July 1, 2014 and March 31, 2015 will be evaluated for study inclusion. Initial prescription will be defined as no previous nicotine patch filled within the past 3 months. The results of the study may be utilized to implement quality improvements and add to literature on smoking cessation. **Results & Conclusions:** Data collection is ongoing. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define appropriate pharmacotherapy options for smoking cessation.  
Recognize obstacles patients may experience during smoking cessation

### Self Assessment Questions:

Which of the following is a recommended pharmacotherapeutic option for a patient who wants to quit smoking?

- A Counseling
- B: Albuterol inhaler
- C: Nicotine patch
- D: Electronic cigarettes

Which of the following is an obstacle in achieving smoking cessation?

- A Withdrawal symptoms
- B Cost of cigarettes
- C Breaking habits and routine
- D Both A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-383L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF TARGETED ADHERENCE CALLS AMONG A MARKETPLACE POPULATION

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**Purpose:** Beginning fall 2016, Qualified Health Plans must display quality ratings defined by the Centers for Medicare and Medicaid Services Quality Rating System (QRS). The ratings comprise of 43 measures including patient adherence to blood pressure, cholesterol, and diabetes medications. A patient outreach call program was implemented to address adherence. Pharmacists within the Clinical Pharmacy Services division of a health plan contacted patients to address barriers including side effects, education, financial, and forgetfulness. The objective of this study is to evaluate the effectiveness of a patient outreach call program on medication adherence to blood pressure, cholesterol, and diabetes medications. **Methods:** This study received a Not Regulated status by the Institutional Review Board. Patients 18 years or older, continuously enrolled in Marketplace health plans between January 1, 2015 and January 31, 2016, and eligible for the Blue Cross Blue Shield of Michigan (BCBSM) QRS Adherence Call Program will be included in the study. Patients are eligible for the call program if they have two or more pharmacy claims for a blood pressure, cholesterol, or diabetes (non-insulin) medication during the baseline period (January 1, 2015 through May 1, 2015) and non-adherent, defined as Proportion of Days Covered (PDC) less than 80 percent. PDC is calculated by the number of days a patient is covered by medication divided by the treatment period. Interventions occurred June 9 through September 30, 2015, consisting of patient outreach calls focused on identifying and resolving any issues in patients medication-taking habits. Due to BCBSMs large population size and patient unavailability, not all eligible patients received an intervention and those who did not will serve as the control group. Effectiveness of the call program will be assessed by comparing the percent change in aggregate PDC rates between the baseline period and 120-day post-period of the intervention and control groups.

**Results/Conclusion:** Data collection and analysis are ongoing.

### Learning Objectives:

Define nonadherence as put forth by the Quality Rating Systems Proportion of Days Covered measure.  
Describe the impact of the Blue Cross Blue Shield of Michigan's Quality Rating System Adherence Call Program.

### Self Assessment Questions:

The Quality Rating System is developed and administered by which of the following agencies?

- A Centers for Medicare & Medicaid Services
- B: Agency for Healthcare Research and Quality
- C: The Joint Commission
- D: National Quality Alliance

The Proportion of Days Covered measure gauges adherence to which of the following drug classes?

- A Statins
- B Renin-Angiotensin System Antagonists
- C Insulins
- D A & b

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-384L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IDENTIFYING, EVALUATING, AND IMPLEMENTING COMPUTER ASSISTED PRESCRIBING USING PATIENT-SPECIFIC CLINICAL DECISION SUPPORT

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**Purpose:** There are various points during the prescribing process to use clinical decision support (CDS). Three key areas for CDS involvement within the prescribing process follow a continuum from start to finish with a proactive, order entry, and order signing phase. Providers are often inundated with many active and interruptive CDS tools being used primarily at the tail end of the process (i.e. at order signing) and many of these tools are not patient-specific. There is utility in exploring the application of patient-specific CDS in other phases of the prescribing process and assessing the outcomes associated with the implementation of these support tools. The purpose of this project is to concentrate efforts on providing patient-specific decision support across the whole spectrum of the prescribing process and ultimately demonstrate the value, limitations, and usability for the different tools. **Methods:** Three patient-specific CDS use cases were identified with the first being dose modification recommendations based on patient specific lab results to providers within the context of oncology clinics. The second use case was developed for inappropriate ordering of adult order sets on pediatric patients based on patient age within an inpatient context using order set group restrictors. The third use case auto-populated NICU parenteral components during order entry. Post-implementation data included the differences in the number of dose modifications made for select treatment plans, amount of pre-identified adult order sets placed on pediatric patients, number of hypoglycemic events in NICU patients, and time spent during NICU parenteral nutrition order input when compared to pre-implementation data.

**Results/Conclusions:** Data collection and analysis are in progress. The results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize novel strategies to improve patient care and provider interaction with the electronic health record through the use of patient-specific clinical decision support tools during prescribing  
Describe limitations faced during implementation of patient-specific clinical decision support tools

### Self Assessment Questions:

What can be used as patient-specific criteria to improve the prescribing process?

- A Absolute Neutrophil Count (ANC) and platelets
- B: Age and weight
- C: Attending physician
- D: A and B

Which of the following are limitations experienced during implementation of patient-specific decision support tools?

- A Increased efficiency
- B Schedule coordination with other project teams
- C Obtaining various approvals
- D B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-912L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## NEGATIVE PREDICTIVE VALUE OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) NASAL POLYMERASE CHAIN REACTION (PCR) IN CRITICAL CARE PATIENTS WITH PNEUMONIA

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**Purpose:** Pneumonia, specifically hospital-acquired (HAP), healthcare-associated (HCAP), and ventilator-associated (VAP), results in 25% of all Intensive Care Unit (ICU) admissions and accounts for 50% of all antibiotics prescribed on these units. Recommended empiric therapy includes antimicrobials targeted towards drug resistant bacteria, including MRSA. The use of MRSA nasal PCR may exclude MRSA as a likely pathogen, leading to discontinuation of MRSA targeted empiric antibiotics. The objective of this study was to establish the negative predictive value (NPV) of MRSA nasal PCR for MRSA pneumonia in critical care units. Previous investigations of this value have produced conflicting results in medical literature. **Methods:** This study was a retrospective chart review approved by the Institutional Review Board. Charts were reviewed for patients admitted to 7 critical care units at two tertiary medical centers within the same health system between May 1, 2014 and October 31, 2015. Patients were included if they had a diagnosis of pneumonia, were started on empiric vancomycin or linezolid, had a MRSA nasal PCR performed, and had either sputum or broncho-alveolar lavage (BAL) cultures obtained during the same critical care admission. Patient charts were reviewed for MRSA nasal PCR date and result, sputum and BAL culture date and results, oxygen delivery method, and hospital unit. All data was stored without patient identifiers and maintained confidentially by the primary investigator. Collected data was analyzed to calculate the NPV and positive predictive value (PPV) for patients admitted to system critical care units and these values were further stratified by oxygen delivery method and specific hospital unit.

**Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the utility of MRSA nasal PCR in patients admitted to critical care units with the diagnosis of pneumonia and started on empiric vancomycin  
Identify how MRSA nasal PCR may aid in the current standard of care when identifying pneumonia pathogens

### Self Assessment Questions:

The utility of using the MRSA Nasal PCR is due to its \_\_\_\_\_ of MRSA pneumonia.

- A Positive Predictive Value (PPV)
- B: Negative Predictive Value (NPV)
- C: Specificity
- D: Sensitivity

What is considered the "Gold Standard" for identifying causative pathogens of pneumonia?

- A Blood Cultures
- B Urinary Antigens
- C Broncho-Alveolar Lavage
- D Mrsa pc

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-385L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF AN INSURANCE CLAIMS DENIALS PREVENTION PROGRAM AT TWO OUTPATIENT HOSPITAL-BASED INFUSION CENTERS

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**Purpose:** High cost medications are increasing at a rate of 20 percent annually and predicted to represent 50 percent of total health plan pharmacy costs by 2018. The Centers for Medicare and Medicaid Services make quarterly updates of medication coverage, which affect claims reimbursement for high cost medications. Additionally, claims reimbursement is affected by payer types and non-standardized clinical criteria imposed by payers. OhioHealth infusion centers receive referrals from various medical practices for infusion services. No formal denials management process is in place. Insurance verification and prior authorization approval status are assumed to be completed by the referring practice prior to infusion. Recurring denials prompted a thorough review of insurance verification and prior authorization processes. The objective of the study is to evaluate a denials prevention program for infliximab therapy at two outpatient hospital-based infusion centers. **Methods:** A descriptive, observational pre-post implementation analysis will be conducted for all insurance claims for infliximab therapy at OhioHealth Bing Cancer and Infusion Center and OhioHealth Grant Arthritis Infusion Center. A denials prevention team, led by pharmacy services, will consist of reimbursement analysts, patient assistance coordinator, infusion center registration and scheduling, and clinical staff to establish integrated workflow processes with a new electronic health record system. Outcomes will include insurance claims denials, financial performance, and funding received via manufacturer sponsored co-pay assistance programs. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the emerging health plan medical policy changes focused on high cost infusion therapies.  
Discuss pre-certification and prior-authorization strategies to mitigate fiscal risk to health systems.

### Self Assessment Questions:

Which of the following is a site of service strategy being implemented by health plans?

- A Through prior authorization
- B: Written communication with members
- C: Discussion with health system leadership
- D: Collaboration with pharmacy services

Which of the following stakeholders play a key role in providing patients with information on patient assistance programs?

- A Physician
- B Nurse
- C Financial advocate
- D Scheduler

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-750L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING THE MANAGEMENT AND CHANGE IN GLYCEMIC CONTROL AFTER DISCONTINUATION OF METFORMIN IN PATIENTS WITH ELEVATED SERUM CREATININE

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**Purpose:** To determine the change in A1c after discontinuation of metformin due to increase in Serum Creatinine (SCr) at the Huntington Veterans Affairs Medical Center (HVAMC). The goal is to assess the change in glycemic control and review subsequent management of Veterans discontinued off metformin due to elevated Serum Creatinine. **Methods:** A retrospective study will be conducted at HVAMC reviewing patients in which metformin was discontinued due to elevated SCr. Up to 200 randomly generated patients will be evaluated in which metformin was discontinued due to elevated SCr between 09/01/2009 and 09/01/2014. The primary endpoint will be to determine the change in A1c after discontinuation of metformin. Also, the management of diabetes will be reviewed after discontinuation of metformin. Charts will be reviewed to determine other secondary endpoints as well including: incidence of lactic acidosis, time to next recorded SCr after discontinuation of metformin, and was metformin re-initiated if next recorded SCr below 1.5mg/dl. **Results:** Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review current ADA guideline recommendations for goals and management of diabetes mellitus  
Discuss the role of metformin in Diabetes Mellitus management

### Self Assessment Questions:

Which of the following best describes the goal A1c for Type II Diabetics according to the ADA ?

- A <5%
- B: <6.5%
- C: <7%
- D: <8 %

Metformin may cause which of the following?

- A Folic acid deficiency
- B Vitamin B12 deficiency
- C All of the above
- D None of the above

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-386L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PHYSICIAN ACCEPTANCE RATE OF PHARMACISTS' RECOMMENDATIONS RELATED TO MEDICARE STAR RATINGS

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**Purpose:** To determine the physician acceptance rate of pharmacists recommendations specifically related to two Medicare Part D Star Ratings: the use of statins for primary prevention in patients with diabetes and appropriate use of high-risk medications in elderly. The secondary objective was to assess factors associated with physician acceptance. **Methods:** This was a retrospective cohort study of Medicare Part D beneficiaries who may or may not have received a comprehensive medication review (CMR) at a regional grocery store chain pharmacy between January 1st, 2014 and October 31st, 2015. An online tool for managing medication therapy management (MTM) cases was used to identify patients who were assigned a therapeutic intervention program (TIP) for high-risk medication use or for ensuring patients with diabetes were being treated with a statin. Patient demographic information including age, gender, current chronic conditions, and medications was recorded. Data related to pharmacists credentials (i.e., clinical lead pharmacist, PGY-1 trained, etc.) and physician type (primary care or specialist) was also collected. Upon determining the rate of physician acceptance for the two Star rating recommendations, post-hoc analyses to evaluate predictors of physician acceptance was performed. **Results and Conclusions:** Data collection is complete and data analyses are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize Medicare Part D Star Ratings quality measures that are impacted by community pharmacists as of 2016.

Identify which measure was tested by Centers for Medicare and Medicaid Services (CMS) during 2015 to support the ACC/AHA 2013 blood cholesterol guidelines.

### Self Assessment Questions:

Which of the following Medicare Part D Star Ratings quality measure is NOT impacted directly by community pharmacists?

- A: Drug Plan Quality Improvement
- B: High Risk Medication use in elderly
- C: Medication Adherence for Cholesterol (Statins)
- D: MTM Program Completion Rate for CMR

Which of the following measures were tested by CMS in 2015 and will be evaluated for addition as a future Part D Star Rating?

- A: Moderate- to high- intensity statin therapy for secondary prevention
- B: Moderate- to high- intensity statin therapy for primary prevention for
- C: Moderate- to high- intensity statin therapy for primary prevention for
- D: Moderate intensity statin therapy for secondary prevention for patients

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-387L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## POSTOPERATIVE PAIN MANAGEMENT IN TOTAL JOINT ARTHROPLASTY AFTER IMPLEMENTATION OF A MULTIMODAL ANALGESIA APPROACH

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**Purpose:** The purported outcomes of a multimodal analgesia order set for patients undergoing Total Joint Arthroplasty (TJA) are to reduce the patient perception of pain and avoid adverse medication events resulting from the overuse of opioids and other agents to control pain. As the incidence of TJA procedures continues to rise, the importance of pain management post-operatively remains vital and is an essential aspect of complete patient care. This study will evaluate the effect on pain scores and adverse event rates after the implementation of a multimodal analgesia order set at a specialty orthopedic hospital. **Methods:** TJA procedures that took place between August 2014 and September 2015 were analyzed for eligibility into this retrospective chart review. The post order set implementation group (n=100) is composed of patients who underwent TJA after implementation of the multimodal analgesia order set. The control group is composed of matched TJA cases (n=100) that occurred prior to implementation of the order set. The cases were matched on the characteristics of age, sex, type of joint, unilateral or bilateral procedure, and whether the patient was considered opioid tolerant prior to the TJA. The primary outcome measure is patient reported pain scores at 1, 6, 12, 24, 36, and 48 hours postoperatively. Secondary outcomes are the comparison of oral morphine equivalents (OME) utilized to manage pain at 24 hours and up to 48 hours, adverse event occurrence, and total cost of stay. **Results & Conclusions:** Data analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify classes of medications commonly utilized as part of a multimodal analgesia approach

Discuss the primary benefits of utilizing a multimodal analgesia approach after Total Joint Arthroplasty (TJA)

### Self Assessment Questions:

Which of the following classes of medications is NOT commonly utilized as part of a multimodal analgesia approach following Total Joint Arthroplasty (TJA)?

- A: Non-steroidal anti-inflammatory agents
- B: Benzodiazepines
- C: Neuropathic agents
- D: Opioids

What is a primary benefit of utilizing a multimodal analgesia approach for pain management after Total Joint Arthroplasty (TJA)?

- A: To increase reimbursement scores
- B: To decrease length of stay
- C: To minimize opioid use
- D: To produce adequate sedation

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-388L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

**SAFETY AND EFFICACY OF DIRECT ORAL ANTICOAGULANT (DOAC) USE IN PATIENTS WHO COMPLETED CATHETER-DIRECTED THROMBOLYSIS WITH THE ENDOWAVE SYSTEM**

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**Purpose:** There are an increasing number of patients started on direct oral anticoagulants after an endowave catheter procedure to treat acute thrombosis. However, there is limited efficacy or safety data to support use of these drugs in this population. The purpose of this study is to describe the safety and efficacy in patients with venous or arterial thromboembolism who undergo endowave catheter placement and are started on a direct oral anticoagulant, to describe the prescribing patterns of anticoagulation in this population, and to describe the impact of direct oral anticoagulants on hospital length of stay. **Methods:** This study is approved by the Institutional Review Board and is a retrospective chart review. Data will be obtained from the electronic medical record for all patients who underwent endowave catheter-directed thrombolysis from July 2010 to December 2015. Data will be collected to include weight, age, height, length of hospital stay (total), length of intensive care unit stay, complete blood count (baseline and every six hours post endowave catheter insertion), BUN/SCr (baseline and daily), liver function tests (baseline), fibrinogen (baseline and daily), co-morbidities, concomitant antiplatelet agents, concomitant systemic anticoagulation, total tPA dose infused (bolus + infusion) start time/date and stop time/date, vasopressor requirement, anticoagulant/direct oral anticoagulant agent used, oral anticoagulant start time/date, oral anticoagulant dosing regimen, therapeutic anticoagulation on discharge, minor bleeding, major bleeding, in hospital mortality, 30-day mortality, recurrent thromboembolism within 90 days, 30-day readmission, arterial thrombosis, any other thromboembolic event, IVC filter placement, blood pressure (baseline), heart rate (baseline), right ventricle diameter/left ventricle diameter ratio, BNP, N-terminal pro-BNP, troponin I, troponin T. Data will be grouped based on type of oral anticoagulation utilized. Data will be analyzed using descriptive statistics to evaluate study outcomes. **Results/Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference

**Learning Objectives:**

Describe the indications for utilizing the endowave system.

Discuss safety and efficacy of the direct oral anticoagulants for the treatment of venous or arterial thromboembolism following treatment with the endowave system.

**Self Assessment Questions:**

A massive pulmonary embolism is characterized by:

- A: Persistent tachycardia for  $\geq 15$  minutes
- B: Systolic blood pressure (SBP)  $\geq 90$  mmHg
- C: Right ventricle/Left ventricle diameter  $< 0.9$
- D: Systolic (SBP)  $< 90$  mmHg for  $\geq 15$  minutes

Which of the following direct oral anticoagulants was found in clinical trials to be superior to warfarin in regards to bleeding events?

- A: Rivaroxaban
- B: Apixaban
- C: Dabigatran
- D: Edoxaban

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-389L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**VANCOMYCIN PHARMACOKINETICS IN CRITICALLY ILL PATIENTS RECEIVING CONTINUOUS RENAL REPLACEMENT THERAPY AND ASSESSMENT OF A PHARMACY-TO-DOSE PROTOCOL**

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**Purpose:** Continuous renal replacement therapy (CRRT) results in alterations in the pharmacokinetics of many antimicrobials, including vancomycin. The objective of this study was to assess the ability of a pharmacy-to-dose protocol to achieve target vancomycin concentrations in CRRT patients. **Methods:** This retrospective, observational study included adult burn, medical, or surgical/trauma ICU patients who received vancomycin during CRRT and had at least one vancomycin concentration measured between 8/1/13-10/1/15. The primary endpoint was percentage of vancomycin concentrations between 10-20 mcg/mL with additional secondary endpoints reported below. The pharmacy-to-dose protocol recommends a 15-20 mg/kg/dose with frequency based on the CRRT flow rate. Data below are presented as mean+SD or median (IQR). **Results:** Thirty-five adults were included (63% male), age of 54+6 years, and BMI of 30.4 (17.3, 35.1). The most common indications for vancomycin therapy included pneumonia (51%, n=18) and bacteremia (40%, n=14). The maintenance dose was 16.3 (15.4, 17.6) mg/kg and duration of therapy was 5 (3, 6) days. Sixty percent (n=21) of patients were dosed intermittently and received 1 (1, 3) dose prior to initial vancomycin concentration. Time between dose and concentration was 24.9 (22.9, 39.9) hours. Eighteen (51%) initial vancomycin concentrations were between 10-20 mcg/mL [12.1 (8.8, 18.9) mcg/mL]. Nine patients had repeat concentrations and 67% were within range (14.5+6.0 mcg/mL). CRRT flow rate was 2200 (2000, 3000) mL/hr and CRRT was running 69% (33, 96) of the time between vancomycin dose and concentration. Of 15 patients with infections due to Gram-positive organisms, positive microbiological outcome was achieved in 80% (n=12). Length of ICU stay was 11 (5, 19) days, hospital length of stay was 14 (7, 22) days, and overall mortality was 63%. **Conclusions:** A vancomycin pharmacy-to-dose protocol for CRRT patients resulted in 55% (N=44) of concentrations between 10-20 mcg/mL. Additional subgroup analyses will be conducted to provide further direction for the protocol.

**Learning Objectives:**

Recognize factors that determine drug clearance in continuous renal replacement therapy

Identify initial vancomycin dosing recommendations in patients receiving continuous renal replacement therapy

**Self Assessment Questions:**

Which of the following may increase vancomycin clearance in patients receiving continuous renal replacement therapy?

- A: Decreased filtration rate
- B: Decreased blood volume rate
- C: Increased frequency of administration of vancomycin
- D: Increased residual renal function

Based on a continuous renal replacement therapy flow rate of 2000 mL/hr, select the estimated creatinine clearance in mL/min for vancomycin.

- A: 25
- B: 35
- C: 40
- D: 50

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-390L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RETROSPECTIVE ANALYSIS OF ANTIEPILEPTIC USE FOR POSTTRAUMATIC BRAIN INJURY SEIZURE PREVENTION

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**Purpose:** Seizure prophylaxis after severe traumatic brain injury (TBI), defined as a Glasgow Coma Scale (GCS) score less than eight, is the standard of care according to the Brain Trauma Foundation. Prompt initiation of antiepileptics can decrease the incidence of early posttraumatic seizures and prevent elevations in intracranial pressure secondary to seizures. It is also critical for antiepileptics to be discontinued after seven days if there has been no evidence of seizures. No clinical trials have shown these agents decrease the incidence of late posttraumatic seizures, defined as seizures occurring greater than seven days after brain injury. In this setting, discontinuing antiepileptics will also prevent adverse drug events from exposure to long-term therapy. At a tertiary care center, streamlined order processing for seizure prophylaxis in TBI patients is not currently available. The objective of this study was to evaluate prescribing practices for seizure prophylaxis in this patient population with potential for protocol development pending study results. **Methods:** A single-center retrospective chart review was conducted to evaluate patient encounters selected based on diagnosis of traumatic brain injury and age greater than 18 years from May 1, 2015 through December 15, 2015. The study author reviewed patient charts for documentation of antiepileptic medication used as well as occurrence of seizures. Patients were excluded if transferred from an outside hospital, had documented history of seizures or seizures occurring before hospital admission following TBI. Other data collected included antiepileptic prophylaxis start and end date, agent selected as well as dose, patient age, GCS score, intracranial pressure (if monitored), intensive care length of stay, hospital length of stay and discharge disposition. If intracranial pressure was monitored, time above an ICP level of 20 was also documented.

**Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify patients diagnosed with traumatic brain injury and determine if they were started on appropriate seizure prophylaxis, as defined by the Brain Trauma Foundation guidelines.  
Review the outcomes of patients on seizure prophylaxis versus those without and discuss the potential benefits of initiating seizure prophylaxis.

### Self Assessment Questions:

Seizure prophylaxis should be initiated within \_\_\_\_\_ hours following severe traumatic brain injury.

- A: 48 hours
- B: 72 hours
- C: 12 hours
- D: 24 hours

What is a benefit of seizure prophylaxis?

- A: Prevent rises in intracranial pressure secondary to seizures
- B: Improve mortality outcomes
- C: Reduce the incidence of the late posttraumatic seizures
- D: Decrease hospital length of stay

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-391L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF 2010 CEPHALOSPORIN CLSI BREAKPOINT REVISIONS FOR ENTEROBACTERIACEAE ON SUSCEPTIBILITY AND ANTIBIOTIC UTILIZATION

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**Purpose:** In January 2015, Norton Healthcare adopted the 2010 CLSI breakpoints for 1st-3rd generation cephalosporins for Enterobacteriaceae but continued to detect and report ESBL and AmpC production. The purpose of this study is to assess the impact of the breakpoint implementation and describe the prevalence, treatments, and outcomes of third generation cephalosporin (TGC) susceptible, ESBL or AmpC positive Enterobacteriaceae. **Methods:** This was a retrospective, observational study performed at Norton Healthcare, a multihospital system in Louisville, Kentucky. Ceftriaxone susceptibilities were reviewed for inpatient and outpatient antibiograms and antibiotic utilization was collected as days of therapy (DOT) per 1,000 patient days: pre- (2014) and post-implementation (2015) of breakpoints. Enzyme-producing, TGC-susceptible Enterobacteriaceae were reviewed for source, definitive therapy, and 30 day mortality. **Results:** Ceftriaxone susceptibility for Enterobacteriaceae minimally decreased post-implementation for inpatient [90% (6221/6936) to 89% (6912/7784), p=0.0856] and outpatient [96% (7652/7959) to 94% (9058/9643), p=0.0001] antibiograms. Carbapenem utilization decreased from 34.2 DOT/1000 patient days, 95% CI [33.5, 34.9] in 2014 to 32.6, 95% CI [31.9, 33.2] in 2015. There were 168 cases of enzyme-positive, TGC-susceptible isolates and 65% were from outpatients (109/168). The most common sources were urine (89%), wound (9%) and blood (2%). Definitive therapy most commonly used for enzyme-positive, TGC-susceptible isolates was nitrofurantoin (22%) and fluoroquinolones (22%). Patients with enzyme-positive, TGC-susceptible isolates that received a TGC as definitive therapy had a thirty day mortality rate of 0% (0/18) and 14% (1/7) for urine and non-urine sources, respectively. **Conclusion:** The implementation of the 2010 CLSI breakpoints had a small effect on ceftriaxone susceptibilities without increasing broad spectrum antibiotic use. TGC-susceptible, enzyme-positive organisms were isolated primarily in outpatient urine cultures. The detection and reporting of ESBL and AmpC enzymes may not be needed for patient care, especially from urine cultures. More data on treatment with TGC in non-urine sourced infections is needed.

### Learning Objectives:

Review the 2010 CLSI 1st-3rd generation cephalosporin breakpoint changes and reporting recommendations for ESBL or AmpC-producing Enterobacteriaceae.

Recognize the impact of the 2010 CLSI 1st - 3rd generation cephalosporin breakpoint changes on local ceftriaxone susceptibilities and broad spectrum antibiotic use.

### Self Assessment Questions:

The 2010 CLSI guidelines recommend which of the following for susceptibility and reporting of ESBL and AmpC-producing Enterobacteriaceae?

- A: Continue reporting the enzyme to aid in antimicrobial therapy selection
- B: Utilize the old MIC breakpoints for susceptibility reporting
- C: Antimicrobial therapy selection should be based upon MIC breakpoint
- D: It is not necessary to test for MIC breakpoints or enzymes for Enterobacteriaceae

Which of the following occurred at Norton Healthcare following the implementation of the new CLSI breakpoint changes?

- A: Enterobacteriaceae ceftriaxone susceptibility significantly increase
- B: Enzyme-positive, 3rd generation cephalosporin-susceptible urine isolates increase
- C: Carbapenem use increased from pre- to post-implementation
- D: Mortality rates were significantly higher for enzyme-positive, TGC-susceptible isolates

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-392L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF PHARMACIST RIBAVIRIN MANAGEMENT PROGRAM FOR PATIENTS ON CHRONIC HEPATITIS C TREATMENT

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**Purpose:** The American Association for the Study of Liver Disease includes ribavirin in many of the recommended regimens for the treatment of chronic hepatitis C. Ribavirin has a black box warning for hemolytic anemia. Ribavirin induced anemia may lead to worsening of cardiac disease and has the potential to lead to both fatal and nonfatal myocardial infarctions. It is recommended to monitor for anemia in patients on ribavirin containing regimens given the severe consequences this medication may have on hemoglobin levels. Given the incidence of anemia is 11-17% on ribavirin therapy, it is important to ensure proper monitoring and dose adjustments are made while on this medication. Ribavirin is also associated with other side effects that may require follow-up and management including nausea, headaches, etc. Currently, there is a lack of literature in the area of ribavirin dose adjustment guidance and the effect pharmacists can have on patient care and outcomes when managing patients on ribavirin. The purpose of this study is to determine the impact of pharmacist involvement with the management of ribavirin in hepatitis C treatment regimens. **Methods:** This is a retrospective assessment determining the impact of pharmacist involvement in the management of ribavirin in patients with chronic hepatitis C at the Digestive and Liver Disorders clinic at Indiana University Health. Patients who are  $\geq 18$  years, have a diagnosis of chronic hepatitis C, and who have been treated with a regimen that includes ribavirin will be included in the study. Patients will be excluded if they have no baseline laboratory values available, the use of ribavirin is contraindicated, there is a history of transplant, or if they are unable to be contacted during therapy. The primary outcome is appropriateness of ribavirin dose. **Results/Conclusion:** Data collection and analysis will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify common adverse effects associated with ribavirin therapy.  
Describe appropriate treatment regimens for the treatment of chronic hepatitis C that include ribavirin.

### Self Assessment Questions:

Which of the following is a Black Box Warning for ribavirin?

- A Hemolytic anemia
- B: QT Prolongation
- C: Hepatotoxicity
- D: Nephrotoxicity

Ribavirin is indicated for use as part of a treatment regimen in which genotypes of chronic hepatitis C?

- A Genotypes 1a, 1b, 2, and 3
- B Genotypes 1a, 1b, 2, 3, and 4
- C Genotypes 1a, 1b, 2, 3, 4, and 5
- D Genotypes 1a, 1b, 2, 3, 4, 5, and 6

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-393L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION AND EVALUATION OF A PRESCRIBING TOOL FOR PATIENTS WITH MILD TO MODERATE SKIN AND SKIN STRUCTURE INFECTIONS SEEN IN THE EMERGENCY DEPARTMENT

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**Purpose:** Mild to moderate skin and skin structure infections (SSSIs) are treated in an outpatient setting and often times patients will seek treatment in urgent care or emergency department facilities. The primary objective of this study is to create a standardized prescribing tool to assist with choosing appropriate empiric antibiotic treatments for patients seen in the ED with skin and skin structure infections using practice guidelines and local antibiotic susceptibility data. The second objective is to evaluate the use and effectiveness of the prescribing tool after implementation. **Methods:** This study was submitted and approved by the Institutional Review Board. A retrospective chart review was performed on patients who visited the ED and were given a diagnosis of cellulitis or skin and skin structure infection in January, April and June 2015. The population size for this study was determined by patient volume rather than calculated statistical power. The following data was collected: location of infection, presence of an abscess, performance of I&D, antibiotic allergies, co-morbid condition of diabetes, antibiotic(s) received in ED, antibiotic regimen prescribed at discharge, and return visit within 30 days with or without admission. Patients were excluded if they were less than 18 years of age, pregnant, admitted to the hospital, presented with a concomitant infection warranting additional antibiotics, or had current antibiotic use. A prescribing tool was developed, reviewed by ED prescribers and infectious disease specialists, and implemented in January 2016. A retrospective chart review will look at the same patient population in February-April 2016. Changes in prescribing patterns and 30-day readmissions will be assessed. **Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify common pathogens associated with purulent and non-purulent skin and skin structure infections.  
Outline empiric antibiotic recommendations for treatment of mild to moderate purulent and non-purulent skin and skin structure infections.

### Self Assessment Questions:

Which organism is most commonly responsible for causing non-purulent skin and skin structure infections?

- A Methicillin-susceptible Staphylococcus aureus (MSSA)
- B: Methicillin-resistant Staphylococcus aureus (MRSA)
- C: Streptococcus pneumoniae
- D: Streptococcus pyogenes

Which antibiotic would be an appropriate empiric treatment recommendation for a patient with a moderate purulent abscess and a sulfa allergy?

- A Tmp/smx
- B Doxycycline
- C Cephalexin
- D Dicloxacillin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-394L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **PATIETN SATISFACTION ASSOCIATED WITH VARIOUS MARKETING TECHNIQUES FOR COMPREHENSIVE MEDICATION REVIEWS IN A COMMUNITY PHARMACY**

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Purpose Medication Therapy Management (MTM), defined as pharmacist-led clinical services, has been shown to improve therapeutic outcomes and reduce health care costs for patients in the United States. Additionally, the use of online MTM platforms has allowed pharmacists to perform MTM in the community pharmacy setting. Despite the availability of these services, many patients are unaware that community pharmacists can provide MTM. As a result, pharmacy personnel spend significant time and resources educating participants about this service and motivating them to receive a comprehensive medication review (CMR) at their pharmacies. This study aimed to compare the effectiveness of various types of MTM marketing techniques. Objective To compare various methods of patient outreach for marketing pharmacist-led comprehensive medication reviews (CMRs). Methods This survey-based study took place in twenty-four Meijer pharmacies in the western Michigan area. Participants included patients who completed a sit-down, in-person CMR with a community pharmacist, pharmacy intern, or pharmacy student between November 2015 and March 2016. IRB approval was obtained through Ferris State University. After arriving at the pharmacy for a CMR, participants were asked to complete a survey that rated their satisfaction regarding various outreach methods they experienced prior to the visit. Patients experienced outreach as either a letter or phone-call from their insurance company, a letter or a phone-call from the pharmacy, in-person at their primary care clinic, or a combination of the above. Patient characteristics, including age, gender, insurance coverage, and number of medications were collected. Data was analyzed to determine satisfaction rates associated with each method of outreach and to determine the outreach method that was most effective at motivating patients to complete their CMR.

Results/Conclusions: Data collection is ongoing. Project outcomes will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Explain the different outreach methods used by community pharmacists to motivate patients to receive a comprehensive medication review at their pharmacy

Describe the most effective communication outreach methods for comprehensive medication reviews in a community pharmacy

### **Self Assessment Questions:**

Which one of the following is NOT a core element of medication therapy management (MTM)?

- A: Motivating the patient to seek out MTM services on their own
- B: Developing necessary interventions and referrals
- C: Performing necessary documentation and follow-up
- D: Making a personal medication record

Which of the following are documented barriers for pharmacists trying to grow their MTM program?

- A: The use of online platforms to document and bill for MTM
- B: The Medicare Part D requirement that insurance carriers must pro
- C: The fact that many patients are afraid that using a pharmacist's re
- D: The fact that medication therapy management typically has a posi

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-395L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **HIGH-DOSE UNFRACTIONATED HEPARIN THROMBOPROPHYLAXIS IN MORBIDLY OBESE, CRITICALLY ILL PATIENTS**

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Purpose: Recent studies have suggested that high-dose thromboprophylaxis is safe and effective at reducing hospital-acquired venous thromboembolism (VTE) and that body mass index (BMI) is an independent predictor of failure of standard dose thromboprophylaxis in critically ill patients. To our knowledge, there have been no studies published to date examining high-dose thromboprophylaxis in morbidly obese, critically ill patients. The primary objective of this study is to compare the incidence of radiographically confirmed deep vein thrombosis (DVT) in the morbidly obese critically ill patient receiving either high dose or low dose subcutaneous heparin prophylaxis. Secondary objectives include determining the incidence of radiographically confirmed pulmonary embolism (PE), suspected PE, major bleed, and length of hospital stay. Methods: This is a single-center, retrospective, observational study to evaluate VTE rates in morbidly obese, critically ill patients receiving either heparin 5000 units subcutaneously three times daily or heparin 7500 units subcutaneously three times daily. Adult patients, ages 18 years or older, admitted to the medical or surgical intensive care units (ICU) for greater than 48 hours between July 1, 2012 through July 1, 2015 will be included in this analysis. Patients will be excluded if they are: admitted to the burn ICU, neurointensive care unit, cardiothoracic ICU, coronary care ICU; post-operative orthopedic patients; pregnant; have a documented VTE within 24 hours of admission; receiving therapeutic anticoagulation; outside hospital transfers; presence of disseminated intravascular coagulation; receiving recombinant factor VIIa, recombinant factor VIII, human purified factor IX, or four-factor prothrombin complex concentrate; or have a history of heparin induced thrombocytopenia. Results/Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Recall risk factors for venous thromboembolism.

Outline available literature and guideline recommendations for venous thromboembolism prophylaxis in acutely ill, obese patients.

### **Self Assessment Questions:**

Which of the following is not a risk factor for venous thromboembolism (VTE)?

- A: Venous stasis
- B: Hypercoagulable states
- C: Major surgery
- D: All of the above are risk factors for VTE

2. Which of the following represents recommendations by the American College of Chest Physicians (ACCP) with respect to VTE prophylaxis in morbidly obese critically ill patients?

- A: Low dose heparin subcutaneous 5000 units three times daily
- B: Low dose heparin subcutaneous 7500 units three times daily
- C: Low dose heparin subcutaneous or low molecular weight heparin
- D: Enoxaparin 40 mg daily

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-751L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**RETROSPECTIVE EVALUATION OF DISEASE MODIFYING THERAPY UTILIZATION PATTERNS AND HEALTHCARE RESOURCE UTILIZATION IN A COMMERCIALY-INSURED MULTIPLE SCLEROSIS POPULATION**

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Research looking at healthcare resource utilization (HCRU) in multiple sclerosis (MS) patients receiving disease modifying therapies (DMTs) has found that non-pharmacy medical costs are increased in patients who switch or discontinue therapy (i.e., are non-persistent). This research has been limited to select DMTs and does not include information on relapse episodes or pharmacy provider type. The primary objective of this study is to assess the relationship between HCRU and DMT utilization patterns, including non-persistence and adherence, encompassing all available DMTs dispensed from a specialty pharmacy setting. Secondary analysis will explore relationships between HCRU and relapse rates, available DMTs, specialty pharmacy settings and DMT sequencing patterns. Using administrative claims data from Jan. 2014 to Dec. 2015, HCRU will be assessed among the variables of non-persistence and adherence patterns in patients with MS. For each variable, patients will be assigned to a descriptive cohort. Non-persistence will be defined as a DMT switch or gap in DMT greater than 30 days, regardless if prior DMT is restarted. Patients will be grouped based on the number of non-persistent episodes. Adherence will be assessed using proportion of days covered (PDC), defined as the sum of days covered on therapy divided by the number of days in the period. Patients will be categorized into three descriptive groups based on PDC adherence rates. Relapses will be measured within each utilization pattern cohort, defined as any inpatient visit with primary ICD-9 diagnosis code of 340.xx, or any outpatient visit with primary ICD-9 diagnosis code of 340.xx and a claim for corticosteroid use up to seven days after the visit. Additionally, the study will investigate relationships between HCRU and relapses across available DMTs and among pharmacy settings. Trends in HCRU and DMT sequencing (i.e., transitioning to alternative DMT products) will also be assessed. Results will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Describe two utilization metrics that are used to assess patient compliance in a specialty pharmacy setting.

Identify differences in disease-modifying therapy formulations and the potential factors leading to noncompliance in patients with multiple sclerosis.

**Self Assessment Questions:**

Which of the following is a correct statement highlighting the differences between medication possession ratio (MPR) and proportion of days covered (PDC)?

- A: PDC is a compliance metric that measures the number of times th
- B: MPR is the compliance metric endorsed by the Pharmacy Quality
- C: PDC is a more conservative measure when compared to MPR, wil
- D: Both MPR and PDC may underestimate adherence when a patien

Which of the following disease modifying therapies listed is matched correctly with its respective dosing formulation and frequency?

- A: Copaxone® (glatiramer acetate) intravenous infusion once monthl
- B: Tecfidera® (dimethyl fumarate) oral capsule twice daily
- C: Gilenya® (fingolimod) intramuscular injection three times weekly
- D: Avonex® (interferon beta-1a) subcutaneous injection daily

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-396L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**UTILIZATION OF LIPOSOMAL BUPIVACAINE FOR ROBOTIC-ASSISTED GYNECOLOGIC SURGERY AT A COMMUNITY TEACHING HOSPITAL: A RETROSPECTIVE STUDY**

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Purpose: Despite limited evidence for liposomal bupivacaine in surgical procedures there is an interest in the use of liposomal bupivacaine by Bronson anesthesiology for a specific indication; a replacement for bupivacaine or ropivacaine for transversus abdominis plane (TAP) blocks for robotic assisted gynecological surgery. Given that current published data do not provide clear, overwhelmingly superior clinical results for liposomal bupivacaine over conventional agents used in TAP blocks based upon the lack of adequately powered multi-centered clinical trials with comparison groups, the purpose of this study is to determine if a TAP block with liposomal bupivacaine decreases the length of hospital stay and total healthcare costs following an elective, robotic assisted, gynecologic surgery at Bronson Methodist Hospital.

Methods: This is a retrospective chart review of female patients ≥ 18 years of age who received elective robotic assisted gynecologic surgery conducted at Bronson Methodist Hospital, a community teaching hospital. The primary outcome of this study will be a comparison of overall healthcare costs and hospital length of stay (LOS) of patient who receive a TAP block with liposomal bupivacaine and those who received conventional long acting anesthetic (bupivacaine or ropivacaine) via a TAP block or otherwise. Secondary endpoints include the impact of liposomal bupivacaine on analgesic use, percentage of patients discharged home from the PACU setting, the presence of nausea/vomiting, incidence of post-operative constipation, safety outcomes, patient satisfaction and 30 day readmission. Results/Conclusion: Data collection and analysis are ongoing. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Describe the mechanism of action of liposomal bupivacaine that contributes to its analgesic effects.

Identify the pros and cons of instituting the use of liposomal bupivacaine in TAP blocks for gynecologic surgeries.

**Self Assessment Questions:**

What type of anesthetic is bupivacaine?

- A: Liposomal
- B: Amide
- C: Ester
- D: A and C

Reduction in cumulative pain intensity scores have reportedly been maintained up to \_\_\_ hours after administering liposomal bupivacaine.

- A: 24
- B: 36
- C: 48
- D: 72

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-752L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**ORAL CHEMOTHERAPY PATIENT OUTREACH STANDARDIZATION: INTERPROFESSIONAL REDESIGN TO MAXIMIZE PHARMACIST EFFICIENCY AND IMPROVE PATIENT SAFETY**

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Purpose: The aim of this study is to improve patient outcomes by increasing compliance with the American Society of Clinical Oncology (ASCO) and Oncology Nursing Society (ONS) practice standards for assessment and safety related to oral chemotherapy. The primary objective of this project is to develop and implement a standardized, pharmacist-led, interprofessional patient outreach program for oral chemotherapy at the University of Wisconsin Carbone Cancer Center (UWCCC). Secondary objectives include an evaluation of the impact of pharmacist-led interprofessional patient outreach on compliance to best practice standards and patient outcomes. Methods: Existing oral chemotherapy patient outreach practice among the healthcare professionals at the UWCCC was analyzed and the development and implementation of a new standardized workflow is in progress. The impact of the new workflow on efficiency and patient safety will be evaluated. Rates of early discontinuation of therapy and hospital readmissions attributable to oral chemotherapy will be retrospectively measured pre- and post- implementation via chart reviews to determine effects on patient outcomes. Summary of results: The new workflow for assessment of toxicity and adherence has been developed and will be implemented. Pharmacists will call patients 7-10 days after the initiation of oral chemotherapy to conduct the initial assessment of toxicity and adherence. Nursing staff will be responsible for performing adherence and toxicity assessments at every clinical encounter from cycle 2 on. Medication specific templates and note templates for documentation in the electronic medical record have been created to standardize the process. The predicted results of this project include a new standardized, efficient workflow compliant with oral chemotherapy patient outreach best practices, improved documentation of follow up activities, and a potential patient safety impact as measured by hospital readmissions and early discontinuation of therapy from toxicity and nonadherence.

**Learning Objectives:**

Describe the rationale for an ongoing assessment of toxicity and adherence for patients on oral chemotherapy

Discuss the process of developing and implementing a new interprofessional workflow to standardized adherence and toxicity assessments for patients on oral chemotherapy

**Self Assessment Questions:**

Which of the following statements is correct?

- A Taking oral chemotherapy more than prescribed can lead to impro
- B: Toxicities related to oral chemotherapy can lead to significant mor
- C: Intravenous chemotherapy is associated with a higher risk of toxic
- D: Poor adherence to oral chemotherapy does not affect outcomes

ASCO/ONS recommends that each practice/institution maintains a policy for which of the following

- A Assessment of toxicity and adherence of oral chemotherapy throu
- B Initial assessment of toxicity and adherence of oral chemotherapy,
- C Ongoing and regimen specific toxicity and adherence assessment
- D Ongoing and regimen specific toxicity and adherence assessment

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-913L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

**EVALUATION OF DIGOXIN THERAPY IN VETERANS WITH ATRIAL FIBRILLATION AND TIME TO FIRST HOSPITALIZATION RELATED TO A CARDIAC EVENT**

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Purpose: Digoxin remains a commonly used medication for rate control in atrial fibrillation. However, limited data exists to support its use, and recent retrospective reviews have shown a possible increased risk of mortality and hospitalizations with digoxin therapy. Currently, most studies have looked at overall hospitalizations and mortality and have yet to specify the cause of hospitalization. The primary objective of this study is to evaluate the safety of digoxin in veteran patients for rate control in atrial fibrillation with or without heart failure by analyzing the time to first hospitalization due to a cardiac-related event. Methods: This retrospective, cohort study is IRB approved. The electronic medical record system will identify patients with atrial fibrillation. The following data will be collected for each patient: diagnosis date of atrial fibrillation, date of birth, gender, past medical history, digoxin therapy initiation date concurrent cardiac-related medications (beta blockers, anti-arrhythmics, oral anticoagulants, aspirin), initial hospitalization date with a cardiac primary admission diagnosis, primary admission diagnosis, length of hospitalization, admission to intensive care unit or general acute medicine floor, serum digoxin level, admission serum creatinine, blood urea nitrogen, troponin, potassium, magnesium, and most recent height and weight. All data will be maintained confidentially. Cardiac event is defined as any of the following: cardiac arrhythmia, acute myocardial infarction, unstable angina, cardiac arrest, hypertensive urgency or emergency, and cardioembolic stroke. Two groups of veterans will be compared: those with atrial fibrillation receiving digoxin therapy and those who are not receiving digoxin therapy. The time to initial cardiac-related hospitalization will be reported in number of days since atrial fibrillation diagnosis for both cohorts, and in number of days since digoxin initiation in patients receiving digoxin. Data/Conclusions: Data collection and analysis are pending. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

**Learning Objectives:**

Review current literature describing digoxin in atrial fibrillation and its potential increase in mortality

Discuss the recommendations for digoxin therapy for rate control in patients with atrial fibrillation

**Self Assessment Questions:**

When is digoxin indicated in the treatment of patients with atrial fibrillation?

- A First line therapy for rate control in all patients
- B: In combination with a beta blocker or non-dihydropyridine calcium
- C: Second line therapy in place of beta blocker (or non-dihydropyridin
- D: First line therapy for rhythm control in patients with heart failure an

Which of the following is a proposed mechanism for how digoxin increases mortality in patients with atrial fibrillation?

- A Elevated serum digoxin levels above therapeutic range
- B Anti-arrhythmic effect, preventing paroxysmal atrial tachycardias, I
- C Increase in vagal tone, reduced AV node conduction, and shorteni
- D A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-397L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PEGGING DOWN RISK FACTORS FOR PEG-ASPARAGINASE TOXICITY IN PATIENTS WITH ACUTE LYMPHOBLASTIC LEUKEMIA

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**Purpose:** Survival for patients with acute lymphoblastic leukemia (ALL) declines dramatically as with increasing age at diagnosis. Cytogenetic and molecular aberrations and treatment selection and tolerability in older patients contribute to this discrepancy. PEG-asparaginase, a mainstay in pediatric therapy, has traditionally been omitted or de-emphasized in adult regimens due to poor tolerability. The primary objective is to identify risk factors for hepatotoxicity in patients treated with PEG-asparaginase. Secondary objectives include identifying risk factors for thrombosis, intracranial hemorrhage, pancreatitis, and hypertriglyceridemia, and the impact of toxicity on clinical outcomes. Doing so may allow us to optimize PEG-asparaginase therapy in adult patients. **Methods:** This is a single-center, retrospective case-control study investigating the impact of age and body surface area on the incidence of hepatotoxicity in patients with ALL treated with PEG-asparaginase. Patients with ALL admitted to the University of Michigan Health System for induction chemotherapy with a regimen incorporating PEG-asparaginase from January 1, 2005 through September 30, 2015 will be included. Children < 1 year of age or those who received Erwinia asparaginase will be excluded. Patient demographic and clinical information including concomitant chemotherapy regimen, PEG-asparaginase dose, asparaginase activity level, and endpoint related data will be collected. A risk factor analysis will be conducted using a multivariate model. Continuous and dichotomous variables will be compared using the student's t-test and Fisher's exact test. Non-parametric data will be compared using the Mann-Whitney U Test. Logistic regression analysis will be conducted to evaluate variables associated with each outcome of interest. Variables with a p-value < 0.2 on univariate analysis will be included in the multivariate model. A two-sided p-value of < 0.05 will be considered statistically significant. **Results:** In progress **Conclusions:** In progress

### Learning Objectives:

Identify the difference in PEG-asparaginase tolerability between pediatric and adult patients  
Recognize the implications of PEG-asparaginase toxicities on patient outcomes

### Self Assessment Questions:

Which of the following regarding PEG-asparaginase use is true?  
A Compared to pediatric patients, is easier for adult patients to tolerate  
B: Patients unable to tolerate PEG-asparaginase have better outcomes  
C: Prolonged PEG-asparaginase use has been associated with improved outcomes  
D: PEG-asparaginase is associated with significant nausea, vomiting

Which PEG-asparaginase toxicities are often more severe in adult patients?

- A Pancreatitis
- B Hepatotoxicity
- C Hypofibrinogenemia
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-398L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PRESCRIBING TRENDS ASSOCIATED WITH CLOZAPINE USE AND AN ANTIPSYCHOTIC POLYPHARMACY PRIOR AUTHORIZATION PROCESS IN THE INDIANA MEDICAID ADULT POPULATION

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**Purpose:** Evidence supports the use of clozapine in individuals with treatment resistant schizophrenia; nevertheless, treatment resistance is a commonly used justification for the use of antipsychotic polypharmacy. Treatment resistance is characterized as a suboptimal response to at least two antipsychotic agents at an adequate dose and trial period. Studies have shown that antipsychotic polypharmacy is often considered before clozapine in patients that have failed at least one antipsychotic agent. The majority of treatment guidelines discourage antipsychotic polypharmacy due to insufficient supporting evidence; yet this has become common practice. Based on this data, Indiana Medicaid initiated a prior authorization process in March 2014 requiring prescribers to evaluate the use of clozapine prior to approval of antipsychotic polypharmacy. The primary objective of this project is to analyze the prescribing trends for clozapine and antipsychotic polypharmacy before and after the implementation of the March 2014 prior authorization. **Methods:** This is a retrospective chart review of the adult Indiana Medicaid population aged 18 to 64 years with an ICD9 code for psychosis. Inclusion criteria consisted of participants having active Indiana Medicaid enrollment at any time between September 1, 2013 and August 31, 2015, one or more claims for clozapine or concomitant antipsychotic therapy, and did not meet exclusion criteria. Data collection included demographics, number of prescriptions for clozapine, number of prescriptions for concomitant antipsychotic therapy, and type of prescriber. Descriptive statistics will be used to describe trends in clozapine and antipsychotic polypharmacy prescribing throughout the study period. The primary outcome is the number and percent of claims for clozapine before and after implementation of the prior authorization. Secondary outcomes will focus on the frequency of antipsychotic polypharmacy throughout the defined study period. **Results/Conclusions:** Data collection is ongoing with results to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain primary literature and evidence-based guidelines pertaining to clozapine and antipsychotic polypharmacy.  
Describe the results of phase 2 of the CATIE trial and the implications on treatment of schizophrenia.

### Self Assessment Questions:

Which of the following is an FDA-approved indication for the use of clozapine?  
A Bipolar I disorder acute mixed or manic episodes  
B: Treatment-resistant schizophrenia  
C: Depression with suicidal thinking  
D: Hallucinations/agitation

According to the CATIE trial, what was the median time until treatment discontinuation for any reason for clozapine?

- A 2.7 months
- B 5.2 months
- C 7.4 months
- D 10.5 months

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-399L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PROPHYLACTIC ANTIBIOTIC USE FOR DELAYED STERNAL CLOSURE IN POST-CARDIOTHORACIC SURGERY PATIENTS

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**Purpose** Open chest management (OCM) with delayed sternal closure (DSC) is a surgical method used in the management of numerous conditions following cardiothoracic surgery. However, OCM with DSC is not without potential infectious complications post-surgery. Sternal wound infection is a serious complication of cardiac surgery with a reported incidence ranging from 1-3%. Clinical practice guidelines for antimicrobial prophylaxis in surgery recommend the use of cefazolin or cefuroxime for surgical prophylaxis before cardiac surgery. However, there are currently no recommendations to guide the management of antibiotic prophylaxis in patients with open chest following cardiothoracic surgery. The primary objective is to describe prophylactic antibiotic use in patients with delayed sternal closure post-cardiothoracic surgery.

**Methods** This study is a single-center, retrospective analysis approved by the Institutional Review Board. Data was extracted from the Society of Thoracic Surgery (STS) Database and electronic medical record for the time period of July 2011 - November 2015. Patients included are adult ( $\geq 18$  years old) post-cardiothoracic surgery patients with delayed sternal closure. Patients on IV antibiotics for active sternal wound infection, endovascular infection, infected cardiac device or endocarditis prior to surgery were excluded. The primary endpoint is the characterization of antibiotic use in patients with delayed sternal closure post-cardiothoracic surgery. Secondary endpoints include comparison of the continuation of standard prophylactic antibiotics to broad spectrum antibiotics on rate of infection and comparison of duration of antimicrobial prophylaxis on rate of infection which includes the following groups: standard duration of prophylaxis, duration of open chest, or prolonged antibiotic use beyond chest closure.

**Results/Conclusions** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe characteristics of the patient population with delayed sternal closure after cardiothoracic surgery  
Identify appropriate antibiotic prophylaxis for post-cardiothoracic surgery patients

### Self Assessment Questions:

Which of the following statements is true?

- A Mortality rate after sternal wound infection is low
- B: Infection is a common reason for delayed sternal closure
- C: Reported incidence of sternal wound infection is 5-10%
- D: Sternal closure can be delayed for hours or days

Per IDSA surgical prophylaxis guidelines, which agent is recommended for cardiac surgery in patients without a -lactam allergy?

- A Vancomycin
- B Cefuroxime
- C Metronidazole
- D Clindamycin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-400L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RISK FACTORS FOR ADVERSE EFFECTS OF PIROXICAM IN DOGS WITH CANCER

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**Purpose:** Piroxicam has been shown to have antitumor effects in dogs with cancer. However, renal and gastrointestinal side effects often limit its use. This study attempts to determine if there are any patient characteristics that predispose dogs to the development of adverse effects. **Methods:** A retrospective study was conducted analyzing cases that were presented to the Purdue Veterinary Teaching Hospital (VTH) between 2005 and 2015. Cases were included if they met the following criteria: dogs with cancer confirmed by biopsy, date when piroxicam was first administered as well as a weight on that date could be identified, a serum biochemistry panel performed at the Purdue VTH at baseline as well as at either one, two, six, or twelve months post drug initiation. Toxic effects of piroxicam therapy were graded according to an established scoring system. **Results:** Results containing descriptive statistics were generated. The study included 137 cases. Of these cases 107 had carcinomas and 30 had sarcomas. One hundred fourteen dogs experienced gastrointestinal toxicity. However, only 7 dogs developed clinically significant (grade 3 or higher) renal toxicity. Statistical analysis to determine if correlations exist between risk factors and toxic effect of therapy are pending. **Conclusions:** Piroxicam is associated with GI and renal toxicoses in a proportion of dogs with cancer. Whether risk factors affect risk of toxicity will be determined after statistical analysis.

### Learning Objectives:

Recognize the common uses of piroxicam in canine patients.  
Identify the most common adverse effects of piroxicam in dogs with cancer.

### Self Assessment Questions:

Which of the following is a use of piroxicam in canine patients?

- A Analgesia
- B: Antitumor effects
- C: Immunosuppressive effects
- D: A and B

What are the most common adverse effects associated with piroxicam when used in dogs with cancer?

- A Gastrointestinal and hepatic toxicosis
- B Gastrointestinal and renal toxicosis
- C Neurologic and gastrointestinal toxicosis
- D Neurologic and renal toxicosis

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-401L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PUSH-DOSE PHENYLEPHRINE TO PREVENT HEMODYNAMIC INSTABILITY DURING RAPID SEQUENCE INTUBATION

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**Purpose:** Post-intubation hypotension has been shown to be deleterious and even fatal in some patients. Preventing hypotension in the peri-intubation setting has its benefits and can potentially prevent further deterioration of the patient. Phenylephrine, a direct-acting alpha-adrenergic agonist, produces systemic arterial vasoconstriction. Such increases in systemic vascular resistance result in a dose-dependent increase in systolic blood pressure (SBP) and diastolic blood pressure (DBP). The aim of this study will be to determine if there is a difference between the incidence of hypotension among patients who receive push dose phenylephrine during the peri-intubation period and those who do not. **Methods:** An Institutional Review Board (IRB) application has been submitted and approved. A retrospective chart review will be conducted of patients who have been emergently intubated in the emergency room and medical intensive care unit. Patients will be separated into groups based upon whether or not they receive push-dose phenylephrine to prevent hypotension, defined as one systolic blood pressure reading below 90 mm Hg. The following data points will be collected: age, sex, admitting diagnosis, time of intubation, if phenylephrine was given, phenylephrine dose, time of phenylephrine administration(s), systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), sedation/paralytic used for rapid sequence intubation (RSI), and vasopressor infusions required to maintain hemodynamic stability. Heart rate, SBP, and DBP will be compared during the peri-intubation period, defined as 60 minutes before and after intubation. All data will be recorded without patient identifiers and confidentiality will be maintained. **Results:** Data collection and evaluation are currently being conducted. Preliminary results will be presented. **Conclusions:** conclusions will be based on results and will be presented.

### Learning Objectives:

Describe the potential role in therapy for push-dose phenylephrine during RSI

Recall intrinsic and extrinsic factors that lead to hypotension in the setting of RSI

### Self Assessment Questions:

There are many extrinsic factors that could lead to a lack of efficacy of phenylephrine, including any medications that the patient may be taking for his/her comorbidities. Which of the following medi

- A: terazosin
- B: enalapril
- C: furosemide
- D: midodrine

Which factor can lead to hypotension in the setting of RSI?

- A: crystalloid fluid boluses
- B: non-compliance with anti-hypertensive medication
- C: stimulation of the Vagus nerve through the passage of the ET tube
- D: None of the above

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-402L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST MONITORING OF TARGET-SPECIFIC ORAL ANTICOAGULANTS (TSOACS)

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**Purpose:** Target-specific oral anticoagulants (TSOACs), namely dabigatran, rivaroxaban, apixaban, and edoxaban, have become increasingly popular in the management of atrial fibrillation and thromboembolic events as clinicians gain more experience with their use. These agents appeal to the general population as they are marketed as safe alternatives to conventional vitamin K antagonists (VKA) and, per the manufacturer, require no routine monitoring. However, there continues to be concern for patient safety regarding the adverse effects of these agents due to the lack of readily available qualitative tests and limited reversal agents. A review of available literature indicates that the risk of adverse events such as bleeding and thromboembolism are similar, if not higher, to patients on VKA therapy. With similar potential for adverse drug events as conventional therapy, monitoring of patient safety parameters of TSOACs is warranted. The primary objective of this project is to review the impact of pharmacist monitoring of TSOAC therapy in the inpatient setting. **Methods:** This retrospective, single-center study was designed to evaluate appropriateness of medication dosing, pharmacist interventions, and adverse events for patients receiving TSOACs. Patients who are 18 years of age and older and on TSOACs for FDA-approved indications prior to admission and/or during hospitalization were included in the study. Prisoners, pregnant women, and patients on TSOACs for short term indications, specifically use after knee and hip replacement, were excluded from the study. Primary outcomes include pharmacist interventions related to appropriateness of TSOACs based on factors such as indication, renal function, age and weight, and whether intervention was accepted by provider. Secondary outcomes include incidence of bleeding or venous thromboembolism while on TSOACs. A study data will be evaluated using various statistical methods appropriate for data type and distribution. **Results and Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference pending completion of data collection and analyses.

### Learning Objectives:

Describe key characteristics of TSOACs and review current literature regarding safety of its use

Discuss the impact of pharmacist monitoring of TSOACs during the transition from hospital to home

### Self Assessment Questions:

Which of the following characteristics should be taken into account when evaluating risk factors for adverse events on TSOAC therapy?

- A: Renal function
- B: Age
- C: Race
- D: All the above

What can be considered as a limitation for implementation of a TSOAC monitoring program?

- A: Limited qualitative tests to assess drug levels
- B: Lack of familiarity of available qualitative tests
- C: Marketed as requiring no routine monitoring
- D: All the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-753L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ANALYSIS OF RISK FACTORS AND ANTIPSYCHOTIC USAGE PATTERNS ASSOCIATED WITH TERMINAL DELIRIUM IN A VETERAN INPATIENT HOSPICE POPULATION

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**Purpose:** The purpose of this study is to (1) Identify risk factors for terminal delirium in a VA inpatient hospice population (2) Assess usage patterns of antipsychotics in terminal delirium (3) Describe nursing assessment, non-pharmacological and pharmacological interventions, and documentation of terminal delirium. **Methods:** This is a retrospective case-control study of patients who expired while enrolled in hospice care at the Edward Hines, Jr. VA Hospital Community Living Center (CLC) during the period of October 1, 2013 to September 30, 2015. Cases were defined as patients who were treated with antipsychotics for terminal delirium within the last two weeks of life. Controls were defined as patients who were not treated with antipsychotics for terminal delirium within the last two weeks of life. All patients enrolled were evaluated with the exclusion of living hospice patients and patients discharged to receive home hospice care prior to death. Patients medical records were reviewed from two weeks prior to death until the recorded death. The following was assessed from the medical record as available: age, terminal diagnosis, time interval cancer diagnosis and death, war era, comorbid conditions, prescribed antipsychotic medications, other medications potentially contributing to delirium, documentation for antipsychotic use, non-pharmacological interventions, and date of death. **Results:** Research in progress. **Conclusions:** Research in progress

### Learning Objectives:

Identify risk factors for the development of terminal delirium in a VA inpatient hospice population.

Describe current antipsychotic usage patterns, documentation of nursing assessment of terminal delirium, and documentation of non-pharmacological and pharmacological interventions to manage terminal delirium.

### Self Assessment Questions:

Which of the following has not been identified as a risk factor for terminal delirium in actively dying patients?

- A: Infection
- B: Renal Failure
- C: Use of benzodiazepines
- D: Hypertension

Which of the following statements is true regarding antipsychotics and terminal delirium?

- A: Haloperidol is the only antipsychotic with an FDA-approved indication for terminal delirium.
- B: First-generation antipsychotics are considered first-line treatment for terminal delirium.
- C: Non-pharmacological alternatives should only be tried after the failure of pharmacological interventions.
- D: Extensive clinical trials have found proven benefit from the use of antipsychotics in terminal delirium.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-754L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSMENT OF PATIENT BENEFITS AND FOLLOW-UP FOR COMMONLY APPROVED NON-FORMULARY MEDICATIONS AT A SINGLE VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** To evaluate clinical benefits and patient follow-up for common non-formulary medication approvals within a single veterans affairs (VA) medical center. Collected data will provide insights into not only the benefits of these agents for a given disease state but also the tools and rationale used by providers to assess patient improvement after approval of a non-formulary medication. Additionally, the data may aid in development of appropriate criteria for reassessment of patients after approval of a specific medication. **Methods:** Retrospective data collection and analysis from the Indianapolis VA medical center will be completed via the Computerized Patient Record System (CPRS) and Decentralized Hospital Computer Program (DHCP). Utilizing a DHCP report, five months of non-formulary approval data was identified from January through May 2015. A total of 2,135 requests were processed within this time frame. A subset of the most commonly approved medications with subjective outcomes was then determined and analyzed. Collected data included the following: reason for approval, status of medication in patient profile, presence of post-approval reassessment by a medical provider, duration of therapy, refill dates, reason for discontinuation, and clinic or service requesting the consult. Also, a comparison of processes utilized when prescribing and assessing efficacy of non-formulary medications will be completed. This will be accomplished via distribution of a "voice of the customer" assessment to providers. **Preliminary Results:** Analysis of the data revealed pregabalin to be the most commonly approved non-formulary medication at this facility and therefore the focus of this study. Of all active pregabalin approvals, only 3 percent of patients have not received provider reassessment. 56 percent of those reassessed received provider follow-up within 3 months of therapy initiation. Among inactive pregabalin orders, 46 percent were discontinued within one month of initiation. **Conclusions Reached:** Conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the most commonly approved non-formulary medications with subjective outcomes at the Indianapolis VA.  
Discuss the processes by which providers adjust pregabalin dosage in patients with a suboptimal response.

### Self Assessment Questions:

Which of the following was the most common indication for pregabalin approval?

- A: Fibromyalgia
- B: Diabetic neuropathy
- C: Non-diabetic neuropathy
- D: Post-herpetic neuralgia

How much time elapsed between medication initiation and reassessment in over half of all patients on pregabalin?

- A: 0-3 months
- B: 3-6 months
- C: 6-9 months
- D: > 9 months

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-403L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CENTRALIZATION OF INTRAVENOUS HAZARDOUS MEDICATION PREPARATION

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**Purpose:** The purpose of this project is to consolidate the receipt, storage, mixing, preparing, compounding, and dispensing of intravenous hazardous drugs to one central location within an academic medical center. **Methods:** The logistics of the project involved the consolidation of all hazardous sterile product production from pharmacy facilities A, B and C into one USP 797 and USP 800 compliant facility A, consolidation of all non-hazardous sterile product production into facility B, and elimination of all sterile product production from facility C. Key stakeholders were identified to serve on a steering committee to evaluate and support the need for a centralized hazardous drug production model. A pharmacy resident served as the project manager and led both the steering committee and a project team. Project management was broken down into four main primary initiatives: inventory management, personnel (staffing models, workflows, and human resources), facilities and technology. The project timeline was set to begin December of 2015 and complete March of 2016. Additional methods will be presented at the Great Lakes Pharmacy Residency Conference. **Expected results:** This project will decrease hazardous type drug exposures to both patients and healthcare personnel. Centralizing all hazardous drug preparation and compounding in one facility design with USP 797 and USP 800 specified engineering controls is expected to bring UW Health into full regulatory compliance. Consolidation of hazardous drug inventory will decrease on-hand inventory costs. Additional results will be presented at the Great Lakes Pharmacy Residency Conference. **Conclusions:** Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the objectives of USP chapter 800 - Hazardous drugs - handling in healthcare settings

Explain the benefits of centralized intravenous hazardous drug preparation model

### Self Assessment Questions:

Which of the following is the best method to protect personnel from hazardous drug exposure

- A: Storing both non-hazardous and hazardous drugs in the same location
- B: Preparing hazardous drugs in a positive pressure non-negative pressure environment
- C: Delivering hazardous drugs to patient locations via pneumatic tube
- D: Separating handling areas designated for non-hazardous and hazardous drugs

Which of the following is an expected result of a centralized hazardous production model?

- A: Increased on-hand inventory costs
- B: Increased personnel risk to hazardous drug exposure
- C: Increased patient and customer satisfaction
- D: Increased number of administered hazardous drugs

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-755L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEXMEDETOMIDINE VERSUS USUAL CARE FOR TREATMENT OF SEVERE ALCOHOL WITHDRAWAL IN THE MEDICAL INTENSIVE CARE UNIT

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**Purpose:** Dexmedetomidine is being used with increased frequency for sedation in severe alcohol withdrawal patients in the medical intensive care unit (MICU). The purpose of this study is to evaluate the role of dexmedetomidine in this patient population. **Methods:** This retrospective cohort conducted at Spectrum Health Butterworth hospital in Grand Rapids, MI analyzed patients admitted to the MICU for severe alcohol withdrawal from October 30th 2012 until April 29th 2015. Patients were divided into two groups: those who received dexmedetomidine in addition to standard institutional Clinical Institute Withdrawal Assessment (CIWA) treatment, and those who received usual care (propofol, midazolam, or lorazepam) in addition to standard institutional CIWA treatment. The primary outcome of this study was MICU length of stay, and secondary outcomes included: total ventilation time, safety of sedative for alcohol withdrawal treatment (hypotension, bradycardia, treatment failure, breakthrough seizure, and death), hospital length of stay, benzodiazepine requirements, and duration of sedation. **Results:** A total of 95 patients were included, 51 in the usual care group and 44 in the dexmedetomidine group. Patients had a mean age of 53 years, and 76% of which were male. MICU length of stay for the usual care group was 152 hours versus 113 hours for the dexmedetomidine group ( $p=0.08$ ). Total ventilation time was 58 hours for usual care versus 27 hours for dexmedetomidine ( $p=0.008$ ). Total IV sedation time was 71 hours for usual care versus 57 hours for dexmedetomidine ( $p=0.2$ ). There was a 49% incidence of any adverse event with the usual care group and a 77% incidence in the dexmedetomidine group ( $p=0.036$ ). **Conclusions:** Patients in the dexmedetomidine group had a shorter total ventilation time and a trend toward a shorter MICU length of stay but a higher incidence of any adverse event, with hypotension being the most prevalent.

### Learning Objectives:

Describe the mechanism of action of dexmedetomidine and its use in alcohol withdrawal.

Identify potential adverse events associated with the use of dexmedetomidine.

### Self Assessment Questions:

Dexmedetomidine's mechanism of action is most similar to which of the following agents?

- A: Carbamazepine
- B: Haloperidol
- C: Clonidine
- D: Chlordiazepoxide

Which of the following is a major side effect of dexmedetomidine?

- A: Myalgia
- B: Bradycardia
- C: Increased Salivation
- D: Hypertension

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-404L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **SINGLE CENTER, RETROSPECTIVE COHORT STUDY TO CHARACTERIZE LEUKOPENIA FOLLOWING ORTHOTOPIC HEART TRANSPLANTATION**

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**PURPOSE:** Myelotoxicity is a serious complication following solid organ transplantation. Leukopenia has been directly associated with an increased risk of infection and indirectly associated with graft rejection. The etiology of leukopenia is likely multifactorial and includes bone marrow suppression caused by infection or drug-related toxicity. The incidence, likely etiology, management, and consequences of leukopenia have been fairly well described in abdominal transplant recipients. Few studies, however, are available describing leukopenia and its management in the heart transplant population. Given the morbidity and mortality associated with leukopenia and the lack of clear guidance for optimal management in heart transplant recipients, further work is warranted. The purpose of this study is to characterize leukopenia following orthotopic heart transplantation (OHT) against a background of contemporary immunosuppression and infection prophylaxis. **METHODS:** We conducted a single center, retrospective chart review of adult patients who underwent OHT between January 2008 and August 2014. Patients who expired during transplantation were excluded. Baseline demographics and laboratory data were analyzed. Primary endpoints included the incidence and time to onset of leukopenia. Secondary endpoints included the duration, recurrence, and severity of leukopenia. Leukopenia was defined as the occurrence of at least one total white blood cell count  $\leq 3000$  cells/mm<sup>3</sup>. Neutropenia and severe neutropenia were defined as the occurrence of at least one absolute neutrophil count  $\leq 1000/L$  and  $\leq 500/L$ , respectively. **PRELIMINARY RESULTS:** Preliminary data is available for 79 patients. 80% (n=63) were male. 56% (n=44) were Caucasian. Average age at OHT was 55.1 years. 25% (n=20) were considered to be high risk for cytomegalovirus infection. For induction, 52% (n=41) received basiliximab and 41% (n=32) received antithymocyte globulin. Leukopenia was observed in 62% (n=49) of patients with a mean time to onset of 10676 days. **CONCLUSIONS:** Preliminary findings suggest that leukopenia is common following OHT. Final results and conclusions will be presented.

### **Learning Objectives:**

Identify risk factors associated with the development of leukopenia following heart transplantation.

Describe strategies for managing leukopenia in heart transplant recipients.

### **Self Assessment Questions:**

Which of the following pharmacologic agents may contribute to the development of leukopenia following heart transplantation?

- A: Mycophenolate mofetil
- B: Antithymocyte globulin
- C: Valganciclovir
- D: All of the above may contribute to the development of leukopenia

All of the following are appropriate management strategies of leukopenia in heart transplant recipients EXCEPT:

- A: Administration of intravenous immune globulin (IVIG)
- B: Plasmapheresis
- C: Administration of recombinant hematopoietic growth factors
- D: Discontinuation or dose reduction of offending pharmacologic agent

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-405L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **EVALUATION OF ENVIRONMENTAL DISINFECTION SYSTEMS AS A PHARMACY-DIRECTED ANTIMICROBIAL STEWARDSHIP INITIATIVE**

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**Purpose:** Hospital-acquired infections cause patient harm, increase length of stay, and are of grave concern due to the increase in multi-drug resistant organisms. These infections are expected to have negative financial implications through reimbursement penalties. Pharmacy-directed antimicrobial stewardship programs need to consider environmental issues as well as antimicrobial utilization when working to reduce hospital-acquired infections. Controlling environmental conditions in patient rooms can help reduce the microbial burden of infectious organisms and decrease overall hospital-acquired infections. The purpose of this study is to identify available disinfection systems, implement the best system, and evaluate hospital-acquired infection rates before and after implementation of the system. **Methods:**

Room disinfection systems were evaluated on hospital-specific needs including efficacy toward targeted hospital-acquired infections, ease of personnel use, hands-on time, room turnover time, and cost. A primary system was determined acceptable for in-house demonstration and further efficacy testing using commercially prepared microbial strips and locally prepared slides inoculated with bacteria. Proposal for capital purchase was presented to leadership, which was approved. An infection control protocol focusing on prioritization and use of the environmental disinfection system within the hospital was developed. Hospital-acquired infection rates prior to implementation of the environmental disinfection system will be collected and compared with post implementation rates, with the purpose of targeting the reduction of specific types of hospital-acquired infections. **Results / Conclusion:** Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Identify specific factors considered in the evaluation phase of environmental disinfection systems and explain how those factors influence the potential use of the system.

Discuss the strategy for managing the use of the fogger system to prioritize disinfection of patient rooms based on prior occupancy.

### **Self Assessment Questions:**

Which of the following statements regarding the assessment of the environmental disinfection systems is true?

- A: An environmental disinfection system was desirable to reduce p
- B: Cost was not a consideration in the evaluation of disinfection syste
- C: The ability of a disinfection system to kill clostridium difficile was a
- D: Operation of the fogger system is so easy that environmental serv

Which of the following infections in a patient who is being discharged from a room should always require disinfection of the room with the fogger system prior to another patient occupying the same room?

- A: Urinary tract infections
- B: Carbapenem-resistant enterobacteriaceae (CRE)
- C: Sepsis
- D: Methicillin-resistant staph aureus (MRSA)

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-914L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARATIVE EFFICACY OF ATYPICAL ANTIPSYCHOTICS IN THE TREATMENT OF ICU DELIRIUM

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**Purpose:** Many patients in the Intensive Care Unit (ICU) develop delirium during their stay. Delirium has been associated with worse outcomes in the hospital, including increased in-hospital mortality, longer length of stays, and reduced ability to perform activities of daily living after discharge. While several antipsychotic regimens are used in the ICU, there is little evidence to suggest the superiority of one antipsychotic agent over the others. The goal of this study is to determine if one antipsychotic regimen is more efficacious at reducing Confusion Assessment Method for the ICU (CAM-ICU) positive days. Secondary outcomes include ICU length of stay (ICU-LOS), hospital LOS, antipsychotic efficacy with various comorbid conditions, adverse drug events, and the presence of delirium symptoms. **Methods:** Patients will be identified from the electronic medical record if they have received one of the following antipsychotics while in the ICU: haloperidol, olanzapine, quetiapine, and risperidone. Adult patients will be included in the study if they had at least one positive CAM-ICU result. Patient records will be excluded for the protected classes of children under the age of 18, pregnant women and prisoners. Data will be collected using information only from existing medical records and will include CAM\_ICU score and number of days CAM-ICU score was positive, length of stay within the hospital and within the ICU, dose of antipsychotic given, Richmond Agitation Assessment Scale (RASS) score, intubation status, delirium symptoms present, serum creatinine, and QTc interval. Demographic information will be collected on patients age, sex, attending physician, comorbidities, and admitting diagnosis. Patient and attending physician will not be identifiable in any reports of the data; all results will be reported only in aggregate.

**Results/Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe adverse outcomes associated with ICU delirium  
Discuss atypical antipsychotic prescribing strategies for ICU delirium

### Self Assessment Questions:

Which of the following is an adverse outcome associated with ICU delirium?

- A Decreased in-patient mortality
- B: Increased length of stays
- C: Decreased duration of mechanical ventilation
- D: Increased functional status at hospital discharge

For treating ICU delirium, the clinical literature most strongly supports which of the following atypical antipsychotics?

- A Quetiapine
- B Risperidone
- C Olanzapine
- D There is no consensus regarding atypical antipsychotic preference

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-406L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF A DOSING STRATEGY FOR THERAPEUTIC ENOXAPARIN FOR ACUTE VENOUS THROMBOEMBOLISM AT THE CINCINNATI VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** The objective is to evaluate the outcomes of two different dosing strategies of enoxaparin for the treatment of acute venous thromboembolism (VTE) that have been used at the Cincinnati Veterans Affairs Medical Center (VAMC). Enoxaparin is an approved subcutaneous injection with a dose of 1 mg/kg twice daily or 1.5 mg/kg once daily for acute VTE. The primary goal is to evaluate the rates of bleeding in patients who received each enoxaparin dosing strategy. Secondary goals include the recurrence of VTE and incidence of death within 3 months of starting enoxaparin. **Methods:** This project is a retrospective chart review of Veterans who received therapeutic doses of enoxaparin for acute VTE from January 1, 2011 - December 31, 2015. One hundred patients who took enoxaparin will be randomly selected, 50 who received enoxaparin 1 mg/kg twice daily and 50 who received 1.5 mg/kg once daily. Patient identifiers will not be used and confidentiality will be maintained throughout the project. Patients that received prophylactic dosing or less than 60 mg of enoxaparin will be excluded. The following data will be collected: patient age, sex, height, weight, serum creatinine, date enoxaparin ordered, enoxaparin dose, duration and indication of therapy, major and minor bleeding on enoxaparin, platelet count <150 x 10<sup>9</sup>/L and VTE recurrence or death that occurred within 3 months of taking the medication. Patients related medical and medication history will be collected and analyzed. The results of the study will help guide decisions on dosing strategies and find areas where further study may be needed at the Cincinnati VAMC. **Results/Conclusion:** Data collection and analysis is ongoing. The results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the advantages and disadvantages of enoxaparin once daily vs. twice daily dosing for acute venous thromboembolism.  
Identify potential factors that increase bleeding risk while using enoxaparin.

### Self Assessment Questions:

Which dose of enoxaparin is an acceptable option for a 72-year-old male patient who was recently diagnosed with a pulmonary embolism (weight = 78 kg)? Patient has a creatinine clearance of 74 mL/min.

- A enoxaparin 40 mg subcutaneously twice daily
- B: enoxaparin 80 mg subcutaneously once daily
- C: enoxaparin 120 mg subcutaneously once daily
- D: enoxaparin 100 mg subcutaneously twice daily

What factor could increase a patient's bleeding risk when taking enoxaparin?

- A Lack of vitamin K intake
- B Renal dysfunction
- C Use of PPI medication
- D Recent hospitalization due to a COPD exacerbation

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-407L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECTS OF A PHARMACY TECHNICIAN-DRIVEN MEDICATION RECONCILIATION PROGRAM FOR BOARDED PSYCHIATRIC PATIENTS IN THE EMERGENCY DEPARTMENT

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**Purpose:** To date, there has been a large amount of literature to support the use of pharmacy staff to complete medication reconciliation processes to decrease various negative outcomes. However, previous studies have not yet examined the rates of admission medication reconciliation completion. The objective of this study is to determine the impact of pharmacy technician-driven admission medication reconciliation on home medication re-initiation on psychiatric patients in the emergency department. **Methods:** This study, approved by the OhioHealth Institutional Review Board, includes two retrospective chart reviews to assess whether a pharmacy technician-driven medication history, including verification by means of a variety of outside sources, on psychiatric patients on medical hold in the emergency department improves home medication re-initiation, as clinically indicated. This will be measured by examining completion of the admission medication reconciliation within the electronic medical record (EMR) by the attending physician, in these patients. Baseline (pre-intervention) rates of admission medication reconciliation completion within the EMR will be determined using a retrospective chart review from June 1, 2015 through August 31, 2015. On September 1, 2015, the pharmacy technician driven medication histories program was implemented on boarding psychiatric patients. In order to assess the effectiveness of this program rates of admission medication reconciliation completion within the EMR will be examined during the post-intervention period, October 1, 2015 through December 31, 2015 by chart review. **Results/Conclusions:** Data collection in progress. Results and conclusions will be presented at the 2016 Great Lakes Residency Conference.

### Learning Objectives:

Discuss risks of an inaccurate or omitted medication history on psychiatric patients  
Review a process of pharmacy technician-driven medication histories in the emergency department

### Self Assessment Questions:

The Joint Commission has designated which of the following processes as a National Patient Safety Goal to improve inaccuracies that may lead to adverse drug events?

- A: Correct patient identification
- B: Chart review
- C: Medication reconciliation
- D: Improvement of staff communication

What is the most appropriate external source of validation for a subjective medication history?

- A: Primary Care Provider (PCP)
- B: Neighbor
- C: Patient
- D: Internet

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-915L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RE-EVALUATION OF GASTRIC ACID SUPPRESSION AGENT USE FOR STRESS ULCER PROPHYLAXIS POST-GUIDELINE IMPLEMENTATION IN THE NON-CRITICALLY ILL PATIENT POPULATION AT AN ACADEMIC MEDICAL CENTER

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**Purpose:** Gastric acid suppression agent use at Froedtert Hospital was previously evaluated through retrospective analysis and compared to other University HealthSystem Consortium (UHC) facilities. Use at Froedtert Hospital far exceeded the average use at other UHC institutions (62% vs. 49%, respectively). A set of institution-wide stress ulcer prophylaxis guidelines were set forth for the critically and non-critically ill patient populations to curb inappropriate prescribing of these agents in March 2013. Despite guideline implementation, there is concern for non-compliance. The purpose of this project is to increase compliance with the current institutional guidelines, henceforth decreasing the inappropriate use of gastric acid suppression agents at Froedtert Hospital and its affiliate hospitals. **Methods:** Assessment of institutional compliance with the guidelines will be completed with a retrospective chart review of 100 non-critically ill patients that were admitted during a selected 30-day period and subsequently started on gastric acid suppression agents. Additionally, admission order sets that included pantoprazole and famotidine (formulary gastric acid suppression agents) were evaluated for appropriateness. To reduce inappropriate ordering, proposed interventions within the electronic medical record (EMR) included removal of pantoprazole and famotidine from admission order sets, as well as requiring an indication if one of these agents is ordered. Upon approval of these interventions by the designated committees and after the implementation of the proposed interventions, 100 non-critically ill patients receiving famotidine and pantoprazole during hospitalization will be evaluated through retrospective chart review to determine appropriate use of these agents. Pre- and post-intervention data will be compared to determine appropriate use of these agents. **Results and Conclusions:** All data collected will be presented at the GLPRC.

### Learning Objectives:

Identify three (3) adverse effects or consequences associated with the inappropriate use of gastric acid suppression agents.  
Recognize potential barriers associated with developing more structured and restricted prescribing with gastric acid suppression agents.

### Self Assessment Questions:

The FDA requires that labeling for PPIs include safety information about a possible increased risk of fractures in all of the following except:

- A: Hip
- B: Wrist
- C: Femur
- D: Spine

Which of the following statements is false?

- A: Esomeprazole may have a drug interaction with clopidogrel similar
- B: Histamine blockers and antacids have not been shown to interfere
- C: Separating the time of clopidogrel and omeprazole administration
- D: CYP2D6 is a drug-metabolizing enzyme that is inhibited by omepr

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-756L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RISK FACTORS FOR PSEUDOMONAS AERUGINOSA IN DIABETIC FOOT INFECTIONS

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**Purpose:** Among diabetic complications, foot infections are a common occurrence leading to increased morbidity and a higher likelihood for amputation. Although gram-positive cocci are the most common pathogens isolated, the prevalence of gram-negative organisms such as pseudomonas aeruginosa remains unclear. Nevertheless, the increased use of broad spectrum antibiotics has contributed to multidrug resistance, driving treatment failures and increased costs. Thus, the primary objective of this study is to identify risk factors associated with the development of pseudomonal diabetic foot infections (DFIs). Secondary objectives include determining the incidence of pseudomonas aeruginosa causing DFIs, and the outcomes associated with these infections. **Methods:** This risk factor analysis is a single-center retrospective case-control study of adult inpatients with diabetes mellitus presenting with a foot infection at the University of Michigan Health System between 2007-2015. Patients transferred from an outside hospital or admitted for vein bypass grafting will be excluded from this study. Patients will be identified through the hospital clinical informatics system based on ICD-9 codes for diabetes and skin and soft tissue infections. The following data will be collected: baseline demographics, comorbidities, past medical history, diabetes duration and history, prior antibiotic and healthcare exposure, infection severity, microbiological data, infection-related complications, and outcomes including length of stay, hospital readmission, and all-cause mortality. All data will be collected and maintained confidentially. Thereafter, multivariate regression analysis will be performed using stepwise logistic regression. Bivariate factors with a p-value <0.2 will be included in the multivariate logistic regression. A sample size of 600 patients will be targeted, estimating 20-30 patients to be included per risk factor. Descriptive statistics will be used to describe patient demographics, microbiological culture data, and infection characteristics. Student's t-test and chi-square tests will be used to evaluate continuous and dichotomous variables, respectively. **Results:** In Progress **Conclusion:** In Progress

### Learning Objectives:

Describe the microbiology of diabetic foot infections.  
Discuss the current literature related to risk factors for pseudomonas aeruginosa causing diabetic foot infections.

### Self Assessment Questions:

Which of the following are the most common bacterial pathogens isolated in diabetic foot infections?

- A Gram-positive organisms
- B: Gram-negative organisms
- C: Anaerobes
- D: None of the above

The IDSA Clinical Practice Guideline for the Diagnosis and Treatment of Diabetic Foot Infections identifies which of the following as risk factors for pseudomonas?

- A Warm climate
- B Frequent exposure of the foot to water
- C High local prevalence of pseudomonas infection
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-408L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ROLE OF TYPICAL VERSUS HIGH-DOSE DEXTROSE IN URGENT REVERSAL OF HYPERKALEMIA

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**Purpose:** Hyperkalemia is an electrolyte disorder that can result in dysrhythmia and death. Treatment of this condition is often urgent. Reversal in the short term is accomplished via the administration of intravenous insulin, along with intravenous dextrose. Despite the use of dextrose, studies have indicated that this therapy results in high rates of hypoglycemia following administration. One potential mechanism to counteract this adverse effect is to administer greater amounts of dextrose. The objective of this study was to determine if high doses of intravenous dextrose resulted in lower events of hypoglycemia following urgent reversal of hyperkalemia relative to typical doses. **Methods:** This was a retrospective, matched cohort study of 240 patients treated for urgent reversal of hyperkalemia. Patients were included if they were greater than 18 years old and received 10 units of intravenous insulin in addition to either 25 or 50 grams of intravenous dextrose. Exclusion criteria included previous reversal of hyperkalemia during admission, use of an insulin drip at time of hyperkalemia admission, use of dextrose infusion >5% at time of treatment, and presence of tumor lysis syndrome, rhabdomyolysis, or hemolysis. The primary outcome studied was incidence of hypoglycemia, defined as a blood glucose less than 70 mg/dL, at one hour following reversal. Secondary outcomes measured included incidence of severe hypoglycemia, defined as a blood glucose less than 40 mg/dL, at one hour following reversal, incidence of hypoglycemia at four hours following reversal, and change in potassium levels at one hour. The primary outcome will be assessed via Chi Square test. Secondary outcomes will be assessed via a Chi Square test or Mann-Whitney U test. **Results/Conclusions:** Data collection is in progress. Final data analysis and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify rates of hypoglycemia following reversal of hyperkalemia with intravenous insulin and dextrose in different patient populations.  
Report a method to decrease risk of hypoglycemia events following urgent reversal of hyperkalemia

### Self Assessment Questions:

Approximately how many patients develop hypoglycemia at one hour following urgent reversal of hyperkalemia?

- A 0-5%
- B: 10-20%
- C: 40-60%
- D: >80%

Based on the results of this study, which of the following is true?

- A Diabetic patients are at a higher risk for hypoglycemia following re
- B C.High doses of dextrose (50 grams) are more effective at reduc
- C High doses of intravenous dextrose do not statistically reduce incid
- D Patients who are treated for hyperkalemia are at risk for hypoglyce

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-916L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INCIDENCE OF DELIRIUM IN CARDIAC AND SURGICAL PATIENTS: A SINGLE-CENTER, RETROSPECTIVE COHORT

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Delirium is a manifestation of acute brain dysfunction that remains a point of interest in clinical research due to its immense clinical impact. Delirium has been associated with increased hospital length of stay, decreased activities of daily living, as well as an overall increase in healthcare costs. Delirium has been documented to occur in 20-50% of non-mechanically ventilated intensive care (ICU) patients and up to 60-80% of mechanically ventilated (MV) ICU patients. Delirium has been studied in both the surgical and cardiovascular intensive care unit, however, there have been no studies directly comparing the impact of delirium in these two populations. The aim of this cohort is to compare the incidence and clinical outcomes of delirium in the post-operative surgical and cardiovascular intensive care unit (SICU and CVICU, respectively) patients. A single-center, retrospective chart review was conducted to evaluate post-operative patients admitted to the SICU and CVICU between November 1st, 2014 and January 31st, 2016. The study included patients 18 years of age or older requiring mechanical ventilation for greater than or equal to 24 hours. Patients were excluded if they had a history of psychosis or if they were unable to communicate with assessors. The primary outcome of this cohort was incidence of delirium, as defined by the confusion assessment method for the intensive care unit (CAM-ICU). Secondary outcomes included ICU length of stay (LOS), hospital LOS, days requiring MV, days of delirium, and characterization of pharmacological interventions.

### Learning Objectives:

Describe the CAM-ICU process used to evaluate delirium in the intensive care unit.

Review literature associating delirium and its impact on clinical outcomes.

### Self Assessment Questions:

Previous literature has associated delirium with which clinical outcomes:

- A: Increased mechanical ventilation days
- B: Increased intensive care unit and hospital length of stay
- C: Increased healthcare costs
- D: All of the above

Which of the following features are included in the confusion assessment method for the intensive care unit (CAM-ICU)?

- A: Acute change or fluctuating course of mental status
- B: Inattention
- C: Altered level of consciousness
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-409L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EFFECT OF A MRSA NARES PCR DRIVEN DE-ESCALATION ALGORITHM ON VANCOMYCIN UTILIZATION

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Statement of Purpose: Infectious disease guidelines recommend empiric methicillin-resistant *Staphylococcus aureus* (MRSA) coverage for high risk patients with a suspected healthcare related pneumonia, but they also recommend considering de-escalation of antibiotics after 48-72 hours. Recent data show a high negative predictive value of MRSA nares screening in prediction of a MRSA pneumonia infection; therefore MRSA nares screenings may be a useful tool for recommending de-escalation of empiric antibiotics. The purpose of this study is to evaluate the strategy of de-escalation by measuring antibiotic usage after implementing workflow algorithms and educating providers and pharmacists on this data. Statement of methods used: This is a pre-post-implementation study of the strategy of de-escalating vancomycin using MRSA nares. Intensive care unit patients were retrospectively reviewed pre-implementation and the post implementation group is being collected prospectively. The primary outcome is total hours of vancomycin usage for the culture negative/MRSA nares negative patients. The secondary outcome is the percentage of patients that were de-escalated off vancomycin within 72 hours. Summary of results:

The primary outcome of mean total hours of vancomycin for the culture negative/MRSA nares negative patients (N=17) was 65.6 hours. Secondary outcome of the percentage of patients de-escalated by 72 hours was 70.6%. 35 patients were treated for pneumonia with vancomycin in the retrospective cohort. 6/35 (17.1%) had a positive MRSA nares. 6/29 (20.7%) patients with negative MRSA nares had at least one positive blood culture and 7/29 (24.1%) had an organism grow in the respiratory culture. Conclusions reached: A negative MRSA nares screening has been shown to correlate to the absence of MRSA pneumonia. Implementation of a vancomycin de-escalation strategy for pneumonia through education and development of a workflow algorithm may decrease empiric vancomycin use for the treatment of pneumonia in patients with negative MRSA nares screening.

### Learning Objectives:

Recall the Infectious Diseases Society of America's recommendation on empiric MRSA coverage for a healthcare-related pneumonia

Select the negative predictive value of a MRSA nares screening in prediction of a MRSA pneumonia

### Self Assessment Questions:

Which of the following is a MRSA risk factor identified by the Infectious Diseases Society of America?

- A: Chronic hemodialysis
- B: A recent urgent care visit
- C: A recent sick child
- D: Vancomycin resistant enterococcus colonization

Which is closest to the negative predictive value of a MRSA nares for predicting a MRSA pneumonia seen in historical studies?

- A: <50%
- B: 60%
- C: 70%
- D: >90%

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-410L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**PROSPECTIVE EVALUATION OF PATIENT AND PROVIDER PERSPECTIVE OF PROCEDURAL SEDATIONS, MEDICATION SELECTION, DOSING, AND ADVERSE EVENTS IN A TERTIARY CARE EMERGENCY DEPARTMENT**

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**Purpose:** Procedural sedation in the emergency department (ED) involves administration of sedatives or dissociative agents. The goal of sedation is to augment the patient's perspective and induce an amnesic state that allows for tolerance of unpleasant procedures while maintaining cardiorespiratory function. Little data describes the patient perspective of the sedation or their experience after the procedure. Furthermore, dosing and agent selection is at provider discretion and few descriptive data exist to support clinical decision making. The purpose of this study is to generate descriptive data regarding patient satisfaction and procedural outcomes based on agents and doses used.

**Methods:** An institutional review board approved questionnaire evaluating satisfaction, pain, nausea, and recall is administered to patients at least thirty minutes after final sedative administration. A follow-up survey to evaluate recall is done by phone in seven to fourteen days. Providers are blinded to the patient satisfaction response and surveyed for sedation satisfaction after the procedure. All patients are consented prior to sedation and survey administration. Data collection will occur for six months with a power of 49 patients in each treatment arm needed to detect a difference in patient satisfaction based on agent used. Metrics evaluated include demographics, adverse outcomes, procedure length, and rate of repeated procedure. Other pertinent outcomes measured include depth and length of sedation, nausea, pain and vital signs pre and post medication administration, and provider reasoning for agent selection. **Results:** Data collection is ongoing.

**Learning Objectives:**

State the purpose of procedural sedation

Identify the reasoning for further research on the subject matter to guide clinical decision making

**Self Assessment Questions:**

What is the purpose of procedural sedation?

- A: A. Create a quiet work environment for the physician
- B: B. Induce a state of amnesia allowing patients to tolerate unpleasant
- C: C. To augment vital signs of patients prior to a procedure
- D: D. Induce a deep sedation requiring intubation

Which organization provides guidelines with robust data pertaining to safety, efficacy, and satisfaction to guide dosing and agent selection based on procedure?

- A: A. American College of Emergency Physicians
- B: B. American Academy of Emergency Medicine
- C: C. Society of Critical Care Medicine
- D: D. None of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-917L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

**EVALUATION OF A COMPREHENSIVE MEDICATION REVIEW SERVICE IN A PATIENT-CENTERED MEDICAL HOME**

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**Purpose:** The purpose of this study is to examine the impact of comprehensive medication reviews (CMRs) on patient medication use and cost with the goal of developing a sustainable service for CMR. The Centers for Medicare & Medicaid Services plans to implement the completion rates of CMRs as a Star Rating quality measure for Medicare Part D plans in 2016. The available literature indicates that CMR completion rates are low and does not provide sufficient evidence for medication therapy management services positively impacting health outcomes due to inconsistency in services provided. **Methods:** The Institutional Review Board has approved this single-center retrospective cohort study. The Benefits Office identified retirees with Prescription Drug Plan benefits who were eligible for a CMR from January 1 to December 31, 2014. Pharmacists within the patient-centered medical home (PCMH) performed a CMR during the initial intake visit where they identified potential drug therapy problems and made recommendations accordingly. Pharmacists followed-up with most patients during a second visit. We will determine an index date reflecting these CMR visits for analysis. Upon completion of the CMR service, participants received a satisfaction survey. Pharmacist documentation of interventions made to improve efficacy, safety, or decrease cost will be used to describe the interventions made. These interventions include adding, deleting or optimizing medications and modifying doses of medications. To analyze intervention data, we will use Chi-squared tests to assess frequency distributions of these interventions associated with cost, safety or efficacy across different disease states. Prescription medication costs 6 months before and after the CMR index date for the patient and drug plan will also be collected and compared using T-tests. Patient satisfaction data will be described and analyzed with ANOVA tests and compared based on demographic data. **Results and Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Explain the importance of medication therapy management (MTM)

Describe the types of interventions made by PCMH pharmacists during CMR visits

**Self Assessment Questions:**

Which of the following provides the best description of the goal(s) associated with medication therapy management (MTM) services?

- A: To ensure medications are safe, appropriate, effective and affordable
- B: To minimize the healthcare costs to patients and insurance companies
- C: To reduce the risk of medication-related adverse effects
- D: To counsel patients on benefits and risks associated with their medications

What is likely the most common type of intervention that pharmacists made during a CMR visit?

- A: Order a urine microalbumin (UMA) lab test
- B: Referral for an annual eye exam
- C: Therapeutic medication change
- D: Referral to the social work team

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-411L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## DEFINING A STANDARDIZED PHARMACIST-DRIVEN PROCESS FOR INPATIENT WARFARIN EDUCATION

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**Purpose:** Warfarin is a high risk medication, with one study reporting 8.2% of patients on warfarin therapy experience a warfarin related adverse event, many requiring hospitalization. To reduce adverse events, improve therapeutic outcomes, and increase medication adherence, it is essential all patients on warfarin are properly educated. The Joint Commissions National Patient Safety Goals focus on reducing patient harm due to warfarin through the use of standardized education. Currently at Norton Healthcare, the nursing staff provides warfarin education to admitted patients prior to discharge. However, pharmacists are well-equipped to provide warfarin education. Research on warfarin education validates patients educated by a pharmacist receive more information and clearer answers to questions when compared to education provided by other health care professionals. The purpose of this process improvement project is to define and implement a standardized, pharmacist-driven process for warfarin education for Norton Healthcare inpatients on warfarin therapy. **Methods:** This is a four week pilot project to assess pharmacists ability to implement the standardized, pharmacist-driven process for inpatient warfarin education. Prior to implementation, a tool was developed within the electronic medical record to standardize the warfarin education documentation. The standardized workflow includes pharmacists identification of patients requiring warfarin education, completion of a medication history, documentation within the electronic medical record, and follow up of identified interventions. Data was collected to ensure pharmacists compliance with each step of the workflow. Additional outcomes to be evaluated include time impact of this new workflow, inclusion criteria for patient education, number of interventions identified by the pharmacist and accepted by the medical staff, and barriers to completion of the workflow. **Analysis/Conclusion:** Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify patients who may benefit from pharmacist-provided warfarin education

Discuss the benefits of pharmacist involvement in warfarin patient education

### Self Assessment Questions:

Which of the following patients would benefit most from pharmacist-provided warfarin education?

- A: A patient who reports adherence to their warfarin therapy and knows their medication history
- B: A patient being newly initiated on warfarin therapy
- C: A patient being transitioned from warfarin to apixaban in the inpatient setting
- D: A patient who understands warfarin related emergencies

Which of the following would be considered false regarding pharmacist involvement in inpatient warfarin patient education?

- A: Patients have better patient understanding of anticoagulant medications
- B: Increased potential for the pharmacist to identify medication related adverse events
- C: Improved relations between pharmacists, patients, and other health care providers
- D: Decreased clarity of information provided to the patient by the pharmacist

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-757L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## FOSFOMYCIN VERSUS DAPTOMYCIN AND LINEZOLID FOR THE TREATMENT OF VANCOMYCIN RESISTANT ENTEROCOCCUS FAECIUM (VRE) URINARY TRACT INFECTIONS (UTI)

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**Purpose:** UTIs are the most common nosocomial infection with enterococcus species being the second most common causative pathogen. The increasing incidence of vancomycin resistant VRE is problematic due to association with increased mortality, limited treatment options and higher overall cost. Two popular treatment options, daptomycin and linezolid, are not ideal due to high cost for both agents and requiring intravenous administration in the case of daptomycin or poor urine concentrations in the case of linezolid. Fosfomycin has consistently adequate in vitro and in vivo coverage of VRE and is administered orally but lacks clinical data and FDA approval for treatment of complicated UTIs. The purpose of this study is to evaluate the efficacy of fosfomycin compared to daptomycin or linezolid for the treatment of VRE UTIs. **Methods:** A retrospective chart review of patients with VRE UTIs between May 2013 and June 2015 was completed. To be included, patients had to be at least 18 years old and have both clinical and laboratory diagnosis of a VRE UTI and received at least one dose of one of the three study drugs. Patients were excluded if they received any other antibiotics with potential activity against VRE (including one of the other study drugs) or died within 48 hours of treatment initiation. The primary endpoint of this study is clinical cure, defined as not requiring retreatment within 30 days and no readmission within 30 days for UTI. The secondary endpoint is microbiological cure, defined as having a confirmed negative urine culture and/or no reinfection within 30 days. **Results/ Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify current treatment options for VRE UTIs and explain pros and cons for each.

Describe the efficacy of fosfomycin compared to daptomycin or linezolid for the treatment of VRE UTIs.

### Self Assessment Questions:

Which of the following antibiotics potentially has activity against VRE?

- A: Ampicillin
- B: Linezolid
- C: Fosfomycin
- D: All of the above

Which of the following antibiotics has had resistance reported in VRE?

- A: Ampicillin
- B: Daptomycin
- C: Fosfomycin
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-412L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ASSESSMENT OF PROPHYLACTIC ANTIBIOTICS ON SURGICAL SITE INFECTIONS IN ELECTIVE COLORECTAL SURGERIES BEFORE AND AFTER IMPLEMENTATION OF A HOSPITAL WIDE SURGICAL SITE INFECTION PREVENTION BUNDLE

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**Purpose:** In an effort to reduce surgical site infections in colorectal surgeries, our facility has implemented a surgical site infection prevention bundle. This two part study served as a formal evaluation of the antibiotics that were being administered for surgical prophylaxis pre-operatively both before and after the bundle implementation.

**Methods:** A retrospective chart review of patients at our facility who have undergone a colorectal surgery before and after the surgical site infection prevention bundle was implemented will be completed. Colorectal surgeries between January 1, 2014 and July 31, 2015 as well as December 1, 2015 and March 1, 2016 will be reviewed. Adherence to the bundle, the rate of colorectal surgical site infections, and the appropriateness of the antibiotics administered pre and post-operatively will be determined. Information regarding type of colorectal surgery and antibiotic dosing and duration will be collected. In patients with a surgical site infection, information will be obtained to track causative organisms and readmission rates at 30 days. Rates of *Clostridium difficile* development will be determined. This analysis will include age, sex, height, weight, temperature, comorbid conditions (diabetes mellitus, chronic kidney disease, cancer, and inflammatory bowel disease), immune suppression (by chemotherapy, radiation, drug therapy, or comorbid condition), serum creatinine, creatinine clearance, albumin, white blood cell count, blood glucose, any drug allergies to the recommended antibiotic agents, procedure duration, contamination, perforation, corticosteroid therapy, and perioperative transfusion of packed red blood cells. **Results/Conclusions:** This study is still under investigation. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss antibiotics that can be used for surgical prophylaxis in colorectal surgeries.

Identify which antibiotics will require re-dosing during lengthy colorectal procedures.

### Self Assessment Questions:

Which of the following regimens is acceptable as surgical prophylaxis for a colorectal surgery in a patient with no known drug allergies?

- A: Vancomycin plus aztreonam
- B: Clindamycin
- C: Ceftriaxone plus metronidazole
- D: Levofloxacin

Which of the following antibiotics must be re-dosed during a colorectal surgery if the procedure has lasted more than two hours from the administration of the pre-operative dose?

- A: Metronidazole
- B: Cefotetan
- C: Aztreonam
- D: Cefoxitin

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-413L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF A COMMUNITY TECH-CHECK-TECH PROGRAM AS A STRATEGY FOR PRACTICE ADVANCEMENT

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**Purpose:** The purpose of this project was to design, pilot, and evaluate a community tech-check-tech (TCT) program as a strategy for pharmacist and technician practice advancement. This was a proof-of-concept study to determine if the application of inpatient TCT programs could be translated to a community pharmacy setting. **Methods:** The policies, technician training requirements, prescription eligibility requirements, and quality assurance measures necessary for the pilot were developed. A pilot site was determined, and the TCT workflows and procedures were integrated into the existing prescription dispensing framework at the site. There were two phases; phase one was the TCT period and phase two was the pharmacist accuracy validation period. During both phases, an analysis of checking accuracy was conducted with approximately four weeks of data collection for each. A self-documentation form was created to collect accuracy data. Direct observation was used to measure pharmacist and technician prescription checking time. To determine TCT technician accuracy in phase one, the TCT technician performed a verification check after the prescription was filled by pharmacy staff. If the TCT technician found an error, they documented the error and returned the prescription to the filling technician for correction. If filled correctly, the TCT technician passed the prescription to a pharmacist for final verification. The pharmacist documented any incorrect prescriptions that the TCT technician "verified." During phase two, pharmacist accuracy and checking time were measured through direct pharmacist observation. This data was then used to evaluate pharmacist time savings as a result of community TCT, while ensuring prescription dispensing accuracy. **Results/Conclusions:** Expected results include a safe and accurate community TCT workflow with quality assurance measures, technician and pharmacist prescription verification accuracy data, as well as quantification of pharmacist time savings resulting from program implementation. Final results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the training requirements that a technician must complete prior to participation in a community tech-check-tech program.

Review the role of pharmacy technicians in the UW Health community tech-check-tech pilot.

### Self Assessment Questions:

Which of the following training requirements must a technician complete prior to participating in a community tech-check-tech program?

- A: Review of all sections in the training manual with a pharmacist
- B: Successful completion of the final exam with a minimum of 90% accuracy
- C: Completion of one-on-one practical training with pharmacists
- D: All of the above

Which of the following most accurately describes the role of the checking technician in the UW Health community TCT program?

- A: Perform clinical review of prescriptions
- B: Enter the prescription information into the pharmacy system
- C: Perform the final check for prescriptions filled by another technician
- D: None of the above

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-758L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **SAFETY AND ECONOMIC BENEFIT OF NAFICILLIN VS. CEFAZOLIN FOR THE TREATMENT OF MSSA BACTEREMIA**

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**Purpose:** In terms of efficacy, cefazolin may be a suitable alternative for nafcillin in the treatment of methicillin sensitive *Staphylococcus aureus* (MSSA) bacteremia. It is unknown if there is a difference in prevalence rates of adverse effects between agents. Additionally, there is a significant difference between the drug acquisition cost of nafcillin compared with cefazolin. The objective of this study is to evaluate the safety and economic impact of using cefazolin versus nafcillin in patients with MSSA bacteremia. **Methods:** This IRB approved study was a retrospective cohort conducted at a four hospital health system. All patients  $\geq 18$  years of age treated for MSSA bacteremia with either cefazolin or nafcillin  $\geq 72$  hours from November 2013 to October 2015 were screened for inclusion. Patients were excluded if they met any of the following criteria: had a baseline serum creatinine (SCr)  $\geq 2$  mg/dL, if the patient was on any form of hemodialysis, peritoneal dialysis, or continuous renal replacement therapy, or if they had confirmed or suspected meningitis. The primary outcome was the incidence of nephrotoxicity defined as an increase in SCr from baseline  $>50\%$  or  $\geq 0.3$  mg/dL. Incidence of nephrotoxicity was adjudicated by investigators blinded to treatment group. Secondary outcomes include clinical cure, incidence of additional adverse events, and cost associated with drug acquisition and length of stay. 150 patients were enrolled to provide 80% power to detect a difference of 20% between groups based on previous studies incidence rates of nephrotoxicity of 29% and 5% in the nafcillin and cefazolin groups, respectively. Categorical variables were compared via Chi-square or Fishers exact test, as appropriate. A multivariate logistic regression was performed to identify independent predictors of nephrotoxicity. **Results and Conclusions:** Will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Identify differences in penicillin and cephalosporin treatment options for the treatment of MSSA bacteremia.

Recognize a safe and cost effective therapy for MSSA bacteremia.

### **Self Assessment Questions:**

Which of the following characteristics is similar between penicillin and cephalosporins for the treatment of MSSA bacteremia.

- A Nephrotoxicity
- B: Efficacy
- C: Doses per day
- D: Cost

MV is a 43 yo female with a confirmed MSSA blood culture. The source of infection is currently unknown. Renal function is at baseline and CrCl  $\sim 80$  mL/min. Which of the following is a cost-effective t

- A Vancomycin pharmacy to dose based on pharmacokinetics for 2 w
- B Daptomycin 6 mg/kg daily for 2 weeks
- C Cefazolin 2 g Q8h for 2 weeks
- D Nafcillin 2 g Q4h for 2 weeks

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-918L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **PERIOPERATIVE USE OF SINGLE DOSE INTRAVENOUS (IV) VERSUS ORAL (PO) ACETAMINOPHEN IN PATIENTS UNDERGOING ORTHOPEDIC SURGERY**

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**Purpose:** Some evidence supports the use intravenous (IV) acetaminophen compared to placebo in orthopedic surgery, showing reduced opioid consumption, improved pain scores and decreased length of stay in the Post-Anesthesia Care Unit (PACU). However, there is also evidence demonstrating no differences in the same outcomes compared to placebo. Furthermore, there are no studies comparing IV to oral (PO) acetaminophen, specifically in orthopedic surgery. The primary pharmacokinetic difference is the maximum concentration achieved, however the area under the curve and duration of action are similar. Given the low cost associated with PO compared to IV acetaminophen and its recent increase in use, there is interest in comparing the two formulations. The purpose of this project is to compare clinical outcomes in patients undergoing hip or knee replacement surgery who receive a single dose of IV versus PO acetaminophen in the perioperative setting. **Methods:** On October 1st, 2015, one orthopedic surgeon at Aurora BayCare Medical Center implemented a practice change in patients undergoing hip or knee replacement surgery; a one-time perioperative dose of 1 g IV acetaminophen was switched to 1 g PO acetaminophen 30 minutes prior to hip or knee replacement surgery, while keeping all other standards of care the same. Before and after comparison will be completed to compare outcomes between 75 patients who received IV acetaminophen and 75 patients who received PO. Primary outcomes of interest include the mean pain score immediately post-op and mean time to first rescue opioid medication. Other outcomes include mean opioid consumption in the first 12 and 24 hours (measured in morphine equivalent units), and length of stay in the PACU. **Results/Conclusion:** Data collection is currently pending and results will be presented at the Great Lakes Conference.

### **Learning Objectives:**

Review literature available discussing acetaminophen and its use in pain management in patients undergoing orthopedic surgery.

Identify key similarities and differences between intravenous and oral acetaminophen.

### **Self Assessment Questions:**

Which of the following is a major pharmacokinetic difference between intravenous and oral acetaminophen?

- A Duration of action
- B: Area under the curve
- C: Max concentration achieved
- D: Half-life

What are known benefit(s) of using acetaminophen over opioids?

- A Less risk of abuse or addiction
- B No respiratory depression
- C Decreased length of stay in the hospital
- D A & b

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-414L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REDESIGN OF THE MY FIRST PATIENT PROGRAM INTO THE CLINICAL ASSESSMENT COURSE

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**Purpose Statement**As a continuous quality improvement initiative, the core components of the My First Patient Program, where students serve as their own first patient, will be embedded into the first pharmacy year Clinical Assessment course and its corresponding skills lab. The objective of this study is to evaluate the impact of this course redesign on student empathy and clinical assessment skills as well as analyze the development of student confidence in these areas throughout the pharmacy curriculum. **Methods**In place of first year pharmacy students receiving health screenings conducted for them by a faculty member, as in the original My First Patient Program, these students will take a more active role in their health and wellness screening experiences. Clinical assessment laboratories include body composition, blood pressure measurement, and point-of-care lipid profile and hemoglobin A1C. Facilitated discussions and active learning assignments on diet and physical activity, vaccine and cancer screenings, and goal setting will also be incorporated into the Clinical Assessment course. Students will create a personal health portfolio of their screening results in addition to setting two lifestyle goals and completing a reflection assignment. Institutional Review Board approved pre and post surveys will be administered electronically to first year pharmacy students to evaluate their confidence to clinically assess areas of health wellness and disease prevention as well as changes in their own self assessment. Second through fourth year pharmacy students, who completed the original My First Patient Program, will be administered a similar survey. This secondary analysis will provide a comparison for the original versus new layout of My First Patient as well as information on changes in student confidence in these areas throughout the pharmacy school curriculum. **Summary of preliminary results**In progress**Conclusions reached**In progress

### Learning Objectives:

Describe the design of the My First Patient Program

Identify the areas of self-assessment analyzed in this course redesign

### Self Assessment Questions:

Which of the following describes the design of the My First Patient Program?

- A: Student partners would act as each other's first patient
- B: Each student would act as their own first patient
- C: Students would be assigned a case example as their first patient
- D: Patient actors would be the students' first patient

Changes in student confidence were assessed for which of the following health screenings?

- A: Blood pressure
- B: Body composition
- C: Hemoglobin A1C
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-759L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF A STEWARDSHIP INTERVENTION ON DURATION OF THERAPY AND ASSOCIATED CLOSTRIDIUM DIFFICILE INFECTION AMONG PATIENTS WITH COMMUNITY ACQUIRED PNEUMONIA

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**Purpose:**The timely identification and management of community acquired pneumonia (CAP) has improved patient care and quality performance measures, however there is minimal focus on appropriate duration of therapy. IDSA/ATS guidelines recommend 5 days of therapy if patients meet certain clinical criteria, though adherence appears suboptimal. Prolonged exposure to antibiotics is a known risk factor for Clostridium difficile infection (CDI). Fluoroquinolones and cephalosporins are common antibiotics for CAP and are also associated with increased risk for CDI. The objective of this study is to assess the impact of stewardship interventions on duration of therapy for CAP and the incidence of CDI. **Methods:** This study was approved by the Institutional Review Board. This multicenter, pre-post-controlled quasi-experimental study will identify patients admitted with CAP before and after the stewardship intervention. The intervention will consist of updating hospital guidelines emphasizing the IDSA/ATS recommendations, education of pharmacists and physicians, and prospective audit with feedback by the antimicrobial stewardship team regarding appropriate duration of therapy for CAP. The stewardship team will recommend discontinuing antibiotics consistent with IDSA/ATS guidelines, and evaluate outcomes. The primary outcome will be the incidence of CDI before and after the intervention within 30 days post-discharge. Secondary outcomes will evaluate the impact of the interventions on length of stay, hospital readmission, and mortality within 30 days post-discharge. The following data will be collected: basic demographic information, risk factors for CDI, respiratory cultures, hospital antibiotics, discharge antibiotics, total duration of therapy, incidence of CDI, length of stay, mortality, and readmission. For control groups, basic demographic information and incidence of CDI will be collected. The primary outcome will be assessed by an interrupted time series analysis. **Results/conclusions:** Data collection is currently ongoing.

### Learning Objectives:

Identify the classes of antimicrobial associated with the highest risk of development of Clostridium difficile infection

Indicate the appropriate duration of therapy for patients with CAP based on IDSA/ATS guideline recommendations

### Self Assessment Questions:

Which of the following antimicrobial agents is most associated with a higher risk of Clostridium difficile infection?

- A: Azithromycin
- B: Piperacillin-Tazobactam
- C: Ciprofloxacin
- D: Amoxicillin-Clavulanate

What is the appropriate total duration of antimicrobial therapy for a patient with the following clinical signs and symptoms currently on day 5 of antibiotic therapy? RR 26, BP 120/84, temperature 37.

- A: 5 days
- B: 7 days
- C: 10 days
- D: Appropriate duration of therapy cannot be determined at this time

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-415L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF BLOOD CULTURES IN COMMUNITY ACQUIRED PNEUMONIA

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**Purpose:** Pneumonia is one of the leading causes of hospitalization with over 1 million related discharges annually. Despite the frequency of diagnosis, only 38% of patients hospitalized with community acquired pneumonia (CAP) have a causative pathogen detected. Previous treatment guidelines recommended all patients with CAP have blood cultures (BC) drawn. Following these recommendations, a National Hospital Quality Measure for CAP was created requiring BC before administration of antibiotics. Subsequent studies found that BC in CAP were positive for a true pathogen in 0 to 14% of cases. True-positive BC led to antibiotic narrowing in 0 to 3% of cases and broadening in 0 to 1%. In addition, false-positive BC were reported in 0 to 10% of cases. Furthermore, patients with false-positive BC have been associated with higher costs and longer lengths of hospital stay compared to patients without evidence of bacteremia. Given these findings, the CAP guidelines were updated to recommend BC only in certain populations. As a result, the CAP National Hospital Quality Measure was retired as of January 1, 2015. Currently, the CAP Treatment Protocol at Edward Hines, Jr. VA Hospital guides all patients with suspected CAP to have BC obtained prior to antibiotic administration to comply with the now retired measure. This study evaluates the impact of BC on antibiotic therapy and length of stay in patients hospitalized with CAP. **Methods:**

All patients admitted to Edward Hines, Jr. VA Hospital from 10/1/2010 to 9/30/15 diagnosed with CAP according to guideline criteria were included. Retrospective chart review was performed and patients were stratified into three groups: false-positive, true-positive, and negative BC. Groups were compared to determine differences in antibiotic usage changes in therapy, duration of therapy, and hospital length of stay. **Results and Conclusions:** Results are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify outcomes associated with the use of blood cultures in CAP.

Describe recent changes to National Hospital Quality Measures related to CAP.

### Self Assessment Questions:

Studies examining microbiology data in CAP have found that the use of blood cultures have been associated with

- A Higher rates of pathogen detection
- B: More targeted antimicrobial therapy
- C: Low rates of true-positive cultures and higher costs due to treatment
- D: Shorter length of hospital stay

The Joint Commission currently recommends data collection for which CAP measure?

- A Blood cultures within 24 hours prior to or after hospital arrival
- B Blood cultures before first antibiotic dose
- C Initial antibiotic selection in immunocompetent patients
- D None as the pneumonia measures have been retired as of 1/1/2015

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-416L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE IMPACT OF A CLINICAL ONCOLOGY PHARMACIST IN THE MANAGEMENT OF ORAL CHEMOTHERAPY

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**Purpose:** Oral anticancer therapies administered in the outpatient setting present new obstacles for healthcare providers and patients. Complex dosing regimens combined with self-administration place patients at an increased risk of non-compliance, drug interactions, and adverse effects. The recent increase in oral anticancer therapies and documented challenges pertaining to administering these agents in an outpatient-setting highlight an important role for pharmacists. The purpose of this study is to evaluate the impact of utilizing an oncology trained pharmacist to optimize patient compliance, improve monitoring, prevent oral chemotherapy waste, and provide proper supportive care in the management of oral anticancer therapy. **Methods:** The Lexington VAMC investigational review board approved a retrospective cohort study utilizing data analysis and chart review. Patients who received an outpatient prescription for an oral anticancer medication between August 15, 2011 and August 15, 2015 will be identified using VISTA pharmacy software. The control group will consist of patients who filled an outpatient prescription for an oral anticancer therapy between August 15, 2011 and August 15, 2013, prior to the implementation of pharmacy services. The test group will include patients whose outpatient oral anticancer therapy was filled between August 16, 2013 and August 15, 2015, post implementation of pharmacy services. Primary outcomes will include medication compliance to oral chemotherapy as measured by medication possession ratio, unused treatment costs, number of reported toxicities to oral chemotherapy, and percentage of patients with appropriate monitoring. This study will utilize medication possession ratio and descriptive statistics to evaluate outcomes. **Results/Conclusion:** Results and conclusion to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe obstacles associated with the utilization of oral anticancer therapy.

Discuss various opportunities for pharmacy involvement in the management of oral anticancer therapy.

### Self Assessment Questions:

Which of the following is a true statement in regards to the safety and efficacy of oral anticancer therapy?

- A Patient adherence is not a concern.
- B: Complex dosing regimens place patients at an increased risk of non-compliance.
- C: Oral chemotherapy is less toxic than traditional intravenous chemotherapy.
- D: None of the above.

Pharmacists may provide which of the following services in the management of oral anticancer therapy?

- A Side-effect management
- B Provide education and medication counseling
- C Identification of drug-drug interactions
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-417L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT OF A QUALITY REVIEW PROCESS FOR ACUTE CARE PHARMACY SERVICES

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**Purpose:** The 2011 ASHP Pharmacy The project was designed to develop a quality and outcomes dashboard, and implement an ongoing professional practice evaluation (OPPE) system. This will be achieved by identifying quality and outcome measures that demonstrate the impact of pharmacists and pharmacy services in caring for patients, while also aligning with organizational goals. In addition, a peer review process will be implemented to assure continuous performance evaluation and feedback to all acute care pharmacists. **Methods:** An implementation team that consists of pharmacy leadership and members of the pharmacy informatics team is being lead to identify and develop the metrics that will be included on the quality and outcomes dashboard. The focus of this group is to identify those key metrics that represent the value of pharmacists and pharmacy services, while developing a meaningful system that will automate the collection and reporting of metrics included in the dashboard. A second implementation team that consists of clinical pharmacists is being lead to develop staff competencies and a pharmacist peer review process as part of the OPPE system. Initially this team is focusing on competencies and a peer review process around pharmacist warfarin dosing and documentation. **Results and Conclusion:** It is expected that after the implementation of the OPPE system we will see improvement in the quality and outcome measures relating to pharmacist warfarin dosing and documentation. In addition, successful implementation of this project will lay the foundation for pharmacist privileging at Froedtert and the Medical College of Wisconsin, and prepare our pharmacists to capitalize quickly on the imminent decision to recognize pharmacists as providers.

### Learning Objectives:

Discuss important factors that should be considered when developing a pharmacy quality and outcomes dashboard.

Define what an ongoing professional practice evaluation (OPPE) is and the value it provides to pharmacists

### Self Assessment Questions:

When determining your departments pharmacy quality and outcome measures which of the following should you align your metrics with?

- A: Electronic health record
- B: Organizational priorities
- C: Pharmaceutical industry
- D: Center for Disease Control

What does OPPE stand for?

- A: Ongoing professional practice evaluation
- B: Outpatient performance evaluation
- C: Office of Policy, Partying, and Evaluation
- D: Ongoing practice policy evaluation

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-760L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSMENT OF COMPLIANCE WITH OUTPATIENT BEACON TREATMENT PLAN UPDATE REQUESTS FOR PATIENTS CURRENTLY RECEIVING INVESTIGATIONAL THERAPIES

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**Purpose:** Clinical trials represent a unique area of pharmaceutical advancement characterized by increasingly complex investigational protocols. Patients enrolled in investigational trials through the Medical College of Wisconsin Cancer Center Clinical Trials Office have investigational treatment plans applied in Beacon, an oncology functionality within Epic. Throughout the course of a trial, update requests initiated by the trial sponsor or local staff members may require changes to Beacon treatment plans. From September 1st, 2014 through August 31st, 2015, 208 Beacon treatment plan update requests required provider follow-up. Requests often contained multiple components requiring separate implementation. Investigational staff members reported that providers were not consistently making requested updates prior to the patients next treatment session and little was known about the frequency and characteristics of these errors. **Methods:** A retrospective chart review from February to April 2015 quantified the current level of compliance with Beacon treatment plan update requests. Information collected regarding compliance included frequency of plans updated prior to next treatment session, frequency of plans updated either late or not at all, characteristics of correctly and incorrectly updated plans, and number of patient affected by updates. The ultimate goal of this phase of data collection was to provide data to support an intervention to improve provider compliance with update requests. **Results/Conclusions:** From February to April of 2015, 49 update requests affecting 26 individual patients and 11 providers were submitted. In 37% of update requests, the update was not applicable to the patient. Of the remaining update requests, 58% were never updated, 23% were addressed by a provider updating the existing plan, and 19% were addressed by the provider removing the existing plan and applying a new updated treatment plan. Implications and future directions are currently being discussed and evaluated by the study team and key stakeholders.

### Learning Objectives:

Describe the current state of the Beacon treatment plan update request process at Froedtert and the Medical College of Wisconsin

Identify feasible solutions to improve the Beacon treatment plan update request process at Froedtert and the Medical College of Wisconsin

### Self Assessment Questions:

How frequently did providers fail to update treatment plans prior to the next scheduled day of therapy (excluding non-applicable update requests)?

- A: 0-25% of the time
- B: 25-50% of the time
- C: 50-75% of the time
- D: 75-100% of the time

Which of the following interventions was identified by local stakeholders as the most feasible to implement as a first step to address this problem?

- A: Expansion of study coordinator responsibilities to correct plans au
- B: Improvements in Epic functionality to automatically update treatme
- C: Collaborative practice agreement with pharmacists to automaticall
- D: Targeted education for key stakeholders including physicians and

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-919L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

**A COMPREHENSIVE, SYSTEMATIC, AND MULTIDISCIPLINARY APPROACH TO CONTINUOUS OPTIMIZATION OF CLINICAL DECISION SUPPORT (CDS)**

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**Purpose:** In 2012, Norton Healthcare completed a transition to an electronic medical record (EMR) including computerized provider order entry (CPOE) with computerized clinical decision support (CDS). Since the implementation of CPOE, concerns with CDS alerts have surfaced, including alert fatigue, irrelevant or inaccurate warnings, and interruptive displays. End-user and stakeholder dissatisfaction centered on these issues provided a major incentive for improvement of the CDS process. There are a number of customizable features within CDS programming and process flow. The purpose of this project is to identify opportunities and strategies for the optimization of CDS across the health system.

**Methods:** This initiative is a process improvement project. Literature review as well as thorough vetting of current real and perceived issues with alert fatigue and end-user complaints provided the foundation for gap analysis. Through analysis of warning data and end-user feedback, several opportunities for improvement were identified. Opportunities exist in both the customizable programming of CDS and the management process necessary to implement change. Without an established approval process, programmatic modification to CDS proved challenging. A comprehensive plan to form a multi-disciplinary committee responsible for timely assessment and implementation of optimized CDS programming and processes was developed. Results and conclusions: Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify obstacles that contribute to poor utilization of CDS within an electronic medical record (EMR).

Discuss the benefits of a multidisciplinary committee to approve and implement changes in CDS programming and process flow.

**Self Assessment Questions:**

Which of the following is consistently the most difficult obstacle to overcome with respect to implementation and optimal utilization of CDS?

- A: Financial burden
- B: Technological difficulties
- C: Alert fatigue
- D: Database maintenance

Which of the following prospectively enhances patient safety, while customizing CDS to satisfy needs of diverse stakeholders?

- A: A consistent committee core
- B: The multidisciplinary input for proposing alterations
- C: The ability to silence "nuisance alerts"
- D: Systematic review of the impact of manipulation

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-761L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**ASSESSMENT AND REVISION OF ORGANIZATIONAL ADULT INTRAVENOUS MEDICATION ADMINISTRATION GUIDELINES**

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**Purpose:** The Adult Intravenous (IV) Medication Administration Guideline within Aurora Health Care (AHC) is a resource devised to promote safe and consistent IV medication administration across the system. This guideline contains key administration parameters, monitoring and use requirements, and precautions. The objective of this project was to assess and align organizational adult IV medication administration guidelines with best practices. **Methods:** System nursing and organizational groups determined three areas of the IV medication administration guideline that required clarification. These three areas were minimum monitoring requirements for select medications, management of extravasation, and IV push best practices. An interdisciplinary workgroup was created to develop further clarification in regards to administration and specific monitoring parameters for a variety of cardiac and non-cardiac medications. The workgroup focused on recommendations regarding requirements for continuous telemetry monitoring, restriction of administration to critical care, minimum monitoring parameters, and central line requirements. For the second area of focus, research based best practices for extravasations were added to the IV medication administration guideline to ensure immediate availability of information. For the third part, a gap analysis between AHC policies, guidelines, and practices to the Institute for Safe Medication Practices (ISMP) 2015 Safe Practice Guidelines for Adult IV Push Medications was completed. All gaps were discussed with appropriate system entities and action plans were developed. A best practice statement for IV push medications was added to the IV medication administration guidelines. **Results/Conclusions:** Implementation of an updated, evidence-based system adult IV medication administration guideline is set for March 2016. Further results and conclusions from the implementation will be shared at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Identify the purpose of the adult IV medication administration guideline at Aurora Health Care.

Restate changes made to the adult IV medication administration guideline to support consistent, safe practice care.

**Self Assessment Questions:**

Which of the following statements is true when describing the purpose of the IV medication administration guideline at Aurora Health Care?

- A: To provide policies of required monitoring upon medication administration
- B: To promote safe and consistent IV medication administration across the system
- C: To store information regarding compatibility of medication and IV sites
- D: To state instructions on how to administer oral medications

Which of the following changes were made to the adult IV medication administration guideline to maintain safe and consistent practice care across the system?

- A: Section added on desired therapeutic effects
- B: Rates of administration added for all IV medications
- C: Continuous telemetry and minimum monitoring parameters update
- D: Common laboratory monitoring added for all IV medications

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-920L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A MEDICATION THERAPY MANAGEMENT SERVICE FOR HIGH RISK PATIENTS

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**Purpose:** The purpose of this project is to develop and implement a follow up pharmacy service for high risk, discharged patients to identify and help resolve patient related medication issues. Aurora St. Lukes Medical Center (ASLMC) discharges greater than 700 high risk patients per month. The pharmacy department is currently involved in patient care during admission medication reconciliation, throughout the hospital stay, during discharge medication reconciliation, and when providing bedside medication delivery. From the time of discharge until the patients transitional care management appointment, pharmacy involvement in the patients care is fragmented. This project will determine the impact of interventions initiated by a pharmacist and the sustainability of a follow up pharmacy service. **Methods:** Patients discharged from ASLMC, with either stroke or heart failure, were chosen for the pilots high risk patient population. Collaboration occurred with the stroke and heart failure teams to identify patients requiring telephone follow-up with a pharmacist. A pilot in the ASLMC Outpatient Pharmacy was carried out from November 2015 through February 2016. During the pilot, the PGY1 community pharmacy resident received a message in the electronic health record (EHR) from the stroke and heart failure teams to identify eligible high risk patients. The PGY1 community resident called eligible patients to provide a comprehensive medication review via telephone. The telephone encounter and any associated interventions were documented in the patients EHR. **Results:** The preliminary results, based on encounters with 30 patients, show that pharmacist follow up phone calls to high risk discharged patients impact quality of patient care. On average, there were 1.5 medication problems detected and 2 medication interventions made per patient encounter. The overall impact and sustainability of the service is currently being analyzed. **Conclusion:**

### Learning Objectives:

Identify the role of an outpatient pharmacist in improving transitions of care for high risk patients.

List at least three interventions that an outpatient pharmacist can recommend to a provider to improve quality of patient care.

### Self Assessment Questions:

Which of the following would be an appropriate service for outpatient pharmacists to implement to improve transitions of care for high risk patients?

- A Create surveys for the patient to fill out after their hospital stay.
- B: Eliminate discharge medication reconciliation.
- C: Provide telephone follow up calls to assess adherence to, appropriate
- D: Have all patients fill their discharge prescriptions at the outpatient

Which of the following interventions would be appropriate to recommend to a provider for a patient who has barriers to adherence?

- A Recommend an increase in the number of doses of medication to
- B Recommend a switch from a prescription medication to an over-the
- C Recommend that medications are always filled for a 30-day supply
- D Recommend consolidation of medication from two separate medic

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-418L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OUTCOMES OF METHICILLIN SENSITIVE STAPHYLOCOCCUS AUREUS BLOOD STREAM INFECTIONS WITH VARIOUS BETA-LACTAM THERAPY

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**Background:** Staphylococcus aureus is a clinically important pathogen, and is the causative organism in a constantly growing number of both hospital- and community-acquired infections. S. aureus has a particularly high prevalence in blood stream infections (BSIs) and, due to its ability to upregulate virulence factors, evade the human immune system, and develop various resistance mechanisms to antibiotics, is difficult to treat. As a result, S. aureus BSIs are associated with significant mortality and healthcare costs. BSIs caused by methicillin sensitive S. aureus (MSSA) may be treated with ceftazolin or oxacillin as first-line options; however, other agents with reported susceptibility may also be considered for use based on convenience of dosing scheme, concomitant infecting organisms, or patient allergies. However, few studies have looked at the comparative efficacy of standard therapy versus other beta-lactams. The purpose of this study is to evaluate the comparative efficacy of standard therapy (ceftazolin or oxacillin) versus other beta-lactams in treating MSSA BSIs. **Methods:** This is a retrospective, cohort study of patients with MSSA BSIs treated with various beta-lactam antibiotics as definitive therapy. TheraDoc (Premier, Inc., Salt Lake City, UT) will be used to identify all patients at Northwestern Memorial Hospital with a positive MSSA blood culture between January 2012 and December 2014. Patients > 18 years of age at time of culture treated with definitive beta-lactam therapy for at least 48 hours will be included. Only the first positive culture per patient in the study period will be considered for inclusion. Data to be collected will include antibiotic used; length of antibiotic therapy; pertinent drug allergies; and patient outcomes data such as symptom resolution, negative bacterial cultures, and recurrence of infection. **Results/Conclusions:** Results and conclusions of this study will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List first line antibiotic therapy for Methicillin Sensitive Staphylococcus aureus blood stream infections

Identify potential barriers to appropriate antibiotic therapy choices for the definitive treatment of Methicillin Sensitive Staphylococcus aureus blood stream infections

### Self Assessment Questions:

Which of the following are considered preferred treatment options for MSSA blood stream infections?

- A Ceftriaxone, Cefazolin, & Ciprofloxacin
- B: Cefazolin, Oxacillin, & Nafcillin
- C: Ciprofloxacin, Oxacillin, & Vancomycin
- D: Ceftriaxone, Oxacillin, & Nafcillin

What are some potential barriers to appropriate antibiotic selection for definitive therapy of MSSA blood stream infections?

- A Inconvenient dosing schema for the preferred antibiotics
- B Significant drug-drug interactions with preferred antibiotics
- C MIC susceptibilities show non-preferred antibiotics as susceptible
- D A & c

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-419L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**VENTILATOR ASSOCIATED PNEUMONIA OUTCOMES COMPARING AEROSOLIZED VERSUS INTRAVENOUS TOBRAMYCIN ADMINISTRATION FOR EMPIRIC GRAM-NEGATIVE COVERAGE IN CRITICALLY ILL PATIENTS (VAP-IT)**

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**Purpose:** The treatment of late-onset ventilator associated pneumonia (VAP) requires broad spectrum empiric antibiotics using an antipseudomonal beta-lactam (ABL) plus additional Gram negative coverage for common multidrug resistant organisms (MDRO). Aminoglycosides are a commonly chosen antimicrobial class used for empiric Gram negative coverage. Only 30% of intravenous tobramycin (IVt) penetrates the lung parenchyma and its use is potentially associated with nephrotoxicity. Aerosolized aminoglycosides are postulated to achieve high, localized antibiotic concentrations and minimize systemic toxicities. Data are conflicting for patient outcomes between inhaled and IVt when initiated as adequate empiric therapy for late-onset VAP. The primary objective of this study was to compare clinical outcomes between patients that received empiric inhaled (INHt) or IVt in combination with an ABL, fluoroquinolone, or carbapenem for late onset VAP. **Methods:** This retrospective, single center, cohort study included adult patients admitted to the ICU over a three year period with late-onset VAP. VAP was defined as a Clinical Pulmonary Infection Score (CPIS)  $\geq 5$  and a quantitative bronchoscopic alveolar lavage with  $\geq 10,000$  cfu/mL Gram negative microbiologic culture result. Patients were excluded if diagnosed with cystic fibrosis, were pregnant, incarcerated, or received less than 48 hours of tobramycin therapy. Primary outcomes included the proportion of patients with a CPIS  $< 5$  at 96-hours and at the end of definitive treatment. Secondary outcomes included MDRO incidence, infection recurrence, and rates of nephrotoxicity and bronchospasm. Clinical outcomes compared include ICU and hospital length of stay, ICU and in-hospital mortality, and mechanical ventilation duration. A two analysis method was used dividing patients into cohorts based off the administration route of either the first dose of tobramycin or the majority of tobramycin administration route during the first 96 hours of therapy. **Results:** Data collection and analysis are ongoing.

**Learning Objectives:**

Discuss common pathogens and diagnostic criteria associated with late-onset VAP.

Review appropriate selection of empiric antibiotic coverage for late-onset VAP.

**Self Assessment Questions:**

Which of the following objective scoring scales is used as both a diagnostic tool and predictor of clinical outcomes for VAP?

- A: Pneumonia Severity Index (PSI)
- B: Clinical Pulmonary Infection Score (CPIS)
- C: Pneumonia Diagnostic Scale (PDA)
- D: CURB-65

Per the 2005 IDSA guidelines, what is an acceptable empiric antibiotic regimen for late onset VAP

- A: Piperacillin/tazobactam + Vancomycin
- B: Ceftriaxone + Tobramycin + Linezolid
- C: Cefepime + Tobramycin + Vancomycin
- D: Levofloxacin + Meropenem

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-420L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**EVALUATION OF A PATIENT SELF-TESTING HOME INR PROGRAM IN A PHARMACIST-MANAGED ANTICOAGULATION CLINIC**

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**Purpose:** Chronic anticoagulation therapy with warfarin requires close monitoring of international normalized ratio (INR) values. Patients typically must schedule appointments at a physicians office with prior lab work completed or at an anticoagulation clinic with a fingerstick test to measure INR values. The Medication Use Committee (MUC) at Franciscan St. Elizabeth Health recently approved a policy for the implementation of patient self-testing (PST) services, monitored by the pharmacist-managed anticoagulation clinic. The purpose of this study is to determine if there is a difference between an individual patients time in therapeutic range (TTR) when monitored in the pharmacist-managed anticoagulation clinic versus TTR in patients monitored via PST results. Primary outcomes include patients individual TTR in clinic compared to the patients TTR during PST. This data will provide guidance to pharmacists at the clinic in the management of PST patients. **Methods:** This is an observational, retrospective, single-centered, nonrandomized, quality improvement intervention. Retrospective chart reviews will be conducted to abstract de-identified existing INR data to evaluate for differences between monitoring sites (PST versus clinic). To be included in the study, patients must have had 9 INRs via clinic monitoring visits and 9 INRs via home-monitoring encounters. Further inclusion criteria include patients at least 18 years of age who have been anticoagulated with warfarin for at least 3 months prior to starting PST services. Exclusion criteria includes patients who have had to stop warfarin for any length of time, had hospitalization, or required monitoring outside of the anticoagulation clinic in the 3 months prior to starting self-testing services or anytime during self-testing services. **Results:** Patients are beginning enrollment in the PST program. Data will be collected and analyzed over the next few months. Preliminary results will be presented at the 31st Annual Great Lakes Pharmacy Resident Conference in April.

**Learning Objectives:**

Discuss how often PST patients are required to test their INR values

Recognize important components that may determine a patients eligibility for PST

**Self Assessment Questions:**

How often are PST patients required to test?

- A: Every week
- B: Every 2 weeks
- C: Every 4 weeks
- D: Every 6 weeks

Which of the following are components to consider when evaluating a patient for PST?

- A: Insurance coverage
- B: Dexterity and competence
- C: Reliability and compliance
- D: All of the above

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-421L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## QUALITY ASSESSMENT OF ADMISSION MEDICATION RECONCILIATION PROCESS AT A VA MEDICAL CENTER

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**Purpose:** Each hospitalized patient experiences at least one medication related error per day. There errors have the potential to cause harm to the patient, extend hospital stay and increase health care costs. Citing these reasons, in 2005 Joint Commission added medication reconciliation as a National Patient Safety Goal (NPSG) across the care continuum. Joint Commission defines medication reconciliation as the process of comparing a patients current medication orders with all the medications the patient has been using. Medication reconciliation processes have been in place at the Clement J. Zablocki Veteran Affairs Medical Center since early 2014 as part of a residency project. Since its initiation it has grown to encompass 168 acute care beds including, general medicine, intensive care unit, spinal cord injury and psychiatric units. The focus of this review is to assess the admission medication reconciliation process for quality measures and identify areas for improvement. **Methods:** The admission medication reconciliation process will be assessed in a retrospective manner, starting August 1st, 2015 through August 31st, 2015. The primary objective is to quantify the percentage of all acute care admissions that received admission medication reconciliation performed by a pharmacist. Secondary objectives are to determine the timeliness of the medication reconciliation and number of interventions made per medication reconciliation. Lastly, pharmacy discharge counseling notes will be evaluated to determine the impact admission medication reconciliation had on the discharge and the documentation of follow-up on items identified upon admission. Interventions were stratified by the type of provider: learners, staff pharmacists or clinical pharmacy specialists. **Results/Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify potential barriers to medication reconciliation within a VA hospital setting

Describe the roles of a pharmacist in medication reconciliation during admission and/or discharge in a VA hospital setting

### Self Assessment Questions:

Which of the following is a barrier to providing medication reconciliation with a VA hospital setting?

- A: Developing a culture of responsibility
- B: Lack of interest
- C: Size of institution
- D: Distrust from other providers

Which of the following is a role of a clinical pharmacist in the medication reconciliation process?

- A: Instruct the patient to take medications they are prescribed
- B: Compiling a list of medication that the patient should be prescribed
- C: Make other providers jobs easier
- D: Communicate therapeutic recommendations to providers

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-762L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## A COMPARISON OF ERROR RATES BETWEEN HAND WRITTEN AND ELECTRONICALLY ORDERED CONTROLLED SUBSTANCE PRESCRIPTIONS

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**Purpose:** The purpose of this research project was to determine if the error rates in C-II prescriptions had decreased when hand written prescriptions were replaced with electronic, digitally signed orders. **Methods:** A retrospective review of C-II hand written prescriptions filled between Jan 1, 2013 to October 5, 2013 at the Richard L. Roudebush VA Medical Center. An equal number of electronic order entry C-II prescriptions were prospectively processed in November of 2015. To be included in the study, patients were at least 18 years of age; only hard copy prescriptions accessible in the outpatient pharmacy were evaluated during the retrospective review. Data collected included whether an error occurred during the entry process and the type of error. The types of errors reviewed were, incorrect dosing, incorrect drug, incorrect quantity, and incorrect strength. The numbers of errors in each group were then compared to determine if there was a statistical significance. **Results:** After review of 409 hand written prescriptions and 409 electronic order entry prescriptions there was shown to be a statistically significant decrease in errors within the electronic order entry group 49/409 compared to 9/409 ( $p < 0.0001$ ). Overall, there was no statistically significant difference in the types of errors between the two groups. However, there was a higher rate of quantity errors observed in the electronic order entry group 5/9 compared to 3/49 among hard copy prescriptions ( $p < 0.001$ ).

**Conclusion:** The switch to electronic order entry for C-II medications has significantly decreased the amount of errors made upon transcription/processing.

### Learning Objectives:

Recognize the significant decrease in errors made with electronic order entry compared to hand written prescriptions

Identify factors that lead to a higher rate of error with hand written prescriptions

### Self Assessment Questions:

The Switch from hand written prescriptions to electronic order entry had what effect

- A: Increased the amount of errors on processing
- B: Decreased the amount of errors on processing
- C: had equal amount of errors on processing
- D: had an undetermined effect on amount of errors

Which of the following can contribute to a higher frequency in errors with hand written prescriptions

- A: pharmacist overwork
- B: sloppy hand writing
- C: improper work flow training
- D: inability to check drug interactions

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-763L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **BILLING FOR PHARMACIST ASSESSMENT, INTERVENTION, AND DOCUMENTATION IN A LARGE ACADEMIC MEDICAL CENTER ("B-PAID")**

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**Purpose:** The purpose of this research is to project the anticipated return on investment for implementing documentation of inpatient pharmacy services for billing purposes. **Methods:** This quality improvement project will evaluate revenue potential for the pharmacy department when billing for inpatient medication therapy management services. Analysis will focus on notes pharmacists are already entering into the electronic medical record at a large, academic, medical center. Pharmacokinetic antibiotic dosing, nutrition consults, and dofetilide counseling will be the studied pharmacist interventions. Data will be collected for all patients in the hospital who have one of the selected notes entered by a pharmacist during the study period. The primary endpoint evaluated will be time added to the pharmacists workload, including face to face interactions with patients and documentation in the electronic medical record. Other trends analyzed include patient location, number of notes per patient per inpatient stay, patient payer source, and frequency of pharmacist intervention by type. This is a quality improvement project and is not subject to IRB approval. **Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Define the components of a pharmacy note which are required to receive reimbursement for inpatient pharmacy services.

Identify the challenges associated with implementation of billing for inpatient pharmacy services.

### **Self Assessment Questions:**

Which of the following correctly identifies a requirement of documentation when billing for inpatient pharmacy services?

- A: Documentation by a BCPS pharmacist
- B: A statement citing the service is "per protocol" or "per physician or
- C: Time spent with the patient
- D: Assessment of patient understanding

What is an example of a challenge associated with the implementation of billing for inpatient pharmacy services?

- A: Requires physical assessment of the patient by a pharmacist
- B: Insufficient opportunities for pharmacist intervention
- C: Physician pushback
- D: Increased documentation burden on pharmacists

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-764L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **EVALUATION OF PATIENT COMPLIANCE WITH CMS CARE COORDINATION MEASURES FOR ASTHMA IN A COMMUNITY PHARMACY SETTING**

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**Purpose:** Prescription non-adherence continues to be an issue among patients who self-administer medications. Adherence to inhalers has been estimated as low as 30% in patients with asthma. In addition, studies have shown improved patient-centered outcomes such as quality of life, asthma control, and severity of symptoms when medications are both appropriately prescribed for and taken in patients with asthma. Despite this evidence, only 50% of patients with asthma were found to have a recommended rescue medication prescribed. CMS has developed care coordination measures focusing on these asthma-related prescribing and adherence issues. The primary objective of this study is to determine the percentage of patients that were appropriately prescribed both maintenance and rescue inhalers for the treatment of asthma, as well as received their maintenance and rescue inhalers  $\geq 85\%$  of the time as prescribed. **Methods:** A retrospective study was conducted at two community pharmacies located within Chicago, IL. Patients were included if they were 64 years of age or less with a diagnosis of asthma and were taking any FDA approved inhaled medication for asthma from January 1, 2014 to December 31, 2014. Collected data included patient age, gender, insurance information, medication name, number of refills, and expected day supply. Prescription data was analyzed for both maintenance and rescue medications. Patients were considered adherent if they filled their medications  $\geq 85\%$  of the time as prescribed. Adherence was calculated by comparing the expected refill date with the actual dispensed date of the medication. In addition, the number of patients with both a rescue and maintenance inhaler was compared against patients missing either therapy. **Results and Conclusions:** Data collection has been completed and analysis is currently ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

List the three asthma care coordination measures that are monitored by CMS.

Identify adherence barriers and methods to overcome them for patients with asthma.

### **Self Assessment Questions:**

Which of the following is a CMS care coordination measure for patients with asthma?

- A: Demonstration of proper inhaler technique
- B: Prescribing of appropriate medications
- C: Yearly medication reviews with a pharmacist
- D: Adherence to asthma medications  $\geq 85\%$  of the time

Which medication-related adherence barrier can pharmacists address with counseling?

- A: Cost of medication
- B: Side effects
- C: Inhaler technique
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-422L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PREVENTION OF GRANULOCYTE-COLONY STIMULATING FACTORS (G-CSF) INDUCED BONE PAIN USING A DOUBLE HISTAMINE BLOCKADE

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**Purpose:** Febrile neutropenia (FN) is an oncological emergency and remains a cause of prolonged hospitalizations, and therefore reduces the patients survival due to chemotherapy dose delays or dose reductions. It is recommended that patients receive primary prophylaxis with G-CSF if their FN risk is 20% or greater. Prophylaxis therapy may also be warranted if patients have a risk of 10-20% with certain risk factors. Bone pain is the most common side effect with an unknown clear mechanism. The objective of this study is to determine the association of bone pain with G-CSF and the analgesic effects of using a double histamine blockade. **Methods:** A retrospective cohort of oncology patients from January 1, 2013 to January 1, 2015 were studied to determine the association between bone pain and a combination of famotidine and loratadine while receiving G-CSFs. Patients were asked to rate their bone pain prior to starting each cycle of myelosuppressive chemotherapy, and at least one day after G-CSF had been given. The two G-CSFs that were included in this study were filgrastim (Neupogen) and pegfilgrastim (Neulasta). The determinations during this interval were averaged, if needed. Electronic medical records were reviewed for patient demographics, past medical history, medications, clinical laboratory parameters, and pain scores. Adult oncology patients were included with an ECOG scale of 0-2 and starting primary or secondary neutropenic prophylaxis therapy. The exclusion criteria included patient: enrolled in another trial, weekly chemotherapy, chronic use of H1/H2 antagonist, and/or chronic use of NSAIDs. Statistical analyses are being conducted using SAS version 9.3 software. This study was approved from the Institutional Review Board of Indiana University Health. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the common indications of Granulocyte Colony-Stimulating Factor (G-CSF) therapy.

Discuss the possible treatment options for bone pain induced by G-CSF therapy.

### Self Assessment Questions:

According to the NCCN Guidelines, Granulocyte Colony-Stimulating Factor (G-CSF) therapy is indicated for the following indication(s)?

- A A single oral temp > 38.3 degrees celsius and ANC < 500 / cells p
- B: If patients have a 10% risk of developing febrile neutropenia
- C: If patients have a 20% risk of developing febrile neutropenia
- D: Choices A & C

If a patient develops bone pain with their previous pegfilgrastim dose, which of the following medications could the patient receive prior to their next dose?

- A Acetaminophen
- B Loratadine & Famotidine
- C Oxycodone
- D Naproxen & Acetaminophen

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-423L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPROVING PERIOPERATIVE GLYCEMIC CONTROL IN CARDIOVASCULAR SURGERY PATIENTS: A RETROSPECTIVE ANALYSIS AND QUALITY IMPROVEMENT STRATEGY

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**Purpose:** Achieving and maintaining optimal glycemic control is an important consideration for critically ill patients. Hyperglycemia in patients undergoing cardiac surgery has been associated with increased morbidity and mortality, higher rates of wound infection, longer lengths of stay, and reduced long term survival. The Society of Thoracic Surgeons and American Association of Clinical Endocrinologists recommend maintaining blood glucose less than 180 mg/dL and avoiding hypoglycemia in cardiac surgery patients. Recent literature suggests that other factors, including glucose variability and diabetes status (nondiabetic, controlled diabetic, uncontrolled diabetic) may also affect outcomes. The purpose of this project is to 1) identify characteristics that increase the risk of perioperative hyperglycemia in cardiac surgery patients and 2) develop and implement a protocol to improve perioperative glycemic control. **Methods:** A retrospective chart review of adult cardiovascular surgery patients who underwent surgery from March 1, 2015 to September 1, 2015 was completed. Patients were included in the analysis if they had any blood glucose reading of 150 mg/dL or higher during their hospitalization. Data collected included blood glucose measurements, diabetic medications, other concomitant medications, preoperative hemoglobin A1c, and diet. Based on the findings of the review, a protocol was created to improve glycemic control in cardiovascular surgery patients. The protocol focused on improving the transition between intravenous and subcutaneous insulin, ensuring adequate meal time insulin coverage, and management of special patient populations (uncontrolled diabetic, nondiabetic or controlled diabetic). This protocol will be implemented in the spring of 2016 and outcomes of patients undergoing cardiac surgery will be compared to those of patients prior to implementation. **Results/Conclusions:** Further data collection and analysis is ongoing. Final results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Identify factors that increase the risk of developing perioperative hyperglycemia among cardiovascular surgery patients.

Describe the negative implications of hyperglycemia in cardiovascular surgery patients.

### Self Assessment Questions:

According to The Society of Thoracic Surgeons Practice Guidelines, what is the current blood glucose goal in cardiovascular surgery patients?

- A <70 mg/dL
- B: <110 mg/dL
- C: <180 mg/dL
- D: <200 mg/dL

Which medication class can contribute to insulin resistance and hyperglycemia?

- A Beta blockers
- B Vasopressors
- C Sulfonylureas
- D Statins

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-765L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE REVIEW OF DIABETIC KETOACIDOSIS TREATMENT AND THE UTILIZATION OF DIABETIC KETOACIDOSIS ORDER SETS

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**Purpose:** Through review of the error reporting system at Mount Carmel West, it has become evident that errors related to the treatment of patients with Diabetic Ketoacidosis (DKA) and the inappropriate utilization of pre-defined order sets have increased. As such, further investigation for process improvement at our institution is necessary. Anecdotal reports have alluded to several potential areas for improvement. Areas being evaluated include; inconsistencies among pre-defined order sets, nursing comfort and understanding of appropriate utilization of the DKA order sets, and the location the patient is receiving the majority of their care. **Methods:** This study is a retrospective chart review of adult patients with DKA, treated at our institution from January 1, 2015 - December 31, 2015. Patients were identified by ICD-9 and ICD-10 codes for DKA and met inclusion criteria if they received medications for the treatment of DKA and were admitted to the hospital. Data collection will include laboratory values pertinent to the treatment of DKA on admission, in the emergency department (ED), and upon transfer to the intensive care unit (ICU) or general medicine floor, patient transfer history, order set details, and extent of deviation from the pre-defined order set. The primary clinical outcome is to determine areas for quality improvement in the care of patients with DKA. Secondary outcomes to be evaluated include the DKA order sets utilized in the ED, on admission to the hospital, and when the elevated anion gap normalizes. Other outcomes evaluated include, nursing adherence to the selected DKA order set, time to anion gap normalization, and length of stay in the ED, ICU and overall hospital length of stay. **Results:** Data collection and analysis currently ongoing. **Conclusions:** Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Review current practice for the treatment of Diabetic Ketoacidosis (DKA) Identify areas for improvement and strategies to implement changes in the treatment of patients with DKA.

### Self Assessment Questions:

Titration of an insulin infusion on a patient with DKA and an anion gap >12 can lead to all of the following, except

- A Hypokalemia
- B: Cerebral edema
- C: Increased rate to anion gap closure
- D: Hypoglycemia

Implementation of one hospital wide order set for the treatment of DKA has shown

- A Decreased Intensive Care Unit length of stay
- B Decreased hospital length of stay
- C Decreased readmission rates
- D A and B

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-424L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF RISK FACTORS FOR VENOUS THROMBOEMBOLISM IN ONCOLOGY PATIENTS

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**Purpose:** There is an increased incidence of venous thromboembolism (VTE) in oncology patients when compared with other patient populations. The Khorana score helps determine the VTE risk level for oncology patients, taking the following factors into account: type and site of cancer; pre-chemotherapy platelet count; pre-chemotherapy hemoglobin level; pre-chemotherapy leukocyte count; and body mass index. Each of these factors is assigned a point value, with a score of 3 or greater being indicative of increased risk of mortality due to VTE. Other studies have examined other risk factors and saw an increase in predictive power when the following factors were added to the Khorana predictive model: the Caprini score, use of antiangiogenic agents and cytotoxic drugs as a chemotherapeutic regimen, age, and D-Dimer. The objective of this project is to evaluate the positive predictive value of the Khorana score with regards to identifying oncology patients at high risk of developing VTE. Other factors, including the Caprini score, D-dimer, and anticancer regimen used, will be evaluated alongside the Khorana score. The ultimate goal is the development of an algorithm for use at the Kellogg Cancer Center of NorthShore University HealthSystem. **Methods:** A retrospective chart review will be used to examine the incidence of primary and secondary endpoints between January 1, 2014 through December 31, 2015. This evaluation is exempt from Institutional Review Board approval because it is a quality assurance evaluation. The primary endpoint is the percent of patients who had a calculated Khorana risk score of three or greater who were diagnosed with VTE. Inclusion criteria are as follows: age 18 years or older, diagnosis of cancer, diagnosis of VTE, and completion of a minimum of 4 cycles of chemotherapy. **Results/Conclusions:** Analysis of results is ongoing. Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Recognize the risk factors for venous thromboembolism in oncology patients.

Review various models for prediction of venous thromboembolism among different patient populations and determine applicability to the patients of the institution.

### Self Assessment Questions:

The Khorana score takes into account:

- A type and site of cancer
- B: post-chemotherapy CBC
- C: body mass index
- D: A and C

Additional factors that have been studied as risk factors for VTE among oncology patients include:

- A chemotherapeutic regimen
- B age of the oncology patient
- C elevations in D-Dimer
- D all of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-425L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IDENTIFYING A RISK FACTOR MODEL PREDICTIVE OF HEALTHCARE-ASSOCIATED METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS PNEUMONIA

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**Purpose:** Healthcare-associated pneumonia (HCAP) is defined by the 2005 Infectious Diseases Society of America (IDSA) guidelines as a patient presenting with pneumonia with any of the following risk factors: hospitalized in an acute care hospital for two or more days within 90 days of the infection, resided in a nursing home or long-term care facility, received recent intravenous antibiotic therapy, chemotherapy, or wound care within the past 30 days of the current infection, and attended a hospital or hemodialysis clinic. Further identifying individual patient risk for MRSA in particular can potentially eliminate the need for the empiric addition of a single, targeted anti-MRSA agent in all patients presenting with HCAP and may result in the downstream minimization of antimicrobial resistance. The purpose of this retrospective review is to identify risk factors and create a new MRSA risk tool to aid in the streamlining of antimicrobial therapy prescribed to patients hospitalized for HCAP. **Methods:** This retrospective, multi-center, observational cohort study will include patients admitted to the hospital from January 2013 to June 2015 for pneumonia with healthcare-associated risk factors. Patients will be identified utilizing an Epic report identifying patients with "HCAP" on their problem list. Patients will subsequently be divided into two groups: MRSA HCAP and non-MRSA HCAP. Patients with positive MRSA respiratory cultures will be placed in the MRSA group, while patients with either no culture or a non-MRSA culture will be placed in the non-MRSA group. Statistically significant risk factors will be identified using univariate and multivariate logistic regression and odds ratios will be used to construct a predictive model that will be validated in a random subset of the original population. **Results:** Data is currently being reviewed and collected; therefore no results are available. **Conclusions:** No conclusions can be made at this time.

### Learning Objectives:

Discuss the origin of healthcare-associated pneumonia (HCAP) criteria  
Describe the current definition and treatment strategy for HCAP

### Self Assessment Questions:

According to the 2005 Infectious Diseases Society of America (IDSA) guidelines, which of the following drug regimens is the most appropriate empiric treatment for a patient with suspected HCAP?

- A: Vancomycin plus cefepime
- B: Levofloxacin
- C: Azithromycin
- D: Ceftriaxone plus azithromycin

Which of the following is the primary potential risk of administering broad-spectrum antimicrobials to patients with non-multidrug-resistant pathogens?

- A: There is no apparent risk
- B: Adequate antimicrobial coverage may not be provided for the cause
- C: The patient may be at risk for increased adverse effects
- D: Development of antibiotic resistance

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-426L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF FUNGAL PROPHYLAXIS WITH ALTERNATIVE DOSING STRATEGIES IN PEDIATRIC PATIENTS UNDERGOING HEMATOPOIETIC STEM CELL TRANSPLANTATION: A RETROSPECTIVE REVIEW

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**Purpose:** The aim of our study was to assess efficacy and safety of three alternative dosing strategies utilized at Cincinnati Children's Hospital Medical Center for antifungal prophylaxis in pediatric patients undergoing hematopoietic stem cell transplant (HSCT). Regimens include: genotype-directed voriconazole, alternate-day micafungin and once-weekly liposomal-amphotericinB (L-AmB). Secondary aims include: safety and pharmaco-economic assessments. **Methods:** A retrospective chart review was conducted for patients  $\leq 18$  years who received an allogeneic HSCT between January 2010 and July 2015. Proven, probable and possible invasive fungal diseases (IFDs) were defined using European Organization for Research and Treatment of Cancer and Mycoses definitions and examined during the first 100 days post-transplant. **Results:** Of the 396 allogeneic transplants performed in 374 patients; 244 met inclusion criteria. Seventy-eight patients (32%) received L-AmB, 98 (40%) received micafungin and 68 (28%) received voriconazole starting day zero. Proven or probable IFD occurred in 6 patients; three in the micafungin group (Candida parapsilosis), 2 in the voriconazole group (Saccharomyces cerevisiae, Candida glabrata) and in the L-AmB group (Candida glabrata) ( $p = 0.66$ ). In eighteen patients, treatment regimens were initiated due to possible IFD, 13 (72%) of these occurred in the micafungin group. Overall, the micafungin group had only 2 adverse events (AEs) leading to drug discontinuation out of 103 total AEs, compared to 43 with L-AmB and 58 with voriconazole ( $p < 0.0001$ ). **Conclusion:** Results show that rates of proven and probable IFD were similar with all three regimens. The number of possible infections were increased on alternate day micafungin, however, overall safety and tolerability were significantly better when compared to L-AmB and voriconazole. Sub-analyses are ongoing to further delineate whether confounding factors such as increased immune suppression or presence of GVHD influenced these results. These data with the pharmaco-economic results will add insight into risk and benefit balance between these regimens.

### Learning Objectives:

Identify and apply the definitions of possible, probable and proven invasive fungal disease (IFD).

Discuss the advantages and disadvantages of genotype-directed voriconazole, alternate-day micafungin and once-weekly liposomal-amphotericinB (L-AmB) when utilized as primary antifungal prophylaxis regimens in the pediatric allogeneic HSCT population.

### Self Assessment Questions:

1. Patient AG is being worked up for an IFD. Currently, she is febrile to 38.7C and has a (+) serum -D glucan test. She is admitted for GVHD and the team recently increased her immunosuppression reg

- A: Proven
- B: Probable
- C: Possible
- D: Potential

Which of the following is correct?

- A: Voriconazole can be administered IV or PO for antifungal prophylaxis
- B: L-AmB is administered bi-weekly for antifungal prophylaxis
- C: Micafungin PK/PD are monitored using CYP2C19 genotype design
- D: Micafungin and L-AmB can only be administered PO for antifungal

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-427L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **A MULTI-INTERVENTIONAL APPROACH TO ACHIEVING SEPSIS BUNDLE COMPLIANCE**

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**Purpose:** Sepsis affects more than one million Americans each year. Sepsis is the body's response to infection that triggers a systemic inflammatory response. This response results in systemic symptoms that may ultimately result in organ failure, hypotension, and or shock. In 2001, Rivers et al. published data that transformed the management of sepsis and led to a protocolized approach to the treatment of a patient with sepsis. Further research has revised the initial protocol. However, the focus remains on early recognition and intervention. Collectively, this research has evolved to form the current surviving sepsis campaign bundles. Although data have demonstrated the mortality benefit of the surviving sepsis campaign bundles, meeting these standards can be a challenge. In order to improve sepsis bundle compliance Advocate Lutheran General Hospital implemented several changes. These changes included implementation of a sepsis rapid response team, multidisciplinary education, pharmacist consult regarding antimicrobial therapy and dosing recommendations as needed, and implementation of an electronic sepsis adviser. The objective of this study is to investigate the effectiveness of these interventions on sepsis bundle compliance, hospital length of stay, and mortality. **Methods:** Data were collected on patients with ICD-9 or ICD-10 codes associated with sepsis between January 1, 2015 and December 31, 2015. Sepsis bundle compliance will be compared from month to month to evaluate the effect of interventions. Additionally, compliance for individual components of the sepsis bundles will be assessed to identify potential opportunities for further improvement. Data were also collected regarding hospital length of stay and mortality. **Results/Conclusion:** Data analysis is pending and will be presented at the Great Lakes Pharmacy Resident Conference in April 2016.

### **Learning Objectives:**

List the components of the surviving sepsis campaign bundles.  
Identify barriers to sepsis bundle compliance and potential strategies for improvement.

### **Self Assessment Questions:**

Which of the following actions need to be performed as part of the three hour surviving sepsis campaign bundle?

- A Draw a lactate level at baseline and repeat within 3 hours.
- B: Administer 20 mL/kg bolus of NS or LR if the patient is hypotensive
- C: Initiate vasopressors if the patient meets criteria for septic shock.
- D: Initiate broad spectrum antimicrobials after drawing blood cultures

Which of the following has been the most challenging barrier to compliance with the surviving sepsis campaign bundles at Advocate Lutheran General Hospital?

- A Lack of healthcare workers education and awareness of the bundle
- B Early identification of patients who meet criteria for sepsis.
- C Time to prepare, deliver, and administer medications.
- D Appropriate selection of antimicrobial therapy.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-428L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **IDENTIFYING BARRIERS TO GLYCEMIC CONTROL IN PATIENTS WITH TYPE 2 DIABETES AFTER COMPLETION OF AN ACCREDITED EDUCATION PROGRAM**

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**Purpose:** To identify patient-perceived barriers to achieving A1C targets after receiving instruction in an accredited diabetes education program. **Methods:** Patients will be identified for study inclusion after completing an American Association of Diabetes Educators (AADE)-accredited education program provided by a pharmacist-managed diabetes center. Patients who are 18 years or older and have had at least one A1C test performed after completion of the program will be eligible for inclusion. Patients will be asked to participate in a semi-structured interview regarding their perspective on self-management after receiving formal education. Pilot testing for clarity was performed by patients currently enrolled in the program. During the interview, participants will be assessed for attainment of glycemic control through A1C results and asked to identify barriers that prevented achievement of desired control. Patients who reached their target will be asked to comment on strategies that contributed to their success. Additionally, participants will be asked if their treatment plan was developed collaboratively with their healthcare provider, and if pharmacist intervention occurred. Investigators will take detailed notes on the questionnaire form during the interview to record patient responses. The responses will be evaluated with qualitative thematic analysis to identify common trends. A code book will be created and maintained for the extent of the study. The investigators will independently code the responses, and any discrepancies will be resolved by a third coder. The study received approval for exemption by the Institutional Review Board. **Results:** N/A **Conclusion:** N/A

### **Learning Objectives:**

Describe common barriers to glycemic control in patients with diabetes  
Explain how diabetes self-management education improves patient outcomes

### **Self Assessment Questions:**

Which of the following is a common reason patients struggle to reach their A1C target?

- A Lack of effective medications available
- B: No access to healthy food choices
- C: Inability to meet with their healthcare provider
- D: Inadequate patient education

Diabetes educators routinely improve patient outcomes by:

- A Providing patients with medication samples
- B Educating patients about healthy eating habits
- C Ordering A1C tests and lipid screenings
- D Requiring patients to start an exercise program

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-429L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING ALIGNMENT OF PATIENT PRESCRIPTION BENEFITS AND HOSPITAL FORMULARIES: A STATEWIDE SURVEY OF PHARMACY ADMINISTRATORS

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**Purpose:** To assess alignment between Indiana hospital formularies and patient prescription benefit formularies among the following medication classes: inhalers, insulin, angiotensin II receptor blockers (ARBs), and novel oral anticoagulants. **Methods:** A 19 question electronic survey was developed using Research Electronic Data Capture (REDCap) to gather institution demographic information as well as the hospitals formulary medications for the previously mentioned medication classes. Hospitals were included if they were located in Indiana. Only one survey from each hospital was accepted for inclusion. However, surveys completed by more than one hospital in a single health system were included. Responses from Veterans Affairs Hospitals, outpatient care facilities, long-term care facilities and sub-acute rehab facilities were excluded from participation in this study. Incomplete responses were excluded from the final analysis. This survey was accessible to participants from October 26, 2015- November 25, 2015. Hospital participants were identified for inclusion by several Indiana pharmacy and medication safety listservs, which were used to distribute the study intent and survey link. Patient prescription benefit formularies were obtained from fifteen publicly available preferred drug lists (PDL). These formularies were used to assess outpatient coverage of the aforementioned medication classes. These plans comprised of a mix of Medicare, Medicaid and commercial insurance plans. In the second phase of this study, all prior authorization (PAs) requests for inhalers, insulin, ARBs, and novel oral anticoagulants submitted through CoverMyMeds at ten outpatient pharmacies were evaluated. All PAs for novel oral anticoagulants were further assessed to determine time to first fill and average delay in therapy. **Conclusions:** Final results and conclusions will be presented at the Great Lakes Residency Conference

### Learning Objectives:

Describe the impact of formulary misalignment on patient transitions of care and access to medications following hospital discharge.

Explain the current state of formulary alignment between hospitals and payers across Indiana.

### Self Assessment Questions:

Misalignment of hospital formularies and patient prescription benefit programs at hospital discharge can result in which of the following?

- A: Unintended medication discrepancies
- B: Duplicate therapy
- C: Gaps in treatment
- D: All of the above

When hospital and patient prescription benefit formularies were assessed in Indiana, which of the following medication classes had a statistically significant difference in medications covered with ho

- A: New oral anticoagulants
- B: Insulin
- C: Inhalers
- D: Angiotensin II receptor blockers (ARBs)

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-921L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF SECURE MESSAGING FOLLOW UP AND GROUP EDUCATION CLASSES FOR VETERANS ON DIRECT ORAL ANTICOAGULANTS

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**Purpose:** The Veterans Health Administration (VHA) System serves a largely older, male population with a high prevalence of chronic atrial fibrillation and venous thromboembolism. Vitamin K antagonists (VKAs) such as warfarin, have been the mainstay of treatment and prophylaxis of thromboembolism. Over the past decade, several direct oral anticoagulants (DOACs) have emerged that have a quicker onset of action and eliminate the need for routine INR monitoring. Use of these agents in the VHA system has increased in the last 3 years. Prior to this project, patients were educated individually over the phone or in person and followed up through phone calls. Secure messaging as a follow up option and group education classes are anticipated to improve time management and workflow for anticoagulation pharmacists in addition to increasing the accessibility of pharmacists to patients. The purpose of this project was to improve the accessibility of clinical pharmacy specialists and the education process for veterans prescribed DOACs at the Aleda E. Lutz Veterans Affairs Medical Center. The primary aim was implementation of secure messaging through MyHealthVet for follow up management of patients on DOACs. The secondary aim was development of a group education class for patients initiating therapy with DOACs. **Methods:** This quality improvement project has been exempt from review by the Institutional Review Board. All patients taking DOACs (rivaroxaban, apixaban, or dabigatran) were identified through a patient list kept by the anticoagulation clinic. An educational flyer was designed and a group secure message was sent to all patients taking DOACs who were already signed up for secure messaging through MyHealthVet to offer participation in the program. A patient education PowerPoint presentation was designed and a clinic grid approved for a DOAC group education class. **Results/Discussion:** Results and conclusions will be presented at the Great Lakes Residency Conference

### Learning Objectives:

Identify the benefit of using secure messaging through MyHealthVet for management of DOACs.

Recognize the advantages of a DOAC group education class.

### Self Assessment Questions:

Which of the following is a benefit of secure messaging through MyHealthVet for veterans?

- A: The ability to communicate on a personal level with healthcare prc
- B: Another way to contact healthcare providers for urgent matters
- C: Increased accessibility of healthcare providers and reduction of "pl
- D: Can replace a clinic visit so the veteran doesn't need to leave his/

What are the two main immediate advantages of a DOAC group education class?

- A: Cost savings and increased patient understanding
- B: Better time management and uniformity of education
- C: Improved patient outcomes and reduction of adverse events
- D: Less travel time for veterans and enhanced pharmacist knowledge

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-430L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**DEVELOPMENT AND EVALUATION OF A PHARMACIST-MANAGED TELEHEALTH GRECC CONNECT CLINIC TO OPTIMIZE MEDICATION REGIMENS IN RECENTLY HOSPITALIZED RURAL GERIATRIC VETERANS**

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**Purpose:** Nearly three million Veterans who live in rural communities are aged 65 or older, many of whom have chronic conditions that require complex medication regimens. There are often inadequate pharmacy services to support rural geriatric Veterans, particularly those who have medication-related issues complicated by a recent hospitalization. The purpose of this study is to create and evaluate a pharmacist-managed telehealth clinic at the William S. Middleton Memorial Veterans Hospital in Madison, WI to address the needs of this Veteran population, focusing on medication regimen optimization during transitions of care from hospital to home. **Methods:** An adapted Intervention Mapping (IM) framework is being used for the systematic design, implementation, and evaluation of the clinic. Interviews, in-depth literature searches, medical record abstractions, and brainstorming sessions will help inform the IM process. Patients will be referred to the pharmacist-managed telehealth clinic from the hospitals existing transitional care program. Veterans will be included after being identified by the transitional care program to have a medication-related issue, and are at least 65 years of age and live alone or were hospitalized in the last year, or have a history of dementia, delirium or cognitive impairment. Patients must be discharged to a community setting and have a primary care provider established at one of the rural Veteran Affairs (VA) clinics associated with the existing GRECC Connect Clinic. **Outcomes** include changes in the number of medications and/or number of doses per day per patient, patient and caregiver understanding of medication use, risk of harm (e.g., geriatric syndromes) due to inappropriate medication use, feasibility of communication with providers outside of the VA system, and 90-day emergency department visit and hospitalization rates. **Results and Conclusions:** The study is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Recognize potential medication-related issues in the elderly and the impact of pharmacist-led post-discharge services on this population. Identify interventions that can be made by clinical pharmacists providing post-discharge services to rural geriatric Veterans.

**Self Assessment Questions:**

Studies suggests that approximately what percent of hospitalized or ambulatory care patients or nursing home residents receive 1 or more unnecessary drugs?

- A 15%
- B: 25%
- C: 50%
- D: 65%

What is the single most important predictor of patient harm including disability, hospitalization, and death?

- A Number of comorbid conditions the patient has
- B Number of medications the patient is taking
- C Number of caregivers the patient has
- D Number of alcoholic beverages consumed

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-431L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**IMPACT OF MEDICATION ADHERENCE IN UNDERINSURED RENAL TRANSPLANT RECIPIENTS ASSISTED BY AN OUTPATIENT PHARMACY BASED MEDICATION ASSISTANCE PROGRAM**

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Medication adherence in transplant patients is extremely important in order to maintain a functional graft. A major risk factor of nonadherence is low income patients with a lack of healthcare coverage. Patients that cannot afford the cost of their immunosuppressive medications can be referred to a Medication Assistance Program (MAP). The purpose of this study is to compare medication adherence in kidney transplant recipients enrolled in MAP at an academic medical center located in the outpatient pharmacy to patients with private insurance. This study received Institutional Review Board approval. This will be a retrospective chart review study. A list will be generated of kidney transplant recipient that fill their immunosuppressive medications at the outpatient pharmacy or with MAP from September 1, 2013-September 1, 2015. The objective of this study is to assess medication adherence and outcomes among underinsured kidney transplant recipients enrolled in MAP compared to recipients with private insurance. Secondary objectives include incidence of graft rejection or loss and readmissions related to transplantation. Eligibility criteria include patients at least 18 years old, renal transplant recipients, and enrolled in MAP or fill immunosuppressant medications at the outpatient pharmacy. Patients will be excluded if kidney-pancreas recipients, enrolled in MAP <3 months, or filled immunosuppressant medications from the outpatient pharmacy <3 months. Demographic data that will be collected includes age, sex, preferred language, date of transplantation, donor type (living versus deceased), and insurance. Refill history will be collected and a medication possession ratio (MPR) will be calculated. Other data points collected will be type of immunosuppression medications, subtherapeutic immunosuppressive levels, contact regarding nonadherence, biopsy proven rejection, treatment for rejection, and readmissions. Data will be analyzed using descriptive statistics.

Collection of information is currently in progress. Final results and conclusions will be presented at the Great Lakes Resident Conference.

**Learning Objectives:**

Recognize risk factors for nonadherence of immunosuppression in transplant recipients  
Discuss the role of Medication Assistance Programs

**Self Assessment Questions:**

Which kidney transplant recipient has the highest risk of nonadherence to his or her medications?

- A 60 year old female with a Masters Degree
- B: 48 year old unemployed male with poor social support
- C: 14 year old male who's mother is a registered nurse
- D: 38 year old female currently working at a coffee shop

Which of the following statements describes the responsibility of a Medication Assistance Program?

- A Provide medications for no cost
- B Only fill medications for transplant recipients
- C Verify patient's income status
- D Monitor therapeutic drug levels

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-766L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## GLYCEMIC CONTROL IN THE INPATIENT SETTING IN NON-DIABETICS STARTED ON CORTICOSTEROID THERAPY

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**Purpose:** Studies have shown that better glycemic control in the inpatient setting leads to better health outcomes for the patient. According to the Endocrine Society, any patient in a non-critical care setting regardless of diabetes diagnosis should be started on point of care blood glucose monitoring upon initiation of corticosteroid therapy. Monitoring may be discontinued within 24-48 hours of corticosteroid therapy as long as blood glucose levels have remained <140 mg/dL fasting and random blood glucose levels <180 mg/dL, goals recommended by the American Diabetes Association. The purpose of this study is to determine the number of patients who are in target blood glucose range 75% of the time before and after the implementation of a pharmacist protocol to add point of care blood glucose monitoring for patients started on corticosteroids. **Methods:** This is a single-centered, retrospective study in a 160-bed institution. A Pharmacy and Therapeutics Committee approved pharmacist protocol allows pharmacists to add point of care blood glucose monitoring for any patient started on a corticosteroid. Patients receiving intravenous methylprednisolone, oral prednisone, or intravenous hydrocortisone will be assessed for appropriate treatment of corticosteroid-induced hyperglycemia both before and after implementation of the pharmacist protocol. **Results:** Pending **Conclusion:** The goal of this study is to determine whether corticosteroid-induced hyperglycemia is treated more appropriately in non-diabetic patients upon implementation of a protocol that allows pharmacists to add point of care blood glucose monitoring to patients who are initiated on corticosteroids. It will also be important to determine the appropriate duration for point of care blood glucose monitoring in this patient population.

### Learning Objectives:

Identify the significance of the different routes of administration of various corticosteroids on glycemic control.

Discuss the role of pharmacists in the setting of corticosteroid-induced hyperglycemia.

### Self Assessment Questions:

1. According to the American Diabetes Association, what is the goal blood glucose range for patients in the inpatient setting (fasting and random)?

- A: Fasting <110 mg/dL and Random <140 mg/dL
- B: Fasting 80-130 mg/dL and Random <180 mg/dL
- C: Fasting <140 mg/dL and Random <180 mg/dL
- D: Fasting <80 mg/dL and Random <130 mg/dL

At what time can point of care blood glucose monitoring be discontinued in patients on corticosteroid therapy according to the Endocrine Society?

- A: Blood glucose monitoring may be discontinued after 24-48 hours if
- B: Blood glucose monitoring may be discontinued after 12 hours if bl
- C: Blood glucose monitoring may be discontinued after 48-72 hours if
- D: Blood glucose monitoring may be discontinued after 72 hours if bl

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-432L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF RAPID SEQUENCE INTUBATION (RSI) MEDICATIONS IN THE EMERGENCY DEPARTMENT

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**Purpose:** Medications used for intubations in the Emergency Department vary based on clinician preference and/or clinical situation. There may be some hesitation to use specific medication classes if a patient is thought to have a difficult airway to secure such as patient tracheal anatomy and chronic diseases. Studies have previously looked at techniques including Rapid Sequence Intubation (RSI) using both induction and paralytic agents which offers a safe and effective environment for successful intubation while decreasing patient risk. It is necessary to evaluate the medications used for this procedure and the effect that it has on patient outcomes. An evaluation of the medications used in order to obtain a secured airway and the outcomes of these patients may help to optimize the treatment of this patient population. **Methods:** This study will be designed as a retrospective, chart review. Patients enrolled in this study will have undergone emergent intubation in the Emergency Department from 7/15/2010 up until 10/15/15. The primary objective will be to evaluate the outcomes of patients intubated in the Emergency Department based on the medications they received during RSI. The composite endpoints will include mortality (in hospital), incidence of airway trauma, unsuccessful intubations, subsequent medication administration and surgical airway placements related to the variable techniques. **Results:** Data collection is currently in progress

### Learning Objectives:

Identify the medication classes used to facilitate rapid sequence intubation (RSI).

Recognize the benefit of medication therapy for rapid sequence intubation (RSI).

### Self Assessment Questions:

Which medication is a paralytic agent used to help facilitate rapid sequence intubation (RSI)?

- A: Etomidate
- B: Rocuronium
- C: Ketamine
- D: Propofol

What is optimal medication regimen to help facilitate intubation in a combative patient in the Emergency Department?

- A: Sedative agent only
- B: Paralytic agent only
- C: Both a sedative and a paralytic agent
- D: No medication therapy is required

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-767L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST-LED ANTIMICROBIAL STEWARDSHIP OF ANTIBIOTIC PRESCRIBING FOR PNEUMONIA IN THE INTENSIVE CARE UNIT

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**Purpose:** Important considerations for patients hospitalized with community-acquired pneumonia (CAP) or healthcare-associated pneumonia (HCAP) in the intensive care unit (ICU) include antibiotic appropriateness, duration of therapy, and multidrug-resistant organism (MDRO) risk factors. Pharmacist-led antimicrobial stewardship strategies have been shown to be effective in reducing and optimizing antibiotic utilization in the ICU, however, their impact on patient outcomes has not been proven and requires further evaluation. The purpose of this study is to determine the proportion of patients receiving appropriate empiric antimicrobial therapy utilized for HCAP and CAP in a mixed medical-surgical ICU, before and after pharmacist-led antimicrobial stewardship program implementation. **Methods:** This is a retrospective, quasi-experimental study, evaluating CAP and HCAP patients who received antibiotic therapy in the Mercy Health Saint Mary's ICU. Data was collected retrospectively using electronic medical records. Appropriate treatment was defined as appropriate spectrum empiric antibiotic therapy in concordance with institutional guidelines. Study endpoints compared between the pre- and post-antimicrobial stewardship implementation periods in both the CAP and HCAP cohorts include proportion of patients admitted to the ICU who received appropriate antimicrobial treatment, time to de-escalation, duration of antimicrobial therapy, percentage of initial antimicrobial treatment failure, and length of ICU and hospital stay. Additionally, patient outcomes compared between groups will include 90-day readmission, in-hospital mortality, reintubation rates, and Clostridium difficile infection within 30 days. Multivariate logistic regression will be performed to assess for risk factors associated with appropriate empiric antibiotic selection in patients with culture positive pneumonia in the ICU. Demographic data will be presented as descriptive statistics. Outcomes measured on a nominal scale will be assessed using a Chi-square or Fisher's exact test. Outcomes measured on a continuous scale will be assessed using a Student's t-test or Mann-Whitney U test as appropriate. **Results:** Data collection and analysis are currently in progress. **Conclusions:** To be presented at the Great Lakes Pharmacy

### Learning Objectives:

Define the patient populations most at risk for pneumonia caused by multi-drug resistant organisms.

List advantages of utilizing a pharmacist-led antimicrobial stewardship program in the ICU.

### Self Assessment Questions:

Which of the following is the least likely risk factor for a multidrug-resistant infection in a patient with pneumonia?

- A: Nursing home residence
- B: Long-term dialysis
- C: Immunosuppression
- D: Age greater than 65 years

Which of the following requires continued research regarding advantages of utilizing pharmacist-led antimicrobial stewardship programs in the ICU?

- A: Improved utilization of antimicrobials in the ICU setting
- B: Improvement in resistance
- C: Patient oriented outcomes
- D: Fewer adverse events related to antimicrobials

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-433L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF CISATRACURIUM DOSING FOR PATIENTS WITH SEVERE ACUTE RESPIRATORY DISTRESS SYNDROME IN THE MEDICAL INTENSIVE CARE UNIT

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**Background:** Acute respiratory distress syndrome (ARDS) is a condition carrying high mortality despite the utilization of evidence based lung-protective ventilation strategies. Administration of a neuromuscular blocking agent (NMBA) during severe ARDS promotes ventilator synchrony, minimizes oxygen consumption and demand, decreases lung and systemic inflammation, and facilitates lung-protective ventilation. Papazian and colleagues showed that the use of an NMBA within 48 hours of developing severe ARDS improves overall survival and decreases duration of mechanical ventilation. Patients treated with cisatracurium in this study received a 15 mg bolus dose followed by 37.5 mg/hour for 48 hours. This fixed dosed strategy used was at the higher end of the dosing range for cisatracurium and therefore dosing remains unknown for ideal outcomes. Currently at The University of Chicago Medicine (UCM), a bolus dose of 0.2 mg/kg followed by a 1-5 mcg/kg/min continuous infusion of cisatracurium is used for paralysis of patients with severe ARDS. Both our institutions practices as well as the Papazian study leave a knowledge gap of whether there is a difference in outcomes based on the level of paralysis. **Purpose:** The purpose of our study is to evaluate outcomes based on level of paralysis by comparing patients receiving light or deep paralysis and evaluating characteristics of paralytic administration. Primary outcome includes duration of mechanical ventilation. Secondary outcomes include length of stay, all-cause mortality, discharge disposition, incidence of pneumothorax, and overall duration of receipt of NMBAs. **Methods:**

We conducted a retrospective chart review of adult medical intensive care unit patients at UCM who received continuous cisatracurium for severe ARDS from January 2010 to December 2015 to assess level of paralysis based on ventilator compliance and train-of-four scoring and compared outcomes between the cohorts. **Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the benefits of administration of neuromuscular blocking agents (NMBA) during severe acute respiratory distress syndrome (ARDS).

Review primary literature for use of NMDAs in ARDS and identify unanswered questions regarding its use.

### Self Assessment Questions:

Which of the following has been shown to be a benefit of administration of a neuromuscular blocking agent (NMBA) during severe acute respiratory distress syndrome (ARDS)?

- A: Increase oxygen consumption and oxygen demand
- B: Exacerbate lung and systemic inflammation
- C: Promote ventilator synchrony
- D: Prohibit lung-protective ventilation

Which of the following is true about the Papazian, et al. study?

- A: Showed the use of an NMBA within 48 hours of developing severe
- B: Dosing of cisatracurium included a 0.2 mg/kg bolus dose followed
- C: Results indicated less adverse effects and shorter ICU stay were
- D: Level of paralysis was monitored with with train-of-four scoring and

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-434L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE EFFECTS OF RANOLAZINE ON HEMOGLOBIN A1C IN A VETERAN POPULATION

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**Purpose:** Diabetes mellitus is a risk factor for the development of cardiovascular disease. Treatment of diabetes reduces the risk for microvascular complications but has not been consistently shown to reduce cardiovascular events. In addition, select cardiovascular medications may potentially worsen diabetes control. Ranolazine, an antianginal agent is associated with a decrease in hemoglobin A1C (A1C). The purpose of this study is to determine the effect of ranolazine 500 and 1000 mg twice daily on A1C and hypoglycemia among veterans with type-2 diabetes. **Methods:** In this retrospective study, the medical records of veterans with type-2 diabetes and a prescription for ranolazine filled between January 2008 through June 2015 will be reviewed for six months prior to ranolazine initiation and six months after ranolazine initiation. Data to be collected includes patient demographic information, ranolazine dose, ranolazine adherence, baseline and follow up A1C, concomitant diabetes medications, concomitant medications that interact with ranolazine, and incidence of hypoglycemia. The primary outcome will be the change in A1C after initiation of ranolazine. Secondary outcomes will include the change in percentage of Veterans achieving HbA1c <7% or <8%, the change in A1C with ranolazine 500 mg twice daily versus 1000 mg twice daily, and the change in incidence of hypoglycemia upon initiating ranolazine. Change in A1C will be analyzed with a paired t-test, and change in Veterans achieving HbA1c <7% or <8% will be analyzed with a McNemar test. Other results will be descriptive. **Results:** Pending data collection and analysis. **Conclusion:** Pending data collection and analysis

### Learning Objectives:

Discuss the literature involving ranolazine and A1C.  
Describe the potential mechanisms of A1C lowering with ranolazine.

### Self Assessment Questions:

Which of the following accurately reflects current literature relating to ranolazine and A1C?

- A: Ranolazine is associated with an increase in HbA1c and an increase in hypoglycemia
- B: Ranolazine is associated with an increase in HbA1c and does not increase hypoglycemia
- C: Ranolazine is associated with a decrease in HbA1c and an increase in hypoglycemia
- D: Ranolazine is associated with a decrease in HbA1c and does not increase hypoglycemia

What is a potential mechanism for A1C lowering with ranolazine?

- A: Inhibition of late sodium channel and preservation of beta-cell function
- B: Preservation of beta-cell function and increased glucose-dependent insulin release
- C: Inhibition of late sodium channel and increased metformin exposure
- D: Weight loss and increased metformin exposure

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-435L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## THE IMPACT OF STATIN USE ON SEVERITY OF COMMUNITY-ASSOCIATED CLOSTRIDIUM DIFFICILE INFECTION

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**Purpose:** Community-associated Clostridium difficile infection (CDI) occurs with rates up to 22 cases per 100,000 persons and is a significant cause of morbidity and hospitalization. Despite CDI acquisition in the community, preventative measures are targeted toward acute care facilities, with focus on optimization of appropriate antimicrobial use. Evaluation of prevention strategies that may be applied in the community setting is pertinent. Statin drugs may possess immunomodulatory and anti-inflammatory properties; studies report reduced risk of hospital-associated CDI, rates of recurrence, and 30 day all-cause mortality in patients taking statin drugs. The impact of statin drugs on community-associated CDI severity and hospital course is unclear. The purpose of this study is to determine whether a difference in severity exists between statin users and nonusers with community-associated CDI presenting to the hospital. **Methods:** This is a retrospective cohort study of patients at Northwestern Memorial Hospital with a positive C. difficile PCR identified within 72 hours of admission between November 30, 2014 to November 30, 2015. CDI severity will be assessed using the Infectious Diseases Society of America guideline criteria and Zar criteria. Demographic information and comorbid conditions will be collected. Home medication lists will be reviewed for statin drugs, antibiotics, and proton pump inhibitors. The primary endpoint will study differences in community-associated CDI severity on admission between outpatient statin users and nonusers. Secondary endpoints include: characterization of statin withdrawal on CDI severity, duration of inpatient antibiotics, CDI therapy, vasopressor use, ICU admission and length of stay (LOS), hospital LOS, inpatient mortality, and disposition location. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define the Infectious Diseases Society of America guideline criteria and Zar criteria used to classify CDI severity.  
Describe the evidence of statin use in hospital-associated C. difficile infection.

### Self Assessment Questions:

Which of the following laboratory or physical findings is involved in assessing CDI severity through the Zar criteria?

- A: Serum creatinine
- B: Heart rate
- C: Body Temperature
- D: Neutrophil Count

Which of the following has been reported in the literature as a statistically significant outcome of statin users and hospital-associated C. difficile infections?

- A: Faster symptom resolution
- B: Higher risk of hospital-onset C. difficile infections
- C: Increased risk of recurrence of hospital-associated C. difficile infections
- D: Reduced 30 day all cause mortality

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-436L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CLINICAL AND ECONOMIC IMPACT OF THE INTRODUCTION OF A NUCLEIC ACID AMPLIFICATION ASSAY FOR CLOSTRIDIUM DIFFICILE

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**Purpose:** In 2012, our institution switched from a C. difficile A/B toxin EIA to a PCR tcdB assay. Given the low sensitivity of EIA, clinicians may be more likely to continue empiric therapy for CDI after a negative EIA compared to a negative test with higher sensitivity. The clinical outcomes and cost implications of a diagnostic shift from toxin EIA to PCR have not been completely characterized in the literature. The purpose of this study is to characterize antimicrobial use and hospital costs associated with a negative C. difficile test diagnosed by two different methods. **Methods:** Retrospective pre-post implementation study of patients admitted with diarrhea and a negative C. difficile diagnostic test result (either EIA or PCR) from 2010 to 2015. Patients will be identified by microbiology records for negative C. difficile results and excluded if they were receiving metronidazole for a concomitant anaerobic infection. Patients with a negative EIA result will be compared to those with a negative PCR result and will be matched by patient location in the hospital. Data collection will include testing strategy employed (EIA or PCR), the number of tests sent per patient per episode, initiation of empiric therapy, time to discontinuation of therapy, and the number of treatment doses the patient received before and after the final diagnostic result. Clinical outcomes assessed will include hospital length of stay (LOS), infection-related LOS, total hospital and infection-related costs, acquisition of VRE colonization, recurrence of CDI and time to discontinuation of contact isolation. Categorical data will be compared by Chi-square or Fishers Exact test. Continuous and discrete data will be compared with a Student t-test (parametric) or Mann-Whitney U test (nonparametric). A two-tailed significance of <0.05 will be considered statistically significant. **Results:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the mechanism of detection of the various diagnostic tests for Clostridium difficile infection (CDI)

Explain differences in clinical applicability among the various CDI diagnostic tests

### Self Assessment Questions:

Which of the following CDI diagnostic tests has the highest specificity?

- A EIA to detect GDH antigen
- B: NAAT to detect C. difficile genes via PCR
- C: Toxigenic culture
- D: EIA to detect C. difficile toxins

With consideration of clinical applicability, which diagnostic test may be superior?

- A EIA to detect GDH antigen
- B NAAT to detect C. difficile genes via PCR
- C Toxigenic culture
- D EIA to detect C. difficile toxins

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-437L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF ANTIHISTAMINE, ANTIPSYCHOTIC, AND BENZODIAZEPINE USE FOR AGITATION IN A RURAL COMMUNITY HOSPITAL EMERGENCY DEPARTMENT

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**Purpose:** Agitation is associated with increased length of hospital stay, increased healthcare costs, poor psychological outcomes, and unfavorable patient-provider relationship. Patients with agitation can also cause safety concerns for staff members and other patients, as well as themselves. The American Association of Emergency Psychiatry recommends benzodiazepines or antipsychotics as treatment options based on the etiology of agitation. Despite lack of adequate clinical trials, first- and second-generation antipsychotics are recommended based on underlying cause. Although current guidelines do not address the use of antihistamines, they are commonly prescribed in the emergency department to treat agitation. The purpose of this study is to characterize the pattern of use and safety of medications ordered for acute agitation in the emergency department. **Methods:** This retrospective, single-center, cross-sectional study will evaluate the use and safety of medications for acute agitation in a rural community hospital emergency department from May 1st, 2015 to January 31st, 2016. Patients 18 years of age or older who were seen in the emergency department, have documented agitation, and received at least one dose of a benzodiazepine, antipsychotic, or antihistamine will be included. Patients will be excluded if agitation was secondary to a non-psychiatric medical condition or medication was documented as a scheduled home medication. This study will characterize agitation treatment by reviewing the medication administered, its dose, and its route in initial agitation management stratified by etiology. It will also determine the percentage of patients requiring additional intervention after initial therapy, including physical restraints or adjunct medication. Lastly, safety will be assessed by determining the incidence of documented adverse drug events. Descriptive statistics will be used to analyze collected data. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Discuss the recommended agitation management algorithms and place in therapy of medications

Outline the similarities and differences between medications used in managing agitated adult patients in an emergency department

### Self Assessment Questions:

Which medication has QTc prolongation as a well-documented side effect?

- A Ziprasidone
- B: Olanzapine
- C: Diphenhydramine
- D: Lorazepam

What is the medication of choice for a 26 year old agitated male due to stimulant intoxication without psychosis, according to American Association of Emergency Psychiatry 2012 Agitation Consensus Sta

- A Haloperidol
- B Diphenhydramine
- C Lorazepam
- D Ziprasidone

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-768L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECT OF VITAMIN D LEVELS ON MOBILIZATION AND ENGRAFTMENT IN AUTOLOGOUS STEM CELL TRANSPLANT PATIENTS

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**Background:** One-third of the population in the US has been found to have insufficient vitamin D levels, however this number has been reported as up to 89% in allogeneic stem cell transplant (SCT) patients prior to transplantation. This rate has not been reported specifically for the autologous SCT population. A retrospective study evaluated the impact of vitamin D levels on several outcomes in pediatric allogeneic SCT patients. In patients with sufficient vitamin D levels, the study found a significant increase in overall survival and relapse free survival as well as a trend toward more rapid neutrophil recovery in the 3 months post-transplant. The role of vitamin D on mobilization was studied in mice by assessing response to granulocyte colony stimulating factor (G-CSF) in vitamin D receptor deficient subjects compared to historical controls. Mice deficient in VDR showed virtually no mobilization response to G-CSF. The effect of low vitamin D levels on hematopoietic stem cell mobilization and engraftment in the adult autologous SCT population has yet to be reported. **Objective:** The primary objective of this study is to evaluate the association of vitamin D levels with the number of CD34+ cells collected during mobilization and time to neutrophil engraftment in autologous SCT patients. **Methods:** This is a retrospective, single-center, cohort study. Patients at least 18 years of age undergoing both mobilization and autologous stem cell reinfusion at the study site who have had a vitamin D level drawn prior to stem cell reinfusion will be included in the study. These vitamin D levels along with baseline characteristics and outcomes data will be collected. Patients will be classified based on baseline vitamin D levels as either deficient or sufficient. All information will be obtained through retrospective chart review.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the prevalence of vitamin D insufficiency in stem cell transplant patients.

Recognize proven and proposed functions of vitamin D.

### Self Assessment Questions:

Which of the following is a proven or proposed function of vitamin D?

- A: Intensification of thirst
- B: Immune modulation
- C: Facilitation of the auditory perception
- D: None of the above

The prevalence of vitamin D insufficiency has been reported to be as high as \_\_\_\_\_ in allogeneic stem cell transplant patients prior to transplant.

- A: 33%
- B: 75%
- C: 39%
- D: 89%

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-438L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CONVERTING TWICE-DAILY TACROLIMUS TO THE ONCE DAILY EXTENDED-RELEASE TACROLIMUS FORMULATION IN RENAL TRANSPLANT RECIPIENTS

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**Purpose:** Lifelong immunosuppression is required to preserve graft function after renal transplantation. Tacrolimus, the most commonly used calcineurin inhibitor, was first developed as a twice-daily formulation. A once daily extended-release tacrolimus formulation was approved in July 2013 for renal transplant patients. The extended-release formulation makes it suitable for once daily administration which may improve patient adherence and potentially decrease side effects. For patients currently on immediate-release tacrolimus, the appropriate dose conversion to an extended-release formulation is still unclear. The purpose of this study is to determine if the 1:1 dose conversion ratio of twice daily immediate-release tacrolimus formulation to the once daily extended-release formulation in renal transplant recipients is safe and effective. **Methods:** Forty patients were converted to extended-release tacrolimus at our institution between 6/1/2014 and 9/1/2015. Sixteen patients met the inclusion criteria, which included renal transplant patients on stable immunosuppression at the time of conversion. Patients started on or discontinued from a medication that interacts with tacrolimus (defined as interaction level D or greater) during conversion were excluded. The primary endpoint of this study was to determine the ratio of total daily dose of twice daily immediate-release tacrolimus to the total daily dose of extended-release tacrolimus required to obtain therapeutic troughs. Secondary endpoints include time to therapeutic trough from time of initial conversion, number of dose changes, number of tacrolimus levels obtained prior to obtaining therapeutic trough, along with biopsy proven acute rejection at 1, 3, and 6 months after conversion. A retrospective chart review was performed.

**Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference. The results of this study will be used to develop a conversion protocol, including specific dose conversion ratio and time to trough level follow-up, to be used at our institution.

### Learning Objectives:

Explain the risks and benefits of converting patients from immediate-release tacrolimus to the extended-release formulation.

Identify specific patient characteristics that make ideal candidates for conversion to once daily extended-release tacrolimus.

### Self Assessment Questions:

Which of the following is a possible benefit of extended-release tacrolimus?

- A: Improvement of side effects
- B: Improvement of compliance
- C: Less drug interactions
- D: Both A and B

Which of the following patients would be a good candidate for conversion to extended-release tacrolimus?

- A: Patient who was recently started on itraconazole
- B: Patient who has not had consistent tacrolimus levels for the past 2
- C: Patient who has difficulties remembering to come to the clinic for
- D: Patient who states he has trouble remembering his evening dose

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-439L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF HEALTH-SYSTEM PHARMACIST INTERVENTIONS ON THE CARE OF PATIENTS FOLLOWED BY HOSPITALIST TEAMS AT A COMMUNITY TEACHING HOSPITAL

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**Purpose:** Health-system pharmacists are frequently part of multidisciplinary teams performing medication profile reviews while verifying the appropriateness of drugs, dosing, and indications. Pharmacists regularly make interventions to improve patient care, resulting in increased safety and well-being of patients, while also reducing cost. Hospitalist physicians often have high patient volumes and substantial workloads. These physicians represent a group that may benefit from a formal drug therapy intervention process by a pharmacist. The purpose of this study is to evaluate the impact of health system pharmacist interventions on patients cared for by a hospitalist physician group over a 12 week period. **Methods:** Data will be collected from December 21, 2015 through February 29, 2016. During this time period, the pharmacy resident will review hospitalist patients and present interventions to the physicians while recording the time spent on profile review and follow-up. Potential interventions include, but are not limited to: switching from intravenous to oral therapy, renal dose adjustments, discontinuation of duplicate therapy, antibiotic de-escalation, and initiation of thromboprophylaxis. The type of intervention made, physician acceptance rate, and resident pharmacist time spent will be recorded. The primary outcome for this study will be number of interventions made per patient reviewed. Secondary outcomes will include type of interventions made, intervention acceptance rate, pharmacist time spent, and cost savings. Descriptive statistics will be used to analyze all data. **Preliminary Results:** 115 patients have been identified for study inclusion as of January 31, 2016. The pharmacy resident identified 130 interventions, for an average of 1.1 interventions per patient reviewed. Physician acceptance rate of pharmacist intervention(s) to-date is 88%. **Conclusions:** Early data suggests when health-system pharmacists review patients cared for by the hospitalist service, interventions are identified and generally well-accepted by physicians. These interventions relate to improved patient care and medication safety.

### Learning Objectives:

Discuss importance of health-systems pharmacist involvement in inpatient care.  
Review potential impact of pharmacist interventions.

### Self Assessment Questions:

What is the estimated return on investment for every dollar spent on clinical pharmacy services?

- A \$1
- B: \$2
- C: \$4
- D: \$8

What is the approximate reduction in preventable adverse events when a pharmacist is involved in patient care?

- A 25%
- B 35%
- C 50%
- D 70%

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-440L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF A PROTOCOL USED TO SCREEN AND CONTROL GLYCEMIC LEVELS FOLLOWING TOTAL ORTHOPEDIC KNEE AND HIP SURGERIES

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**Purpose:** Perioperative hyperglycemia can affect a patient's recovery following orthopedic surgery by increasing the risk of complications including infection and by increasing patient length of stay. Currently, our institution does not have a standardized glucose management protocol for this patient population. The objective of this study is to implement a protocol that can effectively manage patients' glucose levels post-operatively and decrease the rate of post-op infections in patients who have undergone a total orthopedic knee or hip surgery. **Methods:** This study was approved by the institutional review board. Once patients undergo surgery, their glucose level will be managed by a P&T approved protocol using a sliding scale or basal plus correction method of insulin administration. Both non-diabetic and diabetic patients' glucose will be managed by this protocol. Patients will also have hemoglobin A1c drawn to assess their current glucose control. This study will compare the management of patient glucose levels prior to and after the initiation of the protocol. The primary outcome of the study is the rate of post-operative infection. Secondary outcomes include the average glucose on post-operative days 1, 2, and 3, nursing satisfaction, and A1c level. **Results and Conclusions:** Data collection and analysis is currently ongoing. The results and conclusions of the study will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the benefits of glucose screening prior to orthopedic surgery.  
Discuss how institutionalizing a standardized practice of glucose management can positively affect patient outcomes post-orthopedic surgeries.

### Self Assessment Questions:

What is the American Diabetes Association's recommendation for target A1c levels in adults?

- A <6.0
- B: <6.5
- C: <7.0
- D: <7.5

What is a potential adverse effect of orthopedic surgeries that is associated with elevated blood glucose levels?

- A Stroke
- B Prolonged hospital stay
- C Infection
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-769L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **GUIDELINE COMPLIANCE FOR THE TREATMENT OF NEW ONSET CLOSTRIDIUM DIFFICILE INFECTION: A COMMUNITY TEACHING HOSPITAL PERSPECTIVE**

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**Purpose:** The purpose of this study is to assess compliance to Henry Ford Health System (HFHS) guidelines for the treatment of Clostridium difficile infections (CDI). **Methods:** This quasi-experimental study assessed patients with a diagnosis of hospital onset CDI. Patients were analyzed both retrospectively and prospectively for proper treatment of CDI. Retrospective patients were identified by Infection Prevention, based on National Healthcare Safety Network (NHSN) criteria, and analyzed for a 12 month period from November 2014 - November 2015. Prospective patients were analyzed for a 2 month period from January 2016 - February 2016. Qualifying patients in this arm were identified via Theradoc application, a data mining tool used in conjunction with the electronic medical record. Data collected for all patients included baseline characteristics, antimicrobial use prior to CDI, assessment of creatinine, white blood cell count, blood pressure, body temperature, diarrhea, and any alteration of the gastrointestinal tract, CDI classification, initial CDI treatment, therapy compliance to HFHS guidelines, adjunct therapies, and cost savings potential. Prospective patient analysis included pharmacist intervention recommendations to comply with HFHS guidelines, such as initiation of therapy, switching of therapy, and discontinuation of inappropriate agents. The primary outcome of this study was to assess compliance to HFHS CDI treatment guidelines. Secondary outcomes included observing potential trends, which may include frequent occurrences of prior specific antibiotics use, CDI rates in specific treatment units, and potential cost savings.

**Results:** Data collection and analysis are pending. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Outline the proper treatment of Clostridium difficile infection (CDI) based upon disease severity classification.

Describe opportunities for pharmacist driven interventions and initiatives when treating CDI.

### **Self Assessment Questions:**

Treatment of new onset mild to moderate CDI recommends initiating which of the following?

- A Metronidazole PO
- B: Vancomycin PO
- C: Fidaxomylin PO
- D: Rifaxamin PO

Which of the following is not a risk factor for CDI?

- A Exposure to gastric acid suppressants
- B Exposure to broad spectrum antimicrobials
- C Age > 50 years
- D Receipt of anti-peristaltic agents

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-441L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **PATHWAY TO CLARIFICATION OF BETA-LACTAM ALLERGIES**

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**Purpose:** Allergies to beta-lactam antibiotics are commonly reported. However, only a fraction of these documented allergies are true hypersensitivity reactions. We have developed a systematic process at our institution utilizing a specific tool, known as PATHWAY, that consists of a series of questions utilized to determine if the patient can safely tolerate a penicillin or cephalosporin antibiotic. This PATHWAY tool is used by a pharmacist in combination with a chart review to determine if administered penicillin or cephalosporin can be safely provided to the patient after the documented allergy. **Methods:** A retrospective chart review will be conducted of patients at our facility with either a penicillin or cephalosporin allergy, who received antibiotics, excluding antimicrobial agents used for prophylactic purposes only, and were evaluated by a pharmacist for allergy clarification. The chart review will be conducted six weeks after the patient has been evaluated by the pharmacist. When evaluating beta-lactam allergies, the pharmacist will utilize the PATHWAY assessment tool combined with a chart review of previously administered antibiotics from both inpatient and outpatient settings. The number of penicillin and cephalosporin allergies removed from patient medical records and data regarding alterations in antibiotic therapy as a result of allergy clarification will be obtained. Rates of Clostridium difficile, presence of multi-drug resistant organisms, MRSA colonization, and antibiotic days of therapy will be obtained. In addition, baseline patient demographics and comorbidities will be recorded. Other data to be collected includes indication for antimicrobial agent(s), rates of fluoroquinolone, carbapenem, vancomycin, clindamycin, and aztreonam use, as well as the number of patients who received allergy testing or dose challenges conducted by the Infectious Diseases team. All data collected will be compared with a control group of non-beta-lactam allergic patients. **Results and Conclusion:** To be presented at the Great Lakes Pharmacy Residency Conference

### **Learning Objectives:**

Identify the number of patients with a documented penicillin allergy that truly have a hypersensitivity reaction to penicillin antibiotics

Define the number of patients that report an allergy to penicillin

### **Self Assessment Questions:**

What percentage of patients with a reported penicillin allergy have a true hypersensitivity reaction?

- A 10%
- B: 30%
- C: 50%
- D: 75%

What percentage of patients report having an allergy to penicillin?

- A 5-10%
- B 10-20%
- C 20-30%
- D 30-50%

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-442L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST AND NURSE PRACTITIONER CO-MANAGEMENT OF DIABETES ON ACHIEVING DIABETES OUTCOMES

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**Purpose:** Patients with diabetes-associated complications (e.g., retinopathy, nephropathy, neuropathy) have increased costs and reduced quality of life when compared to diabetic patients without complications. Achieving and maintaining near-normal glycemic control in patients with diabetes reduces their risk of developing diabetes-associated complications, thereby helping to maintain quality of life and contain costs. A patient-centered medical home pharmacist has worked with an advanced practice nurse practitioner at Froedtert and the Medical College of Wisconsin (MCW) since July 2014, utilizing a collaborative practice agreement with Froedtert and MCW physicians to provide enhanced diabetes care to patients not meeting therapeutic goals. This pharmacist addresses patient barriers and provides patient education while optimizing safe and efficacious diabetes care as a part of the patients diabetes treatment team. The purpose of this study is to evaluate the impact of pharmacist and nurse practitioner co-management on patients diabetes outcomes. **Methods:** This study is a retrospective chart review of patients referred to the pharmacist and nurse practitioner diabetes co-management service between July 1, 2014 and April 30, 2015. This study evaluates patients diabetes outcomes while under the care of the pharmacist and nurse practitioner compared to while under provider-only care prior to referral for co-management. The primary objective is change in glycosylated hemoglobin (A1C) prior to referral compared to after referral. Select secondary objectives include change in self-monitored blood glucose readings, proportion of patients reaching A1C goal, and time to reach A1C goal. **Results & Conclusion:** Primary and secondary objectives remain under investigation, with data collection and evaluation currently being conducted. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe benefits associated with involving pharmacists on patients diabetes care teams.

Recognize benefits associated with improving glycemic control in diabetic patients.

### Self Assessment Questions:

Which of the following did McAdam-Max et al. conclude regarding pharmacist involvement on patients diabetes care teams?

- A: Pharmacists improved glycemic control but at an increased financial cost
- B: Pharmacists did not improve glycemic control but did increase financial cost
- C: Pharmacists did not improve glycemic control but did reduce financial cost
- D: Pharmacists improved glycemic control and reduced financial cost

Which of the following is associated with improving glycemic control in diabetic patients?

- A: Increased healthcare costs
- B: Reduced quality of life
- C: Reduced risk of diabetes-associated complications
- D: Increased risk of cardiovascular disease

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-443L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF VITAMIN D SUPPLEMENTATION IN CHRONIC HEART FAILURE IN THE VETERAN POPULATION

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**Purpose:** To identify whether chronic heart failure patients supplemented with vitamin D experience clinical benefit. **Methods:** This is a retrospective, electronic chart review of patients at JBVAMC with a diagnosis of chronic heart failure as determined by ICD-9 codes and a 25(OH)D vitamin D level drawn between August 1st, 2010 and July 31st 2013. Exclusion criteria includes a serum creatinine >2mg/dL and/or hemodialysis or peritoneal dialysis, hyperparathyroidism, vitamin D supplementation within 1 year prior to the start of the study period, or receipt of a vitamin D supplement from outside the VA medical system. Outcomes will be analyzed between two study groups: those supplemented with vitamin D, and those not supplemented with vitamin D. The primary endpoint is a composite of heart failure exacerbations leading to hospitalization and/or mortality within two years following vitamin D supplementation compared to chronic heart failure patients not supplemented. Each component of the composite primary endpoint will also be evaluated and reported as secondary endpoints. Subgroup analysis comparing patients with heart failure with preserved ejection fraction to patients with heart failure with reduced ejection fraction will be completed for the primary endpoint. Subgroup analysis of the primary and secondary endpoints will also be completed in patients with a baseline 25(OH)D <20ng/mL, <30ng/mL, and ≥30ng/mL. Additionally, a subgroup analysis will be completed comparing supplementation with ergocalciferol only, cholecalciferol only, and a combination of the two for the primary endpoint. **Results/Conclusion:** Data collection and analysis are pending and will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List proposed mechanisms by which vitamin D deficiency may play a pathophysiological role in chronic heart failure.

Identify the cutoffs for vitamin D deficiency and insufficiency as defined by the Endocrine Society.

### Self Assessment Questions:

Which of the following has been linked to vitamin D deficiency?

- A: Inhibition of the renin-angiotensin-aldosterone system
- B: Increased release of inflammatory cytokines
- C: Increased cardiac output
- D: Increased renal perfusion

According to the 2011 Endocrine Society guidelines for the evaluation, treatment and prevention of vitamin D deficiency, vitamin D deficiency is defined as a 25(OH)D level less than:

- A: 30ng/mL
- B: 20ng/mL
- C: 12ng/mL
- D: 10ng/mL

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-444L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IDENTIFYING PATIENT-SPECIFIC RISK FACTORS FOR ACUTE KIDNEY INJURY DURING CONCURRENT PIPERACILLIN-TAZOBACTAM AND VANCOMYCIN THERAPY: THE KIPTAVAN STUDY

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**Purpose:** The increasing prevalence of multi-drug resistant organisms (MDRO) has made the use of early, appropriate broad-spectrum antibiotics of vital importance to improve mortality. A common regimen is vancomycin and piperacillin-tazobactam due to the broad combined spectrum of activity. However, recent literature has identified an increased incidence of acute kidney injury (AKI) when vancomycin and piperacillin-tazobactam are used concomitantly as compared to monotherapy. To date, no study has investigated whether the presence of certain patient-specific factors may predispose patients to AKI with this combination. This study aims to investigate and pinpoint patient-specific factors that increase the risk of AKI during concomitant therapy.

**Methods:** This retrospective, single-center, case-control study at a community hospital reviewed all admitted patients from November 2012-November 2015 that received concomitant vancomycin and piperacillin-tazobactam in order to examine the role of factors such as comorbidities, dosing of each antibiotic, and concurrent administration on occurrence of AKI. Data was collected from the hospital's electronic medical records system. Categorical data will be analyzed using chi-square or Fisher's exact test as appropriate. A multivariate regression analysis will be used to determine the presence of risk factors that increased the possibility of developing AKI. **Results and Conclusions:** Data collection and analysis ongoing and will be presented at the Great Lakes Pharmacy Resident Conference once complete.

### Learning Objectives:

Discuss current literature related to acute kidney injury with concomitant vancomycin and piperacillin-tazobactam therapy

Identify potential patient-specific risk factors that may put patients at an increased risk of developing acute kidney injury during concomitant piperacillin-tazobactam and vancomycin therapy

### Self Assessment Questions:

Based upon current literature, what is the incidence rate of AKI when vancomycin and piperacillin-tazobactam are used in combination?

- A: 1-10%
- B: 15-35%
- C: 40-50%
- D: >50%

Which of the following would not be expected to increase risk of AKI, regardless of medications?

- A: Admission to the ICU
- B: Administration of vasopressors
- C: Presence of systemic inflammatory response syndrome (SIRS) criteria
- D: Net positive Ins/Outs

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-445L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PATIENT SATISFACTION WITH CLINICAL VIDEO TELECONFERENCING VERSUS CONVENTIONAL CARE

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**Purpose:** Telemedicine provides healthcare via video conferencing, telephone, e-mail, and home monitoring devices. Increasingly, telemedicine is a tool to deliver healthcare because of its potential to diminish logistical challenges. Telemedicine is being implemented via various modalities; however, research on clinical video teleconferencing (CVT) is not extensive. The purpose of this study is to investigate patient satisfaction with CVT specifically clinical consultations between pharmacists and patients. **Methods:** Patient satisfaction and the quality of provider-patient communication will be assessed in patients receiving care via a pharmacist CVT and conventional care clinics at a VA Medical Center. A patient self-reported questionnaire will assess patient satisfaction on both modalities of care. The primary outcome will evaluate patient scores on assessment of the provider's use of patient-centered communication. Secondary outcomes will evaluate patient scores on assessment of the provider's clinical competence and skills, interpersonal skills, and convenience of the visit. Mean patient satisfaction in the survey will be scored on a typical five-level Likert scale. The Mann-Whitney U test will be used to estimate the differences in patient satisfaction between face-to-face and CVT visits. **Results:** At this time, a total of 6 surveys have been completed all in CVT. Preliminary review of these 6 surveys shows that these patients are satisfied with care via CVT as their survey responses are 4 and 5 on the Likert scales. **Conclusions:** Preliminary results indicate patients are satisfied with care through CVT. As we hypothesize that patient satisfaction will not differ for CVT compared to face-to-face care regarding clinical pharmacy consultations, we anticipate that the results of our study will lead to expansion in the roles of clinical pharmacists in CVT, advance the profession, and improve access and quality of care for patients.

### Learning Objectives:

Define telemedicine

Describe the role of pharmacists in providing care through telemedicine

### Self Assessment Questions:

Telemedicine is advocated as a mode of healthcare delivery because

- A: it can improve access to care and diminish inequalities in service
- B: it has been proven to increase patient satisfaction
- C: it allows providers to deliver care to a higher number of patients
- D: none of the above

According to the American Telemedicine Association, what percentage of hospitals currently use some form of telemedicine?

- A: 25%
- B: 35%
- C: 50%
- D: 80%

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-770L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF EMPIRIC DIRECT THROMBIN INHIBITOR THERAPY WITH OPTIMIZATION OF THE HEPARIN-INDUCED THROMBOCYTOPENIA LABORATORY TESTING PROTOCOL AND PHARMACIST INTERVENTION

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**Purpose:** When a patient has an intermediate or high clinical probability for heparin-induced thrombocytopenia (HIT), ELISA and SRA laboratory tests are used to confirm diagnosis. The ELISA immunoassay detects PF4 antibodies and has a high sensitivity but the specificity ranges, making it prone to false-positive results. If the ELISA is positive, an SRA confirmatory test should be performed. This is considered the gold standard for diagnosing HIT but is more expensive and technically demanding. At Norton Healthcare, the current laboratory process involves a HIT panel which includes an onsite ELISA performed three days per week and an offsite SRA for all. Per the current DTI initiation protocol, pharmacists are consulted only to ensure heparin products are discontinued. The proposed optimized laboratory process involves completing the onsite ELISA first and sending a reflex SRA only if the ELISA is positive. If the ELISA or SRA is negative, the pharmacist will contact the provider to recommend discontinuation of DTI therapy.

**Methods:** This is an IRB approved retrospective study of adult patients who received empiric DTI therapy at one of the four Norton Healthcare inpatient hospitals. All patients who received an IV DTI in a one-year period are being assessed to determine the potential impact on duration of therapy with the proposed laboratory optimization and pharmacist intervention. Patients with a previous HIT diagnosis, heparin allergy, or who received a DTI only in a procedural area are excluded. The primary endpoint is to compare the current duration of empiric DTI therapy to the potential duration with the proposed optimization plan. Secondary endpoints include evaluating the potential cost averted for empiric DTI therapy, assessing laboratory test utilization, evaluating the role of pharmacists, and heparin allergy documentation. **Results and Conclusions:** Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the sensitivity and specificity of the ELISA and serotonin release assay (SRA) laboratory tests for HIT

Indicate when it is appropriate to discontinue empiric direct thrombin inhibitor (DTI) therapy based on results of the ELISA and SRA HIT tests

### Self Assessment Questions:

Why is the SRA laboratory test is considered the gold standard for diagnosing HIT over the ELISA test?

- A: It is less expensive
- B: It is an easier test to perform
- C: It has higher sensitivity
- D: It has lower specificity

Based on the laboratory results, in which patient would you recommend discontinuing empiric DTI therapy?

- A: ELISA positive, OD 0.41, SRA negative
- B: ELISA positive, OD 2.10, SRA pending
- C: ELISA positive, OD 0.92, SRA positive
- D: No ELISA, SRA positive

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-446L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## AN EVALUATION OF ADJUNCTIVE TIGECYCLINE USE FOR CLOSTRIDIUM DIFFICILE

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**Purpose:** A 2014 medication use evaluation revealed a large portion of tigecycline use was directed at treating Clostridium difficile infection (CDI). Current clinical literature and national guidelines do not recommend routine use of tigecycline for the treatment of CDI. The purpose of this study is to compare adjunctive tigecycline treatment in patients with CDI to those who did not receive tigecycline to determine if there is a clinical benefit to using tigecycline in the treatment of CDI. **Methods:** A retrospective comparative cohort study of patients with CDI will be conducted within Community Health Network. Patients will be matched to one another based upon admission date (plus and/or minus 14 days) and age (plus and/or minus 5 years) in a minimum of 1:1 (case:control). Patients who received tigecycline will be in the case group while those who received standard CDI therapy without tigecycline will be in the control group. Patients admitted to Community Health Network inpatient facilities between January 1, 2014 and August 31, 2015 who received at least 48 hours of treatment for CDI will be included in the study. The primary objective of this study is to compare the time to resolution of diarrhea in confirmed CDI patients treated with tigecycline compared to patients not receiving tigecycline. Secondary objectives will compare recurrence at days 28 and 56, treatment failure, hospital length of stay (LOS), intensive care unit treatment and LOS, 28 day all-cause hospital mortality and treatment related adverse effects. Demographic variables along with CDI and comorbidity indices will be collected as well. Statistical analyses will be performed as appropriate for the measured objective. **Results/Conclusions:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recall the Infectious Disease Society of America (IDSA) treatment guidelines for Clostridium difficile infections.

Review the antimicrobial, pharmacodynamic and pharmacokinetic properties of tigecycline.

### Self Assessment Questions:

Per current guidelines, which is an appropriate, initial choice of antimicrobial therapy for the treatment of a severe, complicated Clostridium difficile infection?

- A: Metronidazole 500 mg po three times daily
- B: Metronidazole 500 mg po three times daily and Vancomycin 125 mg qd
- C: Metronidazole 500 mg IV three times daily and Vancomycin 500 mg qd
- D: Vancomycin 500 mg po four times daily and Tigecycline 100 mg IV qd

Which of the following statements is true about tigecycline?

- A: Broad spectrum antimicrobial with activity against anaerobic bacteria
- B: FDA approved for use against Clostridium difficile infections
- C: Prodrug requiring conversion by the gastrointestinal tract to active
- D: Product labeling does not contain any Boxed Warnings

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-447L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## INSIGHT THROUGH ANALYTICS: ENGAGING PRESCRIBERS TO USE CLINICAL DATA TO MINIMIZE MEDICATION UTILIZATION VARIATION

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**Purpose:** To identify opportunities, and engage physicians in medication utilization variation reduction, using reports developed by interdisciplinary workgroups. **Methods:** Interdisciplinary clinical and technical workgroups were led by a pharmacy resident and consisted of key stakeholders and data analysts within kidney transplant, anesthesiology, and bone marrow transplant. The aim of the clinical workgroups was to use an iterative process, to design and validate reports that consisted of process, outcomes, and financial data around medication use. The aim of the technical workgroups was to create and modify reports based upon input from the clinical workgroups. To evaluate the reports, the pharmacy resident created a fifteen question five-point Likert scale survey that assessed four domains: usability, utility, reliability, and overall satisfaction. After each iteration of a report, clinical workgroup members completed the survey until results averaged 80% or greater across all domains. Final reports were then presented to a broader audience of physicians, pharmacists, nurses, coordinators, and administrative leadership within each clinical service. Lastly, the pharmacy resident led changes to improve data availability and reliability in the reports and variation reduction. **Summary of preliminary results:** In kidney transplant opportunities for variation reduction in the management of immunosuppression management and induction regimen selection were identified. Additionally, a new role for the transplant pharmacists was developed to improve adherence to induction regimen protocol selection and documentation in the medical record to facilitate reporting. **Conclusions:** To be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Describe how clinical data analytics can be used to improve medication use

Define elements needed to lead successful medication variation reduction efforts

### Self Assessment Questions:

Which of the following definitions best describes clinical data analytics?

- A Collecting, organizing, and analyzing large sets of data from electronic sources
- B Manually collecting data through retrospective chart review
- C Manually collecting data through a randomized, placebo controlled trial
- D Manually collecting data through direct observation time studies

Why is reducing medication variation important?

- A Reduces drug spend and overall healthcare costs
- B Potential to improve patient care and outcomes
- C Reduces waste and improves efficiency
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-771L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE ROLE, CLINICAL IMPACT AND COST SAVINGS ASSOCIATED WITH AN EMERGENCY DEPARTMENT PHARMACIST

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**Purpose:** Emergency department pharmacists have the potential to prevent medication errors, optimize medication management, and minimize cost. The exact role of the emergency department pharmacist needs to be tailored to meet each institution's specific needs. The objective of this study is to analyze the implementation of an emergency department pharmacist at a community teaching hospital designated as a level I trauma center to determine the role, clinical impact and cost savings associated with it. **Methods:** An emergency department pharmacist was introduced at the end of September 2015. The hours staffed were 1500-2330 Monday through Friday. Prior to the implementation of emergency department pharmacy services a baseline survey was given to emergency department staff. The pharmacist tracked their daily activities through interventions recorded in the electronic medical record. These interventions were retrospectively reviewed and categorized into different types of activities. It was presumed that the pharmacist would participate in codes and traumas, answer drug information questions, provide pharmacokinetic and anticoagulation dosing services, optimize medication use and recommend appropriate drug therapy. Fifteen weeks of data will be analyzed. A follow-up survey was administered to emergency department staff after 3 months of pharmacy services being available. Interventions will be analyzed to determine clinical impact and cost savings associated with the emergency department pharmacist. Survey and interventions will be used to help shape the role of the pharmacist. **Results/Conclusions:** Data analysis is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacist Resident Conference.

### Learning Objectives:

Describe the role of emergency department pharmacists.

Identify the types of interventions made by an emergency department pharmacist.

### Self Assessment Questions:

Which of the following is true regarding the role of emergency department pharmacists?

- A A pharmacist must be available in the emergency department 24 hours
- B Filling automated dispensing cabinets is an essential role of emergency department pharmacists
- C The role of the pharmacist is exactly the same regardless of what institution they work for
- D Pharmacists may participate in codes and traumas and offer therapeutic suggestions

Which of the following is true regarding interventions an emergency department pharmacist can make?

- A All interventions made by the emergency department pharmacist will be documented in the patient's medical record
- B An emergency department pharmacist may recommend a dose adjustment
- C There are no potential benefits to emergency department pharmacist interventions
- D Both A and B.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-772L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ANTIBIOTIC PROPHYLAXIS PRESCRIBING HABITS OF DENTAL PROVIDERS AT EDWARD HINES, JR. VA HOSPITAL

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**Purpose:** The American Academy of Orthopedic Surgeons (AAOS) and American Heart Association (AHA) recently updated their guidelines for prophylactic antibiotics use prior to dental procedures. The recommendations from both of these guidelines significantly reduced the number of patients that would be indicated to receive antibiotics prior to a dental procedure. A reduction in the recommendations for antibiotic prophylaxis is not only being driven by the lack of evidence for efficacy, but also due to the risk of adverse drug reactions and increasing antibiotic resistance. Antibiotic resistance is one of the most serious health threats facing the world today, and approximately 50% of antibiotics prescribed in the outpatient setting might be unnecessary. The primary purpose of the project is to assess whether dental antimicrobial prescribing practices at the Edward Hines, Jr. VA Hospital are in accordance with the AAOS and AHA guidelines. A secondary objective will be to identify any adverse effects that may be associated with the antibiotics used in this setting. **Methods:** This project is a retrospective quality assurance review of antimicrobial use in patients at Edward Hines, Jr. VA Hospital who have undergone a dental procedure from January 1st, 2013 and January 1st, 2016. Patients receiving antibiotics for a separate infection around the time of the dental procedure will be excluded. Charts will be reviewed in the computerized patient record system, CPRS, during this time period. **Results and Conclusion:** Data is currently being collected, and results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify patients that are recommended to receive antibiotic prophylaxis prior to a dental procedure based on the AAOS and AHA guidelines  
Recognize adverse effects associated with the antibiotics commonly used for antibiotic prophylaxis prior to a dental procedure

### Self Assessment Questions:

Based on AAOS and AHA guidelines, which of the following patients would require antibiotic prophylaxis prior to a dental procedure?

- A: Patient with a history of previous infective endocarditis
- B: Patient with a prosthetic knee joint
- C: Patient with a prosthetic cardiac valve
- D: A & C

Antibiotics given for prophylaxis prior to a dental procedure put the patient at risk for which of the following?

- A: Clostridium difficile infection
- B: Red Man Syndrome
- C: Ototoxicity
- D: Permanent tooth discoloration

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-773L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RISK FACTORS ASSOCIATED WITH SUBTHERAPEUTIC ANTICOAGULATION WITH BIVALIRUDIN

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**Purpose:** Bivalirudin, a direct thrombin inhibitor, is one treatment option to mitigate the thromboembolic risk associated with heparin-induced thrombocytopenia (HIT). A sliding-scale dosing nomogram for bivalirudin was previously studied in a critically ill population and found to have acceptable outcomes. Implementation of this nomogram at our institution led to increased use of bivalirudin across a diverse patient population. To date, no published studies have identified patients at risk for subtherapeutic anticoagulation with bivalirudin. **Methods:** This is a retrospective, single center, case-control study. Patients are eligible for inclusion if all of the following criteria are met: age  $\geq$  18 years old and  $<$  89 years old, first exposure to bivalirudin therapy and receipt of bivalirudin for  $\geq$  24 hours continuously between November 2011 and September 2015. Exclusion criteria include existing coagulopathy affecting baseline partial thromboplastin time (PTT), support via extracorporeal membrane oxygenation, and change in goal PTT values within the first 24 hours of therapy. The electronic medical record will be accessed to retrieve all data. Compliance with the dosing and monitoring protocol will be assessed by evaluating initial dose, subsequent dose adjustments and frequency of PTT monitoring. The primary objective is to compare patients that achieve therapeutic anticoagulation - defined as two consecutive therapeutic PTTs - within 24 hours of initiation of bivalirudin therapy to those who remain subtherapeutic and identify risk factors associated with subtherapeutic anticoagulation. The secondary objective is to describe the average bivalirudin dose required and time to achieve anticoagulation goals in the group of patients who remained subtherapeutic after 24 hours of continuous bivalirudin therapy. Clinical outcome assessments include new thromboembolic and bleeding complications, as well as mortality. **Results/Conclusions:** Data collection and analysis are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the difference between bivalirudin and argatroban in terms of mechanism of action and pharmacokinetic properties.  
Identify risk factors associated with prolonged ( $>$ 24 hours) subtherapeutic anticoagulation with bivalirudin.

### Self Assessment Questions:

What is the mechanism of action of bivalirudin?

- A: Inhibition of factor Xa and thrombin through potentiation of antithrombin
- B: Selective inhibition of factor Xa and prothrombinase
- C: Inhibition of both free- and clot-bound thrombin
- D: Decreases synthesis of factors II, VII, IX, and X through inhibition

How is bivalirudin metabolized and eliminated?

- A: Proteolytic cleavage; renal elimination
- B: Glucuronidation; fecal elimination
- C: Oxidation via CYP 450 enzymes; biliary elimination
- D: Acetylation; salivary and lacrimal gland elimination

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-448L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PHARMACIST QUEST TO REDUCE THE RATE OF EMERGENCY DEPARTMENT VISITS IN PATIENTS TREATED WITH INTRAVENOUS CHEMOTHERAPY

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Cancer management comprises 5 to 12% of annual health care expenditures. Approximately 40% of oncology patients visit the emergency department (ED) at least once during treatment; subsequent hospitalization rates range from 21 to 58% nationally. Internal data from a previous retrospective study at Henry Ford Health System (HFHS) mirrored the ED presentation rate, while subsequent hospitalization was toward the upper limit at 55%. The purpose of this study is to determine the impact of a standardized pharmacist intervention on rate of ED presentation in oncology patients treated with intravenous (IV) chemotherapy. This is a quasi-experimental study in patients  $\geq$  18 years of age treated with IV chemotherapy at HFHS. Pre-treatment patients were included if they had received  $\geq$  1 cycle of chemotherapy from January to June 2014 and excluded for the following: concurrent oral chemotherapy; clinical trial enrollment; prior bone marrow transplant (BMT); non-oncologic chemotherapy indication. Post-treatment patients were intended to receive the standardized intervention if newly initiated on IV chemotherapy on or after November 30, 2015. Additional exclusion criteria were patient refusal to participate and planned BMT. The standardized pharmacist telephone outreach intervention to be performed within 14 days after the first chemotherapy infusion was comprised of the following: medication reconciliation; adverse effects education for patient-specific regimen and review of management strategies; assessment for adverse effects; reminder of upcoming appointments; addressing patient/caregiver questions and concerns; referral to other health care providers as appropriate; standardized encounter documentation. Participating pharmacists completed a training session prior to outreach. Monthly review of post-treatment patient charts will be conducted to determine ED visit and subsequent hospitalization rates for comparison with the pre-treatment group. A cost benefit analysis will be performed to determine potential health-system cost-savings if the intervention is successful. Preliminary results and conclusions will be reported at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the significant health care costs associated with the treatment of patients with cancer

Discuss national trends of emergency department visit and hospitalization rates for patients with cancer who are treated with intravenous chemotherapy

### Self Assessment Questions:

According to a report by the American Society of Clinical Oncology (ASCO), annual cancer care costs are expected to increase from \$104 billion in 2006 to more than what amount in 2020?

- A: \$157 billion
- B: \$162 billion
- C: \$173 billion
- D: \$186 billion

Approximately \_\_\_ percent of patients with cancer present to the emergency department at least once during treatment and of these, \_\_\_ to \_\_\_ percent are subsequently hospitalized.

- A: 20; 10 to 50
- B: 40; 10 to 50
- C: 20; 20 to 60
- D: 40; 20 to 60

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-449L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF A STANDARDIZED IMMUNIZATION ASSESSMENT TOOL ON COMPANION IMMUNIZATION RATES IN A GROCERY STORE PHARMACY SETTING

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Purpose: The CDC continues to report low immunization rates for non-influenza vaccine preventable illnesses. The primary purpose of this study is to determine whether using a standardized immunization assessment (SIA) tool can increase the number of companion immunizations administered to patients presenting for influenza immunizations in a grocery store pharmacy. For this study a companion immunization will be defined as a non-influenza immunization received within 14 days of an influenza immunization. The SIA tool is a 12 item self-administered questionnaire used to determine an individual's specific immunization needs based on medical and immunization history. Methods: A randomized, prospective, multisite, 1:1 parallel comparator-control site study will be conducted at two grocery store pharmacy locations in the Chicago suburbs from November 2015 to March 2016. One site will participate as the active study location and one site will serve as a comparator control. Inclusion criteria are patients 18 years of age and older who present for an influenza vaccination. The active study site will provide patients with the SIA tool for completion prior to administration of an influenza vaccination. Upon completion, pharmacists will review patient responses and recommend needed immunization(s). Any non-influenza, pharmacist-recommended immunization(s) given within 14 days of SIA tool completion will be documented. The control site will provide current standard of practice for immunization assessment. Number of companion immunizations will be determined by review of individual patient profiles for any non-influenza immunizations received within 14 days of influenza vaccination. A student's t-test will be used to compare number of companion immunizations provided at the active study site and comparator control site. Secondary objectives will be measured by tracking the number of immunizations accepted at each step of the protocol.

Results/conclusions: Data collection is currently in progress. Results will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the immunization rate for different age groups for each vaccine preventable illness discussed.

Define a companion vaccine as it relates to this study.

### Self Assessment Questions:

Per current CDC data, which of the following represents the correct matching of a vaccine preventable illness to its current corresponding immunization rate for individuals above 65 years old?

- A: Tetanus infection and 30% immunization rate
- B: Herpes zoster infection and 25% immunization rate
- C: Pneumococcal infection and 15% immunization rate
- D: Tetanus infection and 15% immunization rate

In this study, a companion vaccine is defined as any non-influenza vaccine given within how many days of an influenza vaccine?

- A: 7 days
- B: 10 days
- C: 14 days
- D: 30 days

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-774L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ADJUNCTIVE NALOXEGOL FOR THE TREATMENT OF SPINAL SURGERY POST-OPERATIVE INDUCED CONSTIPATION

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**Purpose:** Constipation is common after spinal fusion surgery and can be exacerbated by duration of surgery, amount of narcotics administered postoperatively, and intraoperative blood loss. Average length of stay (LOS) for a lumbar laminectomy involving on average 3 levels is 3.5 days and average hospital billing for the related hospital stay is \$14,766. The objective of this study is to evaluate the effectiveness of adding naloxegol (Movantik), a peripherally-acting -opioid receptor antagonist (PAMORA), to the post-operative protocol for patients receiving spinal surgery at Bronson Methodist Hospital (BMH) by assessing overall hospital LOS and time to first bowel movement post-surgery compared to patients that did not receive naloxegol. **Methods:** This study is a retrospective chart review of patients who received spinal surgery from January 2014 through December 2016 at BMH. Patients were included when they were between the ages of 18-84 years old; had a laminectomy, discectomy, and /or fusions; and received an opioid morphine equivalent daily dose of between 30 mg and 1000 mg per day prior to surgery. Patients were not included if they had pain associated with cancer, documented to be end-of-life, had pre-existing diarrhea or constipation, had evidence of gastrointestinal obstruction or increased their risk of bowel perforation, and if they were already taking a PAMORA at home. The primary efficacy outcome is mean time to first bowel movement after spinal surgery. Secondary efficacy outcomes include incidence of postoperative constipation, mean hospital LOS, and total hospital cost. Safety outcomes include prevalence of post-operative adverse effects including abdominal pain, diarrhea, nausea/vomiting, incidence of ileus, and discontinuation of naloxegol or other PAMORA.

**Results/Conclusions:** Data collection and analysis are currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List the different therapeutic classes that are used in opioid-induced constipation and give examples from each class.

Explain the mechanisms of constipation in spinal surgery patients and how peripherally-acting -opioid receptor antagonist can help improve hospital quality of stay and cost.

### Self Assessment Questions:

Which therapeutic classes are used when treating opioid-induced constipation?

- A Osmotic agents
- B: Stimulant agents
- C: Pamora
- D: All of the above

Which mechanisms can cause constipation after spinal surgery?

- A Hypovolemic shock
- B High post-surgery opioid demand
- C Decrease ambulation post-surgery
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-450L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A PHARMACY ENTERPRISE INVENTORY MANAGEMENT SOFTWARE SYSTEM IN A HEALTHCARE SYSTEM

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**Purpose:** To implement and measure the effects of a pharmacy enterprise inventory management software system. **Methods:** A project workgroup was established with key stakeholders from pharmacy, purchasing, informatics, and finance. The charge of the work group was to validate current operational workflows and develop future workflows around inventory management. Current workflows were reviewed and optimized to incorporate a new pharmacy enterprise inventory management software system. Inventory performance metrics were evaluated two months prior to implementation and monthly after implementation. Inventory metrics are being calculated using the software and include low unit of measure (LUM) savings, inventory visibility, inventory turns, inventory reduction, and monthly tracking of cumulative savings across the enterprise. These metrics populate a monthly performance dashboard to be monitored over time. **Summary of results:** The software system has been implemented across all major hospitals within our system. Total savings and cost avoidance of over \$429,000 has been reported with the use of the software system. All results are presented in a dashboard format at the Great Lakes Pharmacy Residency Conference. **Conclusions:** Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recall metrics that should be monitored for inventory performance.

Explain the importance of inventory visibility when implementing an inventory management software system.

### Self Assessment Questions:

Which of the following metric(s) should be monitored for inventory performance?

- A Inventory turns
- B: Medications returned to central pharmacy after being dispensed
- C: Days on hand
- D: Both A and C

Which of the following is the most important element(s) of implementing this software system?

- A Inventory visibility
- B Inventory turns
- C Low unit of measure savings
- D Both A and C

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-775L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT AND IMPLEMENTATION OF A PHARMACIST PRODUCTIVITY DASHBOARD

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**Purpose**The purpose of this project was to develop and implement a visual display tool to facilitate assessment of pharmacists productivity and performance for utilization by both management and front-line pharmacy staff. In addition, we aimed to identify productivity metrics which accurately reflect the output of pharmacy staff and to develop internal peer groups and benchmarks for comparing pharmacist productivity.  
**Methods**A workgroup consisting of pharmacy staff and managers was assembled to identify a comprehensive list of pharmacist performance metrics. An analysis of the feasibility of data collection surrounding each identified metric was conducted. Feedback was then solicited from the workgroup to establish target goals for each metric and to define suitable peer groups to facilitate internal benchmarking. Various methods for individual metric target development and maintenance were evaluated. Potential visual display methods for identified metrics were prepared and evaluated.  
**Results**Metrics identified for inclusion on the dashboard were order verifications, clinical interventions, publications/presentations, education to pharmacy and non-pharmacy learners, research activity, and organizational involvement. Utilizing historical data, targets were set for each of these metrics at the individual level as well as per shift assignment. In addition, peer groups were developed based on job type, patient population, and patient acuity to enable internal benchmarking. Dashboard implementation is proceeding in two phases, with phase one consisting of order verifications and clinical interventions. Phase two will include the implementation of all other identified metrics.  
**Conclusion**Utilizing data in conjunction with input from pharmacy staff, a pharmacist productivity dashboard can be developed to provide a visual display method for both front-line pharmacy staff and management. Pending data validation, such a dashboard could be utilized as a tool to enable a more objective and comprehensive pharmacist performance review.

### Learning Objectives:

State factors to consider when developing a pharmacist productivity dashboard

Identify potential uses for a data-driven pharmacist productivity dashboard

### Self Assessment Questions:

Which of the following was a successful method for dashboard development and ensuring staff buy-in?

- A: Considering workload drivers and excluding key stakeholders
- B: Ignoring workload drivers and excluding key stakeholders
- C: Considering workload drivers and including key stakeholders
- D: Ignoring workload drivers and including key stakeholders

Which of the following is a potential role for a data-driven pharmacist productivity dashboard?

- A: As a sole indicator of overall pharmacist performance
- B: As an objective supplement to subjective performance reviews
- C: Qualitative assessment of pharmacist performance
- D: To outsource pharmacy personnel resources

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-776L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PREDICTIVE FACTORS FOR EARLY READMISSION AFTER LIVER TRANSPLANT

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**Purpose:** The aim of this study is to evaluate predictive factors of early hospital readmission in liver transplant recipients. **Methods:** Investigators conducted a single center retrospective study of 134 liver transplant recipients and associated donors transplanted between January 2010 and July 2015 for factors associated with increased risk of 30 day hospital readmission. **Results:** A total of 62 (46.5%) of transplant recipients were readmitted within 30 days of discharge, with 22 (35%) readmitted within the first 7 days. Readmission rates did not differ between age, race, postoperative complications, or length of stay. Level of education and pre-transplant weight were associated with differences in 30-day readmission rates. Patients with a college degree had a readmission rate of 18% versus 51% of patients without a college degree ( $p=0.006$ ). Patients readmitted were also found to weigh less prior to transplant than patients not readmitted within 30 days, 74.4 versus 83.5 kilograms respectively ( $p=0.025$ ). Liver transplant recipients with diabetes, simultaneous liver-kidney transplant recipients, patients who developed pneumonia, and patients discharged to a rehabilitation facility following hospital admission were rehospitalized more often within 30 days; however, these were not found to be statistically significant factors. **Conclusion:** In our series, patients with a level of education less than a college degree or lower pre-transplant body weight had a statistically significantly higher 30-day readmission rate. There was a trend toward increased 30-day readmissions in patients who had diabetes, received a simultaneous liver kidney transplant, developed pneumonia post-operatively or were discharged to a rehabilitation facility, but these factors were not found to have statistical significance. However, these patient groups may benefit from future interventions such as adjusted medication teaching and counseling or increased monitoring prior to hospital discharge.

### Learning Objectives:

Review the CMS Hospital Readmission Reduction Program

Identify risk factors for 30-day hospital readmission after liver transplant

### Self Assessment Questions:

Which of the following disease states or procedures are currently included in the CMS Hospital Readmission Reduction Program?

- A: Myocardial Infarction and Heart Failure
- B: Venous Thromboembolism
- C: Solid Organ Transplant
- D: Hypertension

Which of the following patient characteristic was associated with a higher 30 day readmission rate post-liver transplantation in our study population?

- A: Chronic renal insufficiency
- B: Diabetes mellitus
- C: Discharge to a rehabilitation facility
- D: Level of education less than a college degree

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-451L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF TWO ANTI-EMETIC REGIMENS AND THEIR EFFECTIVENESS IN PATIENTS TREATED WITH HIGHLY AND MODERATELY EMETOGENIC CHEMOTHERAPY

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**Purpose:** Chemotherapy-induced nausea and vomiting is a significant side effect of chemotherapy. The incidence and severity of this side effect increases with moderately and highly emetogenic chemotherapy. While guidelines from the National Comprehensive Cancer Network provide recommendations to prevent chemotherapy-induced nausea and vomiting, issues with the cost of newer medications, such as palonosetron, limits the feasibility of following these guidelines. This study will assess and compare the efficacy and cost of an anti-emetic regimen that contains palonosetron versus an anti-emetic regimen that does not include palonosetron. **Methods:** In this multi-site quality improvement project, chemotherapy-naïve patients will be identified for participation if they are scheduled to receive high- or moderate-emetogenic risk chemotherapy. Patients will be divided into groups based on the type of anti-emetic regimens they receive: those containing palonosetron or those not containing palonosetron. Anti-emetic regimens will be chosen by the physician and not altered by the investigators. On the first day of chemotherapy treatment, patients will receive a packet containing a letter with instructions, the Multinational Association of Supportive Care in Cancer Antiemesis Tool, and the Functional Living Index - Emesis survey. These validated tools assess nausea and vomiting events in the acute and delayed time periods and the impact of nausea and vomiting on quality of life. These packets will be completed by patients and returned to investigators at the next office visit. Investigators will collect survey answers, as well as baseline demographics, chemotherapy regimens, antiemetic regimens, and cancer type. Data will be evaluated using descriptive statistics, the Fischer's Exact test, and t-tests. The primary outcome is the proportion of patients achieving a complete response during the acute- and delayed-response period after chemotherapy. **Results and Conclusions:** Data collection and analysis is ongoing. Final results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the types of chemotherapy-induced nausea and vomiting  
Select an appropriate anti-emetic regimen for patients receiving highly emetogenic chemotherapy

### Self Assessment Questions:

Which of the following describes delayed-onset chemotherapy induced nausea and vomiting?

- A: Nausea or vomiting occurring the day of chemotherapy
- B: Nausea or vomiting occurring in the 24 hours after chemotherapy
- C: Nausea or vomiting occurring within 5 days after chemotherapy
- D: Nausea or vomiting occurring within 7 days after chemotherapy

Your patient is scheduled to receive doxorubicin and cyclophosphamide a high emetogenic-risk chemotherapy regimen. Which of the following is an appropriate anti-emetic regimen for your patient to receive?

- A: Palonosetron, Fosaprepitant, Dexamethasone
- B: Fosaprepitant, Dexamethasone, Famotidine
- C: Palonosetron, Dexamethasone, Famotidine
- D: Palonosetron, Fosaprepitant, Famotidine

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-452L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT OF A TECHNICIAN TRAINING AND PROFESSIONAL ADVANCEMENT PROGRAM TO IMPROVE WORKFORCE COMPETENCY, ENGAGEMENT AND RETENTION.

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**Purpose:** In 2014, a validated employee engagement survey demonstrated that "overall" engagement scores for UW Health pharmacy technicians were 15% lower than all UW Health employees. Additionally, turnover for technicians range between 20 to 30% compared to 12.5% for the rest of the organization. The purpose of this project is to improve retention, engagement, satisfaction and competency of UW Health pharmacy technicians. **Methods:** A resident led steering committee, Pharmacy Technician Advancement Committee (PTAC), was established of technicians, technician supervisors, human resource (HR) representatives and pharmacy managers. The committee developed and distributed an electronic survey to all pharmacy technicians (N=143) that identified baseline engagement, satisfaction and solicited ideas for root causes of low engagement. A fishbone diagram was created utilizing the survey results. Using a "multivoting" method three areas of improvement were selected to be the focus of the project: onboarding/training, advancement/recognition and the creation of a technician resource center. Subsequently, three workgroups were formed to develop detailed project and implementation plans. In order to improve the training process, the onboarding/training workgroup developed, with HR and the director of pharmacy, a business case to garner senior leadership support for all new pharmacy technicians to train in UW Health's accredited technician training program immediately after hire.

Additionally, the advancement/recognition workgroup developed and proposed a sustainable advancement and recognition program while project leads worked to acquire senior leadership support. Concomitantly, a video was created to highlight the importance of pharmacy technicians in the care of patients. To ensure pharmacy technicians have access to updated training and workflow documents, the technician resource center workgroup will develop an online warehouse with methods to review them regularly. After implementation, PTAC will reissue the electronic survey and compare pharmacy technician engagement and satisfaction. Technician turnover will be calculated by HR quarterly and compared to the baseline rate.

### Learning Objectives:

Review three determinants of low pharmacy technician engagement at UW Health and associated quality improvement projects.  
Describe how to integrate an accredited technician training program into the onboarding process and serve as a pipeline for qualified pharmacy technicians.

### Self Assessment Questions:

Specifically at UW Health (but also across many other organizations), the department of pharmacy is struggling with

- A: High pharmacy technician turnover rates
- B: Low pharmacy technician engagement and satisfaction
- C: Over utilization of our accredited ASHP technician training program
- D: A & B

The benefits of utilizing an accredited ASHP pharmacy technician training program to on-board new staff include(s) which of the following:

- A: Provides consistent and standardized training for pharmacy technicians
- B: Guarantees pharmacy technicians will obtain PCTB certification
- C: Provides a pipeline of skilled and competent pharmacy technicians
- D: A & C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-777L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF MOTIVATIONS AND BARRIERS TO WOMEN SEEKING PHARMACY LEADERSHIP ROLES

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Purpose: The number of female pharmacists has steadily risen in the workforce over the past decade; however women filling leadership roles within the profession has not followed this trend. The purpose of this descriptive study is to identify female pharmacists leadership roles (past or present) and assess their perceptions of modifiable motivations and barriers that may impact decisions to seek a leadership role. Secondary objectives include assessing the differences in baseline demographics between female pharmacists who identify themselves as leaders and non-leaders. Methods: This study is comprised of a national survey of licensed and registered female pharmacists. An email invitation was sent through National Association Boards of Pharmacy (NABP) in January 2016 requesting participation in the survey and data were collected over one month. Questions include, but are not limited to the following topics: self-identification of formal leadership positions, motivations for serving in leadership roles, mentorship, and barriers for assuming leadership roles. Demographic data were also collected. All survey responses (Likert items as well as categorical variables) will be summarized using descriptive statistics (frequencies, percentages, medians, and modes) overall as well as by self-reported leadership status. For the secondary aim, differences between women leaders versus non-leaders will be primarily assessed based on descriptive statistics; a limited number of post-hoc comparisons using chi-square tests or Fishers exact test will be performed. Results: Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe and characterize roles women pharmacists have filled in both management and organizational leadership positions.

Identify main motivations and barriers for women pharmacists taking on or deferring certain leadership roles.

### Self Assessment Questions:

Which of the following was assessed as a barrier for women pharmacists in obtaining a leadership role?

- A: Influence of professional organizations
- B: Career choice
- C: Family priorities
- D: Age

The 2014 ACCP National Pharmacist Workforce Survey documented which of the following?

- A: An increase in women pharmacists seeking management position
- B: A decrease in women pharmacists seeking management positions
- C: A decrease in women pharmacists actively practicing pharmacy
- D: No change

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-778L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF TIME SPENT IN THE EMERGENCY DEPARTMENT ON OUTCOMES IN PATIENTS WITH SEVERE SEPSIS AND SEPTIC SHOCK

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Purpose: A majority of patients with severe sepsis and septic shock are first seen and diagnosed in the emergency department (ED), with a mortality rate of approximately 20%. Methods such as screening tools have proven to be advantageous in identifying ED patients who meet sepsis criteria and therefore allow for timely initiation of treatment. While scoring tools assist with early detection, the onset of symptoms can be delayed, leading to a delay in time to bundle and a higher level of care. ED overcrowding can also contribute to deferment of admission to an intensive care unit (ICU). Causes of ED congestion are numerous and wait time ranges significantly. ED patients are managed in various ways until admitted. The purpose of this study is to examine the impact that time from ED arrival to admission to an inpatient room has on mortality in patients with severe sepsis and septic shock. Methods: A retrospective chart review was conducted from January 2013 to December 2014. All patients at least 18 years old, admitted through the ED, and found to have severe sepsis or septic shock based on ICD-9 codes were included. Exclusion criteria included transfer from an outside hospital, admission to a non-medical ICU team, an injury resulting from a burn or trauma, requiring immediate surgery, electing comfort care, and a primary diagnosis of the following: acute stroke, acute coronary syndrome, or active gastrointestinal bleed. Over 130 patients were reviewed based on a significance level of 5% and a power of 80%. The primary outcome was 30 day mortality. Secondary outcomes include: discharge disposition, ventilator free days of 28 days, in hospital mortality, 90-day all-cause mortality, length of hospital and ICU stay, and weekend versus weekday admission. Results: Results are pending.

Conclusion: Conclusions are pending statistical analysis.

### Learning Objectives:

Discuss traditional sepsis management and its impact on mortality.

Identify the relationship between time spent in the ED and mortality rate: in patients with severe sepsis or septic shock.

### Self Assessment Questions:

Which of the following are ways in which sepsis care could be improved

- A: Implementation of a screening tool
- B: Increasing emergency department overcrowding
- C: Decreasing time to interventions
- D: A&c

Overcrowding of the emergency department has been attributed to

- A: Lack of a primary care physician
- B: Patients with insurance
- C: High throughput
- D: Large observation units

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-453L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **BENEFITS OF IMPLEMENTING A PHARMACY EDUCATION REFERRAL SERVICE**

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**Purpose:** Providing patient education is critical to improve patient outcomes and promote healthy behavior. Governing institutions like the Joint Commission require hospitals to provide patient education to reduce the likelihood of adverse events and to increase medication adherence. Special attention is given to high-risk medications like anticoagulants and disease states such as heart failure. The primary objective of this study is to determine the effect of pharmacy student-provided patient education on patients' understanding of their medications. The secondary objectives include patients' satisfaction with their medication counseling and heart failure readmission rates.

**Methods:** The Pharmacy Education Referral Service will be implemented in an observation short-stay unit in a teaching hospital that provides primary, tertiary, and specialty services to the underserved population. A referral for pharmacy education will be placed electronically for patients receiving medication for heart failure and anticoagulation treatment. The physician will indicate the disease state and medications that require counseling on the electronic referral. Pharmacy students will be responsible for administering a pre-pharmacy education survey, counseling the patient on their heart failure and anticoagulation regimens, and administering a post-pharmacy education survey. The surveys will be used to collect data on patients' understanding of their heart failure and anticoagulation medications, as well as their satisfaction with their medication counseling provided by pharmacy. For patients with heart failure, 30-day readmission rates will also be assessed. All data will be collected and maintained confidentially and in a secure location. **Results/Conclusion:** Data collection and analysis is in progress and will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Identify the barriers to implementing a successful pharmacy education referral service

Recognize the value of a pharmacy education referral service in improving medication-related HCAHPS scores

### **Self Assessment Questions:**

Which of the following is a barrier to implementing a pharmacy education referral service?

- A: Willingness of doctors to place referrals for pharmacy education
- B: Availability of pharmacy students year-round
- C: Time and resources required to train rotating pharmacy students
- D: All of the above

Which of the following is a benefit of a pharmacy education referral service?

- A: Enhancing patients' understanding of their medication
- B: Potential decrease in adverse effects due to misuse of medication
- C: Improving patients' satisfaction with their medication counseling
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-779L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **IMPACT OF ELECTRONIC POP-UP ALERTS ON ANTIBIOTIC THERAPY DURATION**

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**Purpose:** The Infectious Diseases Society of America (IDSA) and the Society of Healthcare Epidemiology of America (SHEA) published guidelines to help develop antimicrobial stewardship programs. One recommendation is to prospectively audit antimicrobial use which includes adherence to an appropriate duration of therapy. At St. Vincent Anderson Regional Hospital (SVARH), prescribers are notified by pharmacists when therapy reaches the appropriate duration. The primary objective of this study is to determine the impact of electronic pop-up alerts in making these interventions. The secondary objectives include the impact of process-of-care variables affecting the duration of antibiotics and prescriber perception of intervention methods. **Methods:** This study was submitted to the Institutional Review Board for approval. All patients receiving antibiotics for treatment of an active infection between June 2015 and December 2015 will be reviewed for inclusion in the study. Pharmacy progress notes will be reviewed to determine if a pharmacist made a recommendation to discontinue antibiotics based on the standard recommended duration of therapy listed in the SVARH guidelines. The following data will be collected: patient age, gender, ethnicity, diagnosis, length of stay, admission to the intensive care unit, vasopressor use, heart rate, respiration rate, white blood cell count, type of intervention made, and the total duration of antibiotic therapy. All data will be recorded and maintained confidentially. Patients will be stratified into two groups based on type of notification to the prescribers (either electronic pop-up alerts or pages and phone calls) about the recommended duration of antibiotics. The reviewer will evaluate whether the pharmacists' recommendations for antibiotic duration were accepted or if duration was extended. After completion of data collection, an anonymous on-line survey will be distributed to prescribers to determine which alert method is perceived as better for their workflow. **Results and Conclusions:** Will follow data collection and analysis.

### **Learning Objectives:**

Identify importance of recommending antibiotic stop dates.

Describe when it is appropriate to recommend a stop date for antibiotics

### **Self Assessment Questions:**

Which of the following is an inappropriate reason to recommend antibiotic stop dates?

- A: Increased risk of side effects
- B: Symptomatic improvement
- C: Based on guideline recommendations
- D: Increased Cost

When is it appropriate to contact a prescriber about a recommendation for an antibiotic stop date?

- A: When the antibiotic is started
- B: Only when using monotherapy
- C: When a patient's white blood cell count is normal
- D: A few days prior to the estimated stop date

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-454L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF CAFFEINE CITRATE DOSING IN THE NEONATAL INTENSIVE CARE UNIT (NICU) DURING A MEDICATION SHORTAGE

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**Purpose:** Apnea of prematurity is a common problem among premature neonates. Pharmacologic treatment options are limited, with caffeine citrate as the mainstay of therapy. Beginning in March 2015, caffeine citrate intravenous and enteral products went on national shortage due to manufacturing reasons. Prior to the critical medication shortage, the standard maintenance dosing of caffeine citrate in our unit was 10 mg/kg/day. The study's primary objective was to analyze the effects of a 5 mg/kg/day caffeine citrate initial maintenance dose restriction. **Methods:** This retrospective chart review analyzed patients admitted in the NICU during March 19 - April 19, 2014 (the control group) or March 19 - April 19, 2015 (the shortage group) and received at least one maintenance dose of caffeine citrate. The purpose of this study was to analyze whether the implementation of a caffeine citrate restriction in the NICU during a time of shortage affected the incidence of restarting caffeine citrate therapy greater than 24 hours after discontinuation during the patient's index admission, or the incidence of apnea-related readmissions within 30 days of discharge from the patient's index admission. Secondary objectives included comparing the corrected gestational age of patients at caffeine citrate discontinuation, incidence of dose escalations (not including weight-adjusted dose increases), incidence of patients discharged home on caffeine citrate, length of hospital stay, total number of doses ordered and administered, and pharmacy caffeine citrate expenditures. **Results:** A total of 107 patients were included in the study, 62 in the control group and 45 in the shortage group. Preliminary data analysis suggests that patients started on a lower maintenance dose required restarting caffeine therapy greater than 24 hours after discontinuation ( $p=0.04$ ). However, a significant difference in 30-day readmissions for apnea was not shown ( $p=0.38$ ). **Conclusions:** Final conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Identify the pharmacologic agents used in the treatment of apnea of prematurity and explain their mechanisms of action.  
Identify the potential adverse effects caused by caffeine citrate therapy.

### Self Assessment Questions:

Which of the following methylxanthines is most commonly used as treatment for apnea of prematurity?

- A Aminophylline
- B: Caffeine
- C: Dyphylline
- D: Theophylline

Which of the following adverse effects of caffeine therapy is commonly seen in premature infants?

- A Necrotizing enterocolitis
- B Cerebral hemorrhage
- C Hyperglycemia
- D Temporary reduction in weight gain

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-455L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## KIDNEY TRANSPLANT RECIPIENT ADHERENCE MEASURED BY PROPORTION OF DAYS COVERED IS ASSOCIATED WITH LATE BIOPSY PROVEN ACUTE REJECTION

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While medication non-adherence is a known risk factor for late "biopsy proven acute rejection (BPAR)," the Pharmacy Quality Alliance definition of "proportion of days covered (PDC)" had not been examined as a tool to identify patients at risk for late BPAR. This analysis combined transplant outcomes from the "UW (University of Wisconsin)" Transplant Database and pharmacy billing files from the UW Specialty Pharmacy Program. Patients included had a primary kidney transplant between 3/10/2006 and 6/30/2012 and 360 days of follow-up. Inclusion required at least 3 mycophenolic acid fills during the study period including one within 15 days before or after date of discharge and one within 100 days of the end of the study period to demonstrate persistence. Late BPAR is defined as BPAR occurring more than 90 days post-transplant. PDC is capped at 100% and calculated as percent of days medication was available during patient-specific 360-day period using time arrays adjusted prospectively for overlapping days supply and truncated at the end of the study period. Primary statistical analysis includes logistic regression. A total of 387 patients met inclusion and exclusion criteria. The incidence of late BPAR in the cohort is 4.9% (19/387). Mean PDC is 91.9%, standard deviation 0.14. The mean number of patients per year with a PDC <100% is 27 in this cohort. Higher PDC is associated with lesser odds of late BPAR (OR 0.03,  $p = 0.004$ ) while higher number of readmissions is associated with greater odds of late BPAR (OR 1.46,  $p = 0.032$ ) after adjusting for all covariates. PDC is significantly and strongly associated with late BPAR in this cohort. With this tool, pharmacists at UW Health can identify approximately 27 patients each year who may benefit from a more thorough review by a pharmacist or more frequent monitoring of donor specific antibodies.

### Learning Objectives:

Describe the calculation of proportion of days covered  
Recall limitations of the proportion of days covered calculation which require clinical interpretation

### Self Assessment Questions:

How is the proportion of days covered different than the medication possession ratio?

- A proportion of days covered ignores overlapping days supply
- B: proportion of days covered counts days covered prospectively
- C: medication possession ratio tends to underestimate adherence
- D: medication possession ratio takes into consideration dose change

What factor(s) may limit the specificity of proportion of days covered in the solid organ transplant population?

- A number of dose changes
- B abnormally high adherence
- C time spent hospitalized
- D Both A and C are correct

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-780L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **IMPACT OF PHARMACIST INVOLVEMENT IN ADMISSION MEDICATION RECONCILIATION IN A LONG-TERM ACUTE CARE HOSPITAL**

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**Purpose:** Medication reconciliation (MedRec) is the process by which medication orders are compared to all medications a patient was taking before admission. Studies show that pharmacists obtain more accurate medication-related information in a shorter or similar amount of time compared to nurses and physicians, leading to cost-savings and reduced hospital-mortality rates. This study will assess the benefit of pharmacist involvement in admission medication reconciliation in a long-term acute care hospital. **Methods:** This project was a single-center, prospective study. Patients admitted to Continuing Care Hospital (CCH) a 57 bed long-term acute care hospital, were included. A home medication history was obtained by a nurse and a comprehensive MedRec, including patient/caregiver interviews, detailed chart/transfer record reviews, and identifying and resolving discrepancies based on home and transfer medications, was performed by a pharmacist. The primary endpoint was incidence of medication reconciliation-associated discrepancies. Secondary endpoints included time spent performing medication reconciliation by a pharmacist, cost impact of pharmacist-identified discrepancies, and clinical relevance of discrepancies. Additional outcomes included incidence of discrepancies based on place of residence before admission and incidence of discrepancies between home and transfer medications. Data was obtained utilizing data collection sheets, transfer records, physical and electronic health records, and outpatient pharmacies. Collected data was primarily evaluated using descriptive statistics. **Results:** Preliminary results showed a total of 238 discrepancies in 31 patients, of which 6% were classified as "major." The most common discrepancy type was omission. The average time of MedRec per patient was 76 minutes and cost impact was \$953 per patient. Seventeen clinically relevant discrepancies requiring physician communication were identified. **Conclusions:** Pending finalized results, overall conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe the overall process of medication reconciliation  
List the most common types of medication errors found during the medication reconciliation process

### **Self Assessment Questions:**

- What is medication reconciliation?
- A: Process by which a patient's home medications are automatically
  - B: Narrative or record of past events and circumstances that are or nr
  - C: Process by which a patient's medication orders are compared to a
  - D: Process by which medication counseling is provided to patients ac

Which of the following is a type of medication error monitored during medication reconciliation?

- A: Admission
- B: Commission
- C: Remission
- D: Formation

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-922L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **MAINTENANCE OF GLYCEMIC CONTROL IN VETERANS DISCHARGED FROM PHARMACY MEDICATION MANAGEMENT CLINICS**

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**Purpose:** Previous studies have demonstrated significant improvements in glycemic control and diabetes care outcomes among patients with diabetes management through a clinical pharmacist. Patients are referred to the pharmacist medication management clinic (PMMC) for uncontrolled diabetes. Once glycemic control is achieved, patients are discharged back to primary care for future follow-up. It is important to determine whether patients maintain glycemic control after being discharged from pharmacist care. Current medication management policy, specifically clinic discharge criteria, should be evaluated to ensure Veterans are being provided the best care possible. **Methods:** A retrospective chart review was performed for this quality improvement analysis. The primary objective was to determine whether Veterans maintain glycemic control after being discharged from PMMC back to a primary care provider (PCP). Follow-up glycosylated hemoglobin (A1C) at least 6 months after discharge from PMMC to a PCP was selected and compared to the A1C at PMMC discharge to assess the number of patients that maintained patient specific A1C goals as the primary endpoint. Time to loss of control was assessed when applicable. Secondary endpoints include change in A1C upon enrollment in PMMC and at discharge (including overall change in A1C) and the number of patients re-consulted back to PMMC clinic during the studied time period. A manual subgroup analysis was reviewed for specific characteristics possessed by patients who did not maintain glycemic control after PMMC discharge. This included new or worsening disease states, newly prescribed medications, financial troubles, and other factors to be determined. Based on results, current clinic discharge criteria will be assessed for appropriateness to determine if there is a need for certain patients to remain in PMMC for diabetes management.

**Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Discuss the impact pharmacy medication management clinics can have in managing patients with diabetes.  
Identify potential factors inhibiting patients from maintaining glycemic control.

### **Self Assessment Questions:**

- Which of the following is an advantage seen in diabetes management by a pharmacist compared to that of a primary care provider?
- A: Greater improvements in A1C levels
  - B: Achieving set A1C goals later
  - C: Decreased medication adherence
  - D: Less patient interactions over the course of the year

Which of the following is a reason a patient may not maintain glycemic control?

- A: Using insulin instead of oral medications
- B: New diagnosis of mental illness
- C: Financial stability
- D: Motivation to prevent heart disease

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-456L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ESTABLISHING A STERILITY TESTING PROGRAM IN AN ACADEMIC MEDICAL CENTER

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The purpose of this project is to establish a sterility testing program in order to align, or extend when applicable, beyond-use dates of compounded sterile preparations with USP Chapter 797 and USP Chapter 71 standards. A workgroup composed of an operations manager, an IV room coordinator, two central pharmacists, and a pharmacy resident was established. Beyond-use dates of current compounded sterile preparations were evaluated to determine sterility testing opportunities, and eight products were selected for an initial cohort. Necessary equipment was obtained, including a membrane filtration pump, incubators, and consumable goods. An electronic library with testing instructions was created for the compounded sterile preparations undergoing sterility testing. Sterility testing was initiated, and batch schedules of these preliminary products were adjusted accordingly. A financial analysis is being completed to compare insourced, outsourced, and hybrid sterility testing programs. For this project, a hybrid program is defined as insourced testing with 10% of samples being validated through an outsourced vendor. To select an outsourced comparator and hybrid component, an initial vendor assessment was completed. All fixed and indirect costs that will be included in the financial analysis were identified. The workgroup will compare pre and post sterility testing program beyond-use dates, batch success rates, and be responsible for inventory management of tested products. Future education and training will be led by the IV room coordinator. After sterility testing techniques have been established and designated staff complete training, the workgroup will expand sterility testing to other products. Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the benefits of an insourced sterility testing program  
Identify fixed and indirect costs that can be included in a financial analysis of an insourced sterility testing program

### Self Assessment Questions:

Which of the following are sterility testing processes described in Chapter USP 71?

- A Membrane filtration and direct inoculation
- B: Direct detection and method plating
- C: Multiple filtration and direct sampling
- D: Automated inoculation and prior authorization

For the purposes of sterility testing, how long must samples be incubated?

- A 3 hours
- B 1 day
- C 7 days
- D 14 days

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-703L03-P

Activity Type: Knowledge-based Contact Hours: 0.5

## VALUE AND DESIGN OF PHARMACY RESIDENCY RESEARCH PROGRAMS

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Purpose: American Society of Health-System Pharmacists (ASHP) objectives around pharmacy residents major projects and research training focus on resident exposure to process and skills development. Individual residency programs, however, may also prioritize projects with high impact to the organization (e.g., through building pharmacy services) and/or the profession (e.g., through scholarship). Thus, values outside of residency standards may influence programs design of their research learning experiences. The purpose of this study is to characterize the extent to which different residency programs value project/research output of residents, and to explore how research programs are designed to achieve various organizational objectives. Methods: A survey directed to residency program directors at ASHP-accredited PGY1 pharmacy practice programs was created to gather data on respondent and program demographics, residency research program objectives and design characteristics, and perceptions related to project/research values. Values will be categorized within three domains: skills development, impact to the organization, and scholarship. Skills development measures were drawn from ASHP objectives. Organizational impact measures will include service/process development, enhancement, and/or validation. Scholarship measures will include resident publications, podium presentations, and national and/or regional poster presentations. The online survey was distributed via emails obtained from the ASHP online residency directory, during January and February 2016. Program characteristics will be described by summary statistics, and research program quality in the different value domains will be measured on a Likert scale. Comparisons among programs ranking high in the different value domains will be made using chi-square tests. This study was determined exempt by the Ohio State University Institutional Review Board. Results/Conclusions: Results and conclusions will be presented at the 2016 Great Lakes Residency Conference.

### Learning Objectives:

List published barriers of resident research  
Describe how different values of resident research may be achieved through residency research program design

### Self Assessment Questions:

Which of the following is cited as a barrier of resident scholarly activity?

- A Multidisciplinary teams
- B: Lack of time
- C: Mentorship
- D: Knowledge of the process

According to ASHP residency accreditation standards, which of the following is a required PGY1 objective for resident major and/or research projects?

- A Effectively develop and present, orally and in writing, a final project
- B Design, execute, and report results of investigations of pharmacy-related issues
- C Participate in prospective clinical, humanistic, and economic outcomes research
- D Present a final project on a national or regional stage

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-781L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT OF STANDARDIZED WORKLOAD METRICS TO DEFINE AND MEASURE RESOURCE NEEDS AND PERFORMANCE AT A SPECIALTY PHARMACY

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The purpose of this project is to identify workload metrics at the UW Health Specialty Pharmacy and develop a system to measure specialty pharmacy performance metrics for quality improvement. All activities from prescription intake through product shipping were observed and documented via process mapping. Upon completion of process mapping, methods for data collection were developed. When possible, data were collected electronically through prescription filling, telephone, and shipping software platforms. These data were then validated by the project investigator through direct observation. Metrics collected in this fashion included prescription volume, time to order verification, and average patient hold time. Data that could not be captured by electronic means were collected manually and included time requirements for pharmacist profile review, medication reconciliation, patient consultation documentation within the electronic medical record (EMR), medication-related interventions such as dose changes or side effect management, and mail-order prescription packaging. To collect this information, a self-documentation form was developed with input from specialty pharmacy employees. Data collected on the self-documentation form was also validated by the project investigator. Data collection allowed for patient stratification based on whether a prescription was specialty or non-specialty and whether a prescription was new or refill. Data was also collected in a fashion to delineate human immunodeficiency virus (HIV), multiple sclerosis, hepatitis C, transplant, and tumor necrosis factor (TNF) inhibitors. Once time standards are developed for each activity within the specialty pharmacy workflow, data will be analyzed to identify differences between estimated workload and actual pharmacy resources. If variances are identified, a plan will be developed and implemented to improve efficiency and better match resources to areas of need. Additionally, the results will be used to accurately predict and allocate pharmacy resources when expanding specialty pharmacy services.

### Learning Objectives:

Describe differences between specialty and non-specialty prescription dispensing processes

Explain general processes of developing and measuring pharmacy workload metrics

### Self Assessment Questions:

Which of the following is most unique to the specialty pharmacy prescription dispensing process?

- A: Verifying appropriate medication use
- B: Extensive profile review, patient education, and documentation prior to dispensing
- C: Identifying potential drug-drug interactions
- D: Consulting on potential medication-related side effects

Which of the following is the initial step in developing and measuring pharmacy workload metrics?

- A: Time standards data collection
- B: Validating time standards, both manual and electronic
- C: Developing time standards collection forms
- D: Drafting an accurate process map

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-782L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF A PHARMACIST RUN MEDICATION THERAPY MANAGEMENT (MTM) SERVICE ON REIMBURSEMENT AND CLINICAL OUTCOMES OF PATIENTS WITHIN A FAMILY MEDICAL PRACTICE

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Purpose: In 2004, a consensus of 11 national pharmacy organizations created a definition of medication therapy management (MTM) including a list of related activities. Since that time, MTM implementation into pharmacy practice has been occurring more frequently and successfully transforming practice settings and revolutionizing patient care. The goal of these clinics is to provide patient-centered care with a focus on identifying, preventing, and solving drug-related problems in route to optimizing therapeutic outcomes for each patient. Numerous laws have recently been passed allowing pharmacists to bill a wide variety of insurances for these services. The purpose of this study is to evaluate the utility of a pharmacist run MTM clinic by evaluating number of visits, total reimbursement, and the interventions made during visits.

Methods: Patients of the Family Medicine Center were referred by attending and resident physicians based on necessity of medication therapy management and clinical judgment. Three 60-minute appointment slots per week were made available for pharmacist conducted initial MTM visits. After the initial visit, subsequent visits or phone calls were made to the patient for follow-up on interventions as needed. Interventions to address the problems regarding the medication's indication, effectiveness, and safety as well as the patient's compliance and understanding were tracked. Preliminary Results: As of January 1st 2016, a total of 9 patients have completed initial MTM visits with the primary study investigator as well as varying numbers of follow-up visits and phone calls with an average of 7.1 interventions made per person. The total number of visits, interventions made, and reimbursement will be documented and presented at the conference.

Conclusion: Final results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Identify the purpose of medication therapy management clinics and the pharmacist role in providing patient-centered care

Describe how pharmacists are able to bill for medication therapy management services

### Self Assessment Questions:

What is the purpose of patient-centered medication therapy management (MTM)?

- A: Assisting in the accurate diagnosis and treatment of chronic disease
- B: Educating physicians and residents about pharmacotherapy
- C: Identifying, preventing, and solving drug-related problems
- D: Verifying accuracy of medications to be dispensed to patients

What billing codes can pharmacists use to bill for their medication therapy management services?

- A: "Incident to" CPT code: 99211
- B: "MTM" G codes: G0108 - G0109
- C: "MTM" CPT codes: 99605 - 99607
- D: Both A and C

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-457L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF HEART FAILURE MANAGEMENT IN PRIMARY CARE CLINICS AT A VA MEDICAL CENTER; PART 1

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**Purpose:** To analyze current treatment of congestive heart failure (CHF) patients managed by primary care providers within a VA facility. The data collected will give insight into potential gaps in care to guide development of a pharmacist-driven CHF management scope of practice to be piloted in the primary care setting. **Methods:** The initial phase of this study will retrospectively analyze patients with a qualifying ICD-9 CHF diagnosis managed by primary care teams within a VA facility from July 1, 2014 - June 30, 2015. Baseline characteristics via the Computerized Patient Record System (CPRS) will be collected including: patient demographics, NYHA Functional Class, CHF diagnostic results, signs and symptoms of heart failure, social history, and presence and control of comorbidities. Data will also be collected on medications used in the treatment of heart failure and if target dose were achieved, adherence to therapy, and use of medicines known to exacerbate heart failure. Adherence to drug treatment will be measured by Medication Possession Ratio (MPR) and patient use of medication boxes. Patient outcomes will also be collected including incidence of emergency department visits, urgent care visits, or hospital admission encounters related to CHF complications in addition to all-cause and CV related mortality. Nominal data will be analyzed for trends regarding medication optimization and patient outcomes. The information gathered will be used to create a scope of practice for CHF management in primary care by clinical pharmacy specialists.

**Preliminary Results:** Pharmacists may play a crucial role in the management of CHF within the primary care setting. Preliminary results indicate that patients were frequently below target doses of CHF medications without being titrated to goal, and often received incorrect or inappropriate medications based on their disease progression and comorbidities. **Conclusions:** Conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List target dosing for medications used for heart failure management. Identify study endpoints that pharmacists intervention may be able to reduce.

### Self Assessment Questions:

What was the most common outcome documented?

- A: Death from cardiovascular cause
- B: CHF related hospitalization
- C: Urgent Care Visit
- D: Emergency Department Visit

Which of the following medications is at target dose for CHF management?

- A: Carvedilol 12.5mg PO BID
- B: Losartan 100mg PO Daily
- C: Metoprolol succinate 200mg PO Daily
- D: Enalapril 5mg PO BID

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-458L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ASSESSMENT OF A NEW SEDATION PROTOCOL IN MECHANICALLY VENTILATED MEDICAL ICU PATIENTS

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**Purpose:** Benzodiazepines are commonly used in the ICU setting for the care of mechanically ventilated patients. Within this population this class of drugs are often used as a continuous infusion. Data has shown that benzodiazepines used as continuous infusions can prolong hospital stay, increase duration of mechanical ventilation and are associated with a higher risk of death. Although these agents are associated with certain risks there are strategies that can be utilized to minimize their use. One such strategy is the focus of this study; the newly implemented protocol being assessed is designed to reduce the overall use of benzodiazepines for sedation within the medical ICU (MICU) population. The purpose of this study is to assess the implementation of a new sedation protocol in MICU patients and the impact it has on time spent at target Richmond Agitation Sedation Scale (RASS) score. **Methods:** This is a retrospective, before and after study looking at mechanically ventilated MICU patients. Data will be collected on approximately 50 patients prior to protocol implementation and 50 patients post-implementation. The patient population will consist of MICU patients, age 18-80, who are mechanically ventilated >48 hours. Patients will be excluded if they do not meet age requirements, ventilation duration requirements, <48 hour ICU stay, have active substance abuse, paralytic use or are admitted with acute neurologic injuries or cardiac arrest. The primary endpoint will be time at target RASS score. Secondary endpoints include duration of mechanical ventilation, total dose of sedatives given, average daily dose of sedatives, incidence/duration of delirium/coma, length of ICU stay, ICU re-admissions, need for neuro-imaging and death. Continuous data will be analyzed using a Students t-test, nominal data will be analyzed using a chi-square test. **Results/conclusion:** Results and conclusion to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the rationale for sparing continuous infusion benzodiazepine regimens for sedation in the ICU

Outline alternative regimens for sedation in the ICU aimed at reducing time on the mechanical ventilation

### Self Assessment Questions:

In what ways can pharmacists impact sedative management in the ICU setting?

- A: Protocol development
- B: Drug selection
- C: Monitoring of sedation level
- D: All of the above

What risks are associated with continuous infusion sedative use?

- A: Increased time on mechanical ventilation
- B: Shortened ICU stay
- C: Higher RASS scores
- D: None of the above

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-459L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF POST INTUBATION ANALGESIA AND SEDATION IN THE EMERGENCY DEPARTMENT

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**Purpose:** Current Society of Critical Care Medicine guidelines for the management of pain, agitation and delirium in adult patients in the intensive care unit recommend providing analgesia coverage prior to sedation and slowly titrating to achieve light levels of sedation (defined as a Richmond Agitation-Sedation Scale (RASS) of 0 to -1). A post intubation analgesia and sedation protocol was implemented based on current practice guidelines for use in the emergency department (ED). The objective of our study is to compare the utilization of analgesia and sedation prior to and post protocol implementation. **Methods:** Approval by the Institutional Review Board was obtained prior to study implementation. A retrospective chart analysis was conducted on patients who were intubated in the ED from March 1st, 2015 to October 31st, 2015 to determine current prescribing practices for post intubation analgesia and sedation. After retrospective analysis, a physician favorite order set was created with an emphasis on providing adequate analgesia prior to sedation and titrating to achieve light levels of sedation (defined as RASS score of 0 to -1). A prospective analysis will be conducted on patients seen from November 1st, 2015 to March 31st, 2016 to determine the utilization of the favorite order set by ED physicians. The primary outcome being evaluated is the percentage of patients who achieved a RASS score of 0 to -1 pre- versus post-intervention groups. Secondary outcomes being evaluated are mean analgesia and sedation doses per kg, use of antipsychotic agents/restraints, documentation rate of RASS scores, and ICU and overall hospital length of stay. **Results:** Retrospective analysis has shown that most patients receiving post-intubation analgesia and sedation did not have an analgesia agent prescribed and achieved much lower RASS scores (-3 to -4) than desired. Results of the prospective analysis will be presented at Great Lakes Pharmacy Conference.

### Learning Objectives:

Identify appropriate agents for use in post intubation analgesia and sedation

Recognize the benefits of targeting light levels of sedation for mechanically ventilated patients

### Self Assessment Questions:

Which of the following are appropriate agents for use in post intubation analgesia?

- A Propofol
- B: Midazolam
- C: Dexmedetomidine
- D: Fentanyl

Which of the following are complications associated with targeting high levels of sedation?

- A Shorter duration of mechanical ventilation
- B Increased risk of prolonged ventilation, hemodynamic instability
- C Increased need for analgesia agents
- D Shorter time to extubation

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-460L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF ATROPINE EFFICACY FOR SYMPTOMATIC BRADYCARDIA IN THE EMERGENCY DEPARTMENT

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**Purpose:** Atropine is considered first line treatment for symptomatic bradycardia. In clinical practice, the efficacy of atropine has been unreliable and many patients require additional therapy including transcutaneous pacing, dopamine or epinephrine infusions, and pacemaker placement to correct their bradycardia. Use of atropine is also associated with ventricular fibrillation and other cardiac arrhythmias. The purpose of this study is to report the rate of response to atropine when used for symptomatic bradycardia in the emergency department and identify factors that could help predict response to treatment. The safety of atropine will also be reported. **Methods:** This study was approved by the Institutional Review Board. The electronic medical record system was used to identify patients from the emergency department who had a diagnosis of symptomatic bradycardia and received atropine. The following data was collected: patient age, gender, race, blood pressure, heart rate, initial EKG rhythm, total dose of atropine received, dose of each atropine injection, mortality, secondary measures for symptomatic bradycardia treatment, baseline electrolytes, presenting symptoms, home medications, comorbidities, underlying etiology of bradycardia, and heart rhythm after atropine administration. All data was recorded without patient identifiers to maintain confidentiality. Based on blood pressure, heart rate response, and heart rhythm after atropine administration, patients were placed into one of four categories: complete response, partial response, no response, or new cardiac arrhythmia. The rate of response was determined by the number of patients who had either a full or partial response to atropine. Data collected was used to determine predictors for atropine response. The safety of atropine was determined by the number of patients who had a new cardiac arrhythmia after atropine administration. A statistician aided in the evaluation of data. **Summary of Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Residency Conference

### Learning Objectives:

Describe the American Heart Association's Advanced Cardiovascular Life Support guidelines for the management of symptomatic bradycardia  
Identify limitations with the use of atropine for symptomatic bradycardia

### Self Assessment Questions:

What is the proper dosing of atropine for symptomatic bradycardia?

- A 0.5mg Q 1-3 minutes
- B: 0.5 mg Q 3-5 minutes
- C: 1mg Q 1-3 minutes
- D: 1mg Q 3-5 minutes

In which of the following patients would atropine be the best treatment option?

- A A patient with a HR of 57 and an EKG that shows 3rd degree AV block
- B A patient with a HR of 38 and a history of heart transplantation with a pacemaker
- C An asymptomatic patient with a heart rate of 62 and blood pressure of 100/60
- D A patient complaining of chest pain with a HR of 54 and blood pressure of 100/60

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-461L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **MSSA BACTEREMIA: IMPACT OF BETA-LACTAM ALLERGY STATUS ON RECEIPT OF OPTIMAL THERAPY**

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Methicillin-susceptible *Staphylococcus aureus* bloodstream infections (MSSA BSI) are associated with significant disease burden. It is well established that patients who receive a beta-lactam antibiotic have improved mortality rates and shorter durations of MSSA BSI than patients who receive vancomycin. Penicillin allergies are widely reported, while up to 90% of patients who self-report a penicillin allergy can safely receive a beta-lactam. It is unknown whether a label of beta-lactam allergic significantly impacts the management of MSSA BSI. Our hypothesis is that a documented beta-lactam allergy will significantly reduce receipt of optimal therapy as well as delay time to optimal antibiotic and negatively impact patient outcomes. This was an IRB approved retrospective matched cohort study in a health system with four acute care hospitals. Antibiotics given for MSSA BSI in patients with a documented beta-lactam allergy were compared to patients without a documented beta-lactam allergy. Patients were matched on time of index infection and if the majority of care was in an ICU or GPU setting. Patients 18 years of age or older who had MSSA BSI index infections between January 2014 and January 2016 were included; patients who were hospice at time of diagnosis or had a polymicrobial BSI were excluded. Primary outcome of interest was receipt of, and time to, optimal antibiotics. Secondary outcomes were clinical cure, recurrence, and mortality, as well as length of stay. A sample size of 176 patients matched 3:1 will allow detection of a 15% difference in receipt of optimal antibiotics. Predictors of optimal therapy will be analyzed using stepwise bivariate and multivariate techniques. Results and conclusions will be presented at the Great Lakes Conference.

### **Learning Objectives:**

Discuss optimal antibiotic therapy for MSSA BSI in patients with and without a documented beta-lactam allergy.

Identify characteristics associated with suboptimal MSSA BSI therapy.

### **Self Assessment Questions:**

MV is a 63 YOM from Long Island with a history of IVDU. A chart review reveals that he has a beta-lactam allergy, listed as "nausea". You are consulted to dose vancomycin for MSSA BSI. Which of the fo

- A: Verify the vancomycin and recommend two weeks of therapy.
- B: Recommend starting nafcillin regardless of the allergy documental
- C: Clarify the nature of the penicillin allergy, then reassess if nafcillin
- D: Recommend daptomycin 8mg/kg daily for two weeks.

Which of the following is not associated with improved quality of MSSA BSI therapy?

- A: ID consultation.
- B: Beta-lactam allergy in patient chart.
- C: Tee.
- D: Rapid diagnostics with audit and feedback.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-462L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **HIGH DOSE VITAMIN D3 FOR THE TREATMENT OF VITAMIN D DEFICIENCY IN ADULTS WITH CYSTIC FIBROSIS**

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Purpose: Patients with cystic fibrosis (CF) have multiple associated complications, including the inability to properly absorb fat and fat-soluble vitamins A, D, E, and K due to pancreatic insufficiency. Current standard of practice for vitamin D deficiency in CF patients includes daily supplementation, with a goal serum 25-hydroxyvitamin D (25-OHD) level of at least 30 ng/mL. This recommendation is based off of consensus guidelines. Even with daily doses of up to 10,000 units, patients may not reach their 25-OHD goals. This study will examine the effectiveness of using single doses of 300,000 or 500,000 IUs of cholecalciferol in adult patients with CF. Methods: This study will be an open label, prospective study, with patients serving as their own controls. Patients that are  $\geq 18$  years old, have been diagnosed with CF, are established patients of the IU Health Adult CF Clinic, and have baseline serum 25-OHD levels  $< 30$  ng/mL will be eligible for inclusion in this study. Patients who are pregnant or who have undergone lung transplantation will be excluded. Patients enrolled in this study would be given single, large doses of vitamin D3 for 1-2 doses, 6 months apart over the course of 12 months. At the 3 month visit, a serum ionized calcium level will be obtained for safety monitoring. Patients will not be prescribed additional daily supplementation, but they will be instructed to continue taking their CF multivitamin which contains vitamin D. Levels that rise to or above the goal level of  $\geq 30$  ng/mL will be defined as clinical success at each time point. Primary endpoints are change in post-dose serum 25-OHD levels. Secondary endpoints include attainment of goal 25-OHD as a whole and stratified by dose received. Demographic data and results of pulmonary function tests will also be collected. Results/Conclusions: Data collection is currently ongoing.

### **Learning Objectives:**

Define the goal serum 25-OHD concentration for patients with cystic fibrosis.

Describe the challenges of attaining goal 25-OHD concentrations in patients with cystic fibrosis.

### **Self Assessment Questions:**

The minimum goal 25-OHD concentration, as defined by the CF Foundation, is:

- A: 20 ng/mL
- B: 25 ng/mL
- C: 30 ng/mL
- D: 35 ng/mL

Which of the following is a barrier to achieving goal serum 25-OH concentrations in CF patients?

- A: Poor compliance
- B: Inability to absorb fat-soluble vitamins
- C: Less sun exposure in winter months
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-463L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING MEDICATION USAGE AND STANDARDIZATION OF CATARACT SURGERY MEDICATION AND PREPARATION PROCEDURES

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Purpose: Aurora Health Care makes up a large system. With multiple hospitals, ambulatory surgery centers, and clinic sites, this allows for considerable variation in product use and preparation across the system. Looking at cataract surgeries alone, there is an opportunity for product standardization, reduced product variation, and cost savings opportunities. Currently, Aurora Health Care is operating a central IV preparation center that prepares many products for the system (ex, avastin syringes). An initial assessment of one provider estimates a minimum of \$80,000 per year cost savings for central preparation of a single antimicrobial used in cataract surgeries. This project examines the feasibility of standardizing preparation and products used in cataract surgical procedures by first assessment of a single site: Aurora St. Lukes Medical Center Surgery Center. Methods: Cataract surgeries were shadowed at various sites to gain insight into the medication system workflow throughout several phases of care and to identify variations in medication use and preparation to determine areas for standardization. A drug class review was performed on several of the key classes used throughout the phases of care and recommendations were developed based on best medication option per class. Taking into account the drug class reviews, physiological properties of the drugs, and current practice, recommendations were developed regarding central IV preparation of specific medications. The time and cost of each case and process of medication administration was compared to the recommendations. These recommendations will be discussed with the nurses and ophthalmology for potential implementation. Based on which drugs would best suit the objectives of this project, including stakeholder buy-in, it is anticipated that a trial run will be performed to analyze the effectiveness of this approach. Preliminary Results/Conclusions: Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Outline 2 characteristics to take into consideration when determining feasibility of central IV preparation of a medication.  
Describe 2 barriers to product standardization.

### Self Assessment Questions:

When determining feasibility of central IV preparation of a medication, the following are factor(s) to consider:

- A: cost
- B: sterility
- C: stability
- D: all of the above

A barrier to medication standardization may include:

- A: Multiple providers with lack of unified group
- B: Considerable variation
- C: Lack of guideline support
- D: all of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-783L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## INCIDENCE OF VENOUS THROMBOEMBOLISM IN HOSPITALIZED MEDICALLY ILL PATIENTS RECEIVING FIXED-DOSE UNFRACTIONATED HEPARIN PROPHYLAXIS IN MULTIPLE WEIGHT COHORTS

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Purpose: The American College of Chest Physicians (ACCP) guidelines provide useful direction on thromboprophylaxis in medically ill patients. What remains to be elucidated in the literature is VTE incidence in patients of varying body mass indices (BMIs). Since fixed-dose unfractionated heparin (5000 units subcutaneously every 8 hours) is the standard of care for pharmacologic VTE prophylaxis at Sinai-Grace Hospital (SGH) of the Detroit Medical Center (DMC) regardless of body weight, the purpose of this study is to evaluate the incidence of VTE and bleeding as a function of BMI. Methods: This single-center, retrospective, observational study was approved by the Institutional Review Board of Wayne State University/DMC. Adult patients admitted to non-intensive care medical wards on prophylactic doses of heparin initiated within 24 hours of admission for greater than or equal to 72 hours at SGH were evaluated. The primary objective is to determine VTE incidence in patients receiving fixed-dose heparin prophylaxis in two weight cohorts: less than 30 kg/m<sup>2</sup> and greater than or equal to 30 kg/m<sup>2</sup>. Secondary objectives include determining the incidence of VTE, deep vein thrombosis (DVT), pulmonary embolism (PE), and major hemorrhage in three BMI cohorts: less than 18.50 kg/m<sup>2</sup>, between 18.50 and 29.99 kg/m<sup>2</sup>, and greater than or equal to 30.00 kg/m<sup>2</sup>. A total of 314 patients were included to detect a 10 percent absolute increase in VTE between the two groups providing a power of 80 percent and two-sided type I error rate of 0.05. The following additional data was collected: age, sex, weight, complete blood count, principle diagnosis, VTE risk factors per hospital policy, active cancer, active smoking status, presence of peripherally inserted central catheter or midline, time to VTE event, and presence of bleeding. Results/Conclusions: Data collection and analysis are currently ongoing. Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the epidemiology and risk factors for venous thromboembolism (VTE)

Outline current guideline recommendations for pharmacologic VTE prophylaxis in hospitalized medical patients at increased risk of thrombosis

### Self Assessment Questions:

Which of the following is false regarding venous thromboembolism (VTE) in medical patients?

- A: Hospitalization with an acute medical illness has been associated
- B: Of all symptomatic events, one-third of patients manifest DVT and
- C: The annual incidence of first-time VTE is estimated to be 100 pers
- D: Increasing age, obesity, and smoking are risk factors

Which of the following is not an appropriate pharmacologic option for VTE prophylaxis according to the American College of Chest Physicians (ACCP) guidelines?

- A: Low-dose unfractionated heparin twice daily
- B: Low-dose unfractionated heparin three times daily
- C: Rivaroxaban
- D: Fondaparinux

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-464L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATING THE IMPACT OF IMPLEMENTING A PENICILLIN SKIN TESTING PROTOCOL TO OPTIMIZE ANTIMICROBIAL THERAPY SELECTION

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**Background:** Approximately 10-20% of patients admitted to the hospital have a self-reported history of an allergy to beta-lactam antibiotics. Of these individuals, 90% are designated with a penicillin allergy unnecessarily and can generally tolerate beta-lactam antibiotics.

**Objective and Purpose:** The primary objective of this study is to determine the impact of penicillin skin testing on expanding the utilization of beta-lactam antibiotics in patients without a true penicillin allergy. Secondary objectives include determining the percentage of false allergies recorded in medical charts, decreasing desensitization rates, and reducing multidrug resistant pathogens. **Methods:** This study is a retrospective case-control study designed to determine the impact of implementing a penicillin skin testing protocol to optimize antimicrobial therapy selection. Physicians who desire to utilize beta-lactam antibiotics in patients with documented allergies to these agents will request the penicillin skin test. Upon request by the physician, an interview will be conducted to obtain a thorough background on the allergy history. If no anaphylaxis to beta-lactams within the last five years is reported and other eligibility parameters are met, the individual will qualify to receive testing. If able to tolerate the skin puncture and intradermal testing, an oral or intravenous challenge of the beta-lactam indicated for the infection will be given. All patients included in the testing will be case matched to an individual not receiving penicillin skin testing based on age, admission dates, and infection type to assess the primary and secondary objectives. **Results & Conclusions:** Data analysis and conclusions will be presented at the Great Lakes Pharmac Resident Conference

### Learning Objectives:

Describe patients that are appropriate candidates for penicillin allergy skin testing

Discuss the role of penicillin allergy skin testing for antimicrobial stewardship

### Self Assessment Questions:

Which patient is the best candidate to receive a penicillin skin test:

- A: A 32-year-old male IV drug user with blood cultures positive for MRSA
- B: A 64-year-old female with a urine culture positive for Escherichia coli
- C: A 55-year-old male with diabetic foot infection that has a wound culture positive for MRSA
- D: A 82-year-old female with endocarditis and cultures positive for MRSA

What potential benefits to antimicrobial stewardship does penicillin skin testing provide?

- A: Increased use of broad spectrum antibiotics
- B: Decreased cost
- C: Increased length of stay
- D: Increased multidrug resistant pathogens

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-784L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## THE IMPACT OF PHARMACIST INVOLVEMENT DURING INPATIENT HOSPITALIZATION: INTERVENTIONS REQUIRED FOR DISCHARGE MEDICATION RECONCILIATION ON PATIENTS WITH CONGESTIVE HEART FAILURE FOR TEACHING SERVICES VERSUS NON-TEACHING SERVICES

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**Purpose:** Many studies have been conducted evaluating improvement in outcomes associated with the addition of a pharmacist to the healthcare team. This study aims to quantify the value of the clinical pharmacist involved in patient care throughout the course of hospitalization compared to those who are just seen at discharge for medication reconciliation. The objective is to compare the rate of pharmacist identified interventions on discharge medication reconciliation forms for patients with congestive heart failure discharged from a teaching service, which has a clinical pharmacist, versus a non-teaching hospitalist services which does not have a clinical pharmacist. **Methods:** A retrospective, single center, chart review approved by the Institutional Review Board at Akron General Medical Center (AGMC) was conducted. Eligible subjects were discharged from AGMC with a diagnosis of congestive heart failure and received pharmacist discharge medication reconciliation between 1/1/2014 and 6/20/2015. Subjects were excluded if they were discharged from specialist service lines or intensive care units, if the discharge medication reconciliation was missing from the chart or completed by the pharmacist on a day different than discharge, if the discharge order was entered on a day different than discharge or no discharge order entered, or based on inability to find patient due to incomplete pharmacist documentation. The primary outcome is the rate of pharmacist identified interventions reported per discharge and per medication. Secondary outcomes include: time required to complete pharmacist discharge medication reconciliation reported per discharge and per medication; time to discharge from time of initial discharge order to time pharmacy notified and time patient actually discharged; and the composite outcome of unplanned 30-day readmission and emergency department visitation. Risk factors associated with the composite of 30-day readmission and emergency department visitation will also be reported. **Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Review changes to reimbursement enacted by the Affordable Care Act.

Discuss which outcomes the addition of a pharmacist to the healthcare team may improve.

### Self Assessment Questions:

The Affordable Care Act gave CMS the right to deny reimbursement to hospitals for patients:

- A: Who are outside their insurance network
- B: Who are readmitted within 30 days
- C: Who are on hemodialysis
- D: Who are admitted to the hospital for greater than 30 days

Literature has shown that addition of a pharmacist to the healthcare team:

- A: Increases rates of readmission
- B: Increases length of stay
- C: Decreased medication costs
- D: Decreased medication adherence

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-923L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ADJUNCTIVE VALPROIC ACID FOR THE TREATMENT OF ICU DELIRIUM

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**Purpose:** Acute, intensive care unit (ICU) delirium in critically ill patients continues to be a challenge for healthcare professionals. Suboptimal clinical response and unwanted side effects from current standards of therapy obviate the need for improved management of ICU delirium. The addition of valproic acid (VPA) may enhance symptom improvement and reduce patient requirement of concomitant antidelirium medications. The primary objective of this study is to further evaluate the efficacy and tolerability of VPA for the treatment of delirium in the ICU at Bronson Methodist Hospital, while also establishing a safe and effective dosing strategy for the titration and tapering of VPA in two differing patient populations: those in the medical intensive care unit (MICU) and the trauma care unit (TCU). **Methods:** This is a retrospective chart review analyzing data collected from the electronic medical record of patients prescribed VPA in MICU or TCU between September 1st, 2015 and February 29th, 2016. Patients were included if they were at least 18 years of age and received VPA for the indication of ICU delirium for at least 48 hours. Patients were excluded if they received VPA for an indication other than delirium or if VPA was determined to be a home medication. Primary outcome measures include changes in patient requirement for concomitant sedative, opiate, and antipsychotic medications; the incidences of clinician-defined treatment success and failure in patients following the recommended VPA dosing schedule; CAM-ICU scores; and RASS scores after initiation of VPA. Secondary outcomes include mean time to extubation, number of ventilator days, and ICU length of stay prior to and after initiation of VPA.

**Results/Conclusions:** Data collection and analysis are currently in progress. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List the four baseline characteristics that have been proven to predispose patients to ICU delirium.  
Explain the mechanisms of valproic acid that make it an appealing agent for use in the management of ICU delirium.

### Self Assessment Questions:

Which of the following patient characteristics has been proven to predispose patients to ICU delirium?

- A: Female
- B: History of alcoholism
- C: History of diabetes
- D: Caucasian ethnicity

Which of the following is a mechanism of action of valproic acid that makes it a potentially attractive agent for the treatment of ICU delirium?

- A: Increases release of acetylcholine
- B: Increases release of dopamine
- C: Inhibits GABA effects
- D: Reduces expression of melatonin receptors

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-465L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## TREATMENT OUTCOMES AMONG PATIENTS WITH METHICILLIN-SUSCEPTIBLE STAPHYLOCOCCUS AUREUS BLOODSTREAM ISOLATES POSSESSING MECA BY COMMERCIAL PCR COMPARED TO PATIENTS WITH METHICILLIN-RESISTANT S. AUREUS

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**Purpose:** Commercial MRSA PCR assays test for the mecA gene which is responsible for penicillin-binding protein-2a (PBP-2a); the PBP that confers methicillin-resistance in *S. aureus*. Commercial mecA PCR assays can help expedite appropriate antimicrobial therapy for patients with life-threatening staphylococcal BSIs. However, mecA-positive *S. aureus* isolates, identified using a MRSA PCR test, that are also susceptible to oxacillin using automated susceptibility testing (mecA-MSSA) have been described. This phenotypic-genotypic discrepancy presents a diagnostic and treatment challenge for clinicians. The purpose of this study is to describe the treatment and outcomes among patients with mecA-MSSA BSI compared to patients with MRSA BSI.

**Methods:** This is a retrospective, observational study of adult patients admitted to a Wheaton Franciscan Healthcare hospital in Wisconsin between January 1, 2010 and August 31, 2015. Data extracted from patients medical records will include pertinent demographic characteristics, comorbid conditions, severity of illness at the time of the index blood culture, origin of infection, intensive care unit (ICU) admission and ICU length of stay (LOS), hospital LOS, infection-related LOS, concomitant sites of *S. aureus* infection, duration of bacteremia, and response to therapy. All antibiotics given to patients will be recorded including dose, duration of therapy, whether therapy overlapped with an additional antibiotic(s). Antibiotic susceptibility for all isolates will be recorded as well. Patients with mecA-MSSA will be matched 1:1 to confirmed MRSA patients based on the following criteria: vancomycin MIC, age, primary type of BSI, and origin of bacteremia. The MRSA comparators will be taken from the same hospital and during the same year as the mecA-MSSA isolates to account for any differences in local practice habits and the availability of novel anti-staphylococcal antibiotics. Descriptive statistics will be used to compare treatment and outcomes between the two groups. **Results/Conclusion:** Data collection and analysis are ongoing.

### Learning Objectives:

Recognize differences in treatment outcomes based on blood stream infection isolate.  
Define factors that may impact treatment choices, length of hospitalization and length of positive blood cultures based on the isolate identified.

### Self Assessment Questions:

Following the Clinical and Laboratory Standards Institute (CLSI), a MRSA isolate will be defined as *S. aureus* isolate with:

- A: Oxacillin MIC equal to 2mg/L via automated susceptibility technology
- B: Oxacillin MIC greater than 2mg/L via automated susceptibility technology
- C: Oxacillin MIC greater than 2mg/L via automated susceptibility technology
- D: Oxacillin MIC equal to 2mg/L via automated susceptibility technology

A rapid PCR test is available for blood stream infections that can detect the mecA gene which is responsible for:

- A: Efflux transporter pump of beta-lactams
- B: Thickening of the cell wall
- C: Beta-lactamase
- D: Penicillin-binding protein 2a

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-466L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF PERSONALIZED PAIN MANAGEMENT PLANS IN PATIENTS WITH ACUTE SICKLE CELL PAIN CRISES

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**Purpose:** To analyze the effectiveness of personalized pain management plans in decreasing length of hospitalization for patients with sickle cell disease (SCD). The development of these personalized pain management plans is part of an ongoing quality improvement initiative at Children's Hospital of Michigan. **Methods:** This retrospective study will utilize newly created personalized pain management plans documenting therapy for patients with acute pain crises while admitted to Children's Hospital of Michigan between August 2015 and January 2016. The primary outcome of this study is to evaluate the length of hospitalization of patients with SCD following the implementation of personalized pain management plans. Secondary outcomes include evaluating the normalized narcotic use upon subsequent admissions for vasoocclusive crises (VOC) and an overall reduction in hospitalization costs. Analyses of these outcomes will be examined using case-control series, whereby each patient with pain management plans will serve as their own control. A paired t-test will describe the outcomes of this study and statistically significant differences will be achieved at a p-value of  $\leq 0.05$ . **Preliminary Results:** A total of 76 patients were identified with an inpatient admission to Children's Hospital of Michigan for VOC due to SCD accounting for a total 119 personalized pain management plans. 30 patients were identified to have subsequent admissions and were included in this evaluation. **Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Conference.

### Learning Objectives:

List the common treatment for vaso-occlusive crises in pediatric sickle cell disease patients

Recognize the strengths and weaknesses of personalized pain management plans in vasoocclusive crises

### Self Assessment Questions:

What is the maximum number of days a pediatric patient can receive ketorolac treatment?

- A: 3
- B: 4
- C: 5
- D: 7

Which of the following statements regarding personalized pain management plans is true?

- A: They do not improve process efficiency
- B: They decrease avoidable ED visits and reduce overall healthcare costs
- C: They do not alter patient outcomes
- D: They decrease effective communication between clinicians

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-467L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATION OF A PHARMACIST-LED POPULATION MANAGEMENT INITIATIVE TARGETING HIGH RISK MEDICATION USE IN OLDER ADULTS

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**Purpose:** To determine physician acceptance rates of medication recommendations for older adults experiencing polypharmacy based on the Anticholinergic Risk Scale (ARS) and 2015 Beers Criteria.

**Methods:** In this two-phase prospective cohort study, the business intelligence department of an integrated healthcare system generates a bi-monthly report for a pharmacist-led initiative targeting high risk medication use in older adults. The service targets patients  $\geq 60$  years old who (1) have a primary care provider (PCP) visit in the next two weeks, (2) have  $\geq 3$  inpatient hospitalizations or emergency room visits in the past year, and (3) have  $\geq 10$  medications on their medication list. In phase one, patients with an ARS score  $\geq 3$  trigger medication recommendations from the pharmacist to the PCP via a shared electronic health record (EHR) at two clinic locations. Phase two involves an expansion of the service, both in terms of process and locations. Patients at four clinics are screened for high risk medications using the ARS and 2015 Beers Criteria. High risk medications trigger a comprehensive medical record review followed by recommendations to decrease risk using the 2015 Beers Alternative Medication List. Recommendation outcomes (accepted vs. rejected) will be assessed two weeks after the patients visits with their PCPs. Multi-level regression analyses will be utilized to determine overall physician acceptance rates for both phases, which will be compared to benchmark data generated during a pilot study. **Results:** To be determined. **Conclusions:** Results of this project will inform future directions. If the positive results observed in the pilot are replicated, consideration will be given to how this service can best be expanded to other clinics throughout the system.

### Learning Objectives:

Describe the relationship between polypharmacy, adverse drug events, potentially inappropriate medications, and older adults  
Review the Anticholinergic Risk Scale, 2015 Beers Criteria and Alternative Medication List

### Self Assessment Questions:

Which of the following statements is false regarding potentially inappropriate medications, adverse drug events, and older adults?

- A: Polypharmacy can lead to adverse drug events in older adults
- B: Age-related changes in pharmacokinetics and pharmacodynamics
- C: There are several tools created to help identify potentially harmful medications
- D: Anticholinergic medications are safe to use in older adults as they are commonly prescribed

Which of the following statements is false regarding the ARS and 2015 Beers Criteria?

- A: The 2015 Beers Criteria provides a list of potentially inappropriate medications
- B: A patient's ARS score is a summation of each high risk anticholinergic medication
- C: The higher a patient's ARS score, the lower their risk of experiencing adverse drug events
- D: The American Geriatric Society endorsed 2015 Beers Alternative Medication List

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-785L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## INCORPORATING PHARMACY STUDENTS TO UPDATE MEDICATION HISTORIES IN THE ELECTRONIC MEDICAL RECORD

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**Purpose:** An accurate medication history is essential when performing medication reconciliation. Current evidence demonstrates that medication discrepancies may lead to incorrect prescribing, which results in poor patient outcomes. Pharmacy students are equipped with the fundamental knowledge to obtain a thorough medication history. Many healthcare organizations employ pharmacy students to obtain medication histories and, as a result, have demonstrated a reduction in medication errors. The current inpatient workflow for performing medication reconciliation at this health system is dependent on physicians, nurses, and pharmacists obtaining medication histories at the time of admission. However, there continues to be opportunities to improve the timeliness and accuracy of medication reconciliation. This project looks to optimize the utilization of pharmacy students in obtaining timely and comprehensive medication histories. This would allow more time for other healthcare professionals to perform other patient care responsibilities. **Methods:** A taskforce of selected pharmacists determined the project objectives and assisted in decision making. A questionnaire was developed and distributed to seven healthcare organizations currently utilizing pharmacy students and/or pharmacy technicians to update medication histories in the electronic medical record. The questionnaire evaluated workflow, training, and overall implementation of students obtaining and updating medication histories in the electronic medical record. The functionality of the electronic medical record to allow pharmacy students to update the patients prior to admission medication list has been explored. The workflow procedures and educational materials for pharmacy students to obtain medication histories have been developed, and pharmacy students on advanced practice rotations will be utilized to pilot this service. A job description will be developed for potential future expansion of this service. This evaluation is a quality improvement project and is therefore exempt from review by the Institutional Review Board. **Results and conclusion:** Results and conclusions are currently in progress. Final conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Outline the workflow and processes required to allow pharmacy students to obtain and update medication histories in the electronic medical record.

Describe the expectations and requirements for pharmacy students to appropriately document medication histories in the electronic medical record.

### Self Assessment Questions:

Which of the following are actionable items when updating medication histories in the electronic medical record?

- A Omissions
- B: Duplications
- C: Dosing errors
- D: All of the above

What outcomes/measures may improve as a result of utilizing pharmacy students in obtaining medication histories?

- A Increase presence and visibility of the pharmacy department
- B Decrease medication-related errors
- C Decrease in readmissions
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-786L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFICACY, NEPHROTOXICITY, AND INCIDENCE OF CLOSTRIDIUM DIFFICILE INFECTION WITH BROAD SPECTRUM ANTIBIOTIC REGIMENS IN PATIENTS WITH NOSOCOMIAL PNEUMONIA

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**PURPOSE:** Vancomycin plus piperacillin-tazobactam is a broad spectrum antibiotic regimen chosen as empiric therapy for a multitude of infections, including hospital-acquired pneumonia (HAP), healthcare-associated pneumonia (HCAP), and ventilator-associated pneumonia (VAP). Recent data suggest that this combination may increase the risk of nephrotoxicity when compared to vancomycin alone, or when compared to vancomycin plus an alternative beta-lactam antibiotic, such as cefepime. The purpose of this study was to evaluate the efficacy of vancomycin plus piperacillin-tazobactam versus vancomycin plus cefepime (with the addition of metronidazole in cases of possible aspiration) in nosocomial pneumonia. Additionally, this study evaluated the incidence of nephrotoxicity and Clostridium difficile infection associated with these regimens. **METHODS:** This study was a retrospective, electronic chart review of patients with nosocomial pneumonia. Eligible patients with active orders for the broad spectrum regimens of interest were identified. Inclusion criteria for the study included male and female patients  $\geq 18$  years of age with a clinical diagnosis of nosocomial pneumonia who received one of these broad-spectrum antibiotic regimens for at least 48 hours. Patients were excluded if they received chronic dialysis or had a diagnosis of end stage renal disease. The primary outcome being evaluated was the clinical efficacy of antibiotic regimens, reflected by improvement in two of the following three clinical symptoms at 48 hours: fever, leukocytosis/leukopenia, and purulent secretions. Secondary endpoints included the incidence of Clostridium difficile infection within 14 days of starting antibiotics and acute kidney injury. Data collection included demographics, classification of pneumonia, antibiotic regimen, vital signs, imaging, laboratory data, concomitant use of nephrotoxic drugs, clinical improvement as documented in progress notes, and adverse drug reaction or allergy to antibiotics. **RESULTS/CONCLUSIONS:** Research in progress.

### Learning Objectives:

Discuss the evidence suggesting an increased risk of nephrotoxicity associated with the use of piperacillin-tazobactam plus vancomycin.

Identify the difference in efficacy, nephrotoxicity, and incidence of Clostridium difficile infection between vancomycin plus piperacillin-tazobactam and vancomycin plus cefepime (with or without metronidazole) in patients with nosocomial pneumonia.

### Self Assessment Questions:

Which of the following pneumonias is not associated with exposure to a healthcare environment?

- A Hap
- B: Hcap
- C: Cap
- D: Vap

Which of the following may be responsible for the increased incidence of nephrotoxicity with piperacillin-tazobactam when given with vancomycin?

- A Acute interstitial nephritis
- B Direct cellular necrosis
- C Subtherapeutic vancomycin trough levels
- D A & b

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-468L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## STANDARDIZING THE MEDICATION-USE PROCESS FROM A PEDIATRIC PERSPECTIVE

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**Purpose:** Pediatric patients are a high-risk population within healthcare due to their unique medication needs. This is especially apparent in the pharmacologic management of these patients, as significant considerations must be made to weight-based dosing, volume restrictions, and routes of administration. The Joint Commission outlines strategies for minimizing risk in the care of these patients, such as creating standardized medication orders, limiting the number of available standard concentrations, and providing real-time access to drug information references. The goal of this project was to incorporate these risk reduction strategies to standardize the ordering, preparation, and administration of intravenous (IV) medications used in the pediatric patient population in a multi-hospital health care organization. **Methods:** A process for prioritizing medication for standardization was developed. For each drug, standards for order entry, preparation, and administration were created and vetted through stakeholder groups. Standards were then implemented through coordination with leadership and education of stakeholders directly impacted by the change. **Results/Conclusion:** Data collection is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Express differences in the medication-use process between adult and pediatric patients

Identify opportunities to leverage technology in order to improve safety within the medication-use process

### Self Assessment Questions:

Which of the following are considerations that must be made during the medication-use process that are unique to the pediatric patient population?

- A: Timing of medication administration
- B: Obtaining accurate patient weights every two years
- C: Diluting commercially available products in order to obtain measure
- D: None of the above

What methods can be used to improve safety during medication ordering for pediatric patients?

- A: Develop standard doses based on diagnosis
- B: Create dose buttons of commonly used doses within computerized
- C: Use hospital based protocols that incorporate Adult dosing standards
- D: Restrict order entry to pediatric pharmacists

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-924L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ASSESSMENT OF AN ONGOING MEDICATION USE EVALUATION OF FOUR-FACTOR PROTHROMBIN COMPLEX CONCENTRATE

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**Purpose:** The University of Michigan Health System Anticoagulation Program has developed a guideline for use of 4F-PCC. We developed and implemented a medication use evaluation (MUE) process to improve guideline adherence of 4F-PCC prescribing. The purpose of this study is to evaluate the effectiveness of this intervention. **Methods:** This study was a single-center, quasi-experimental study. The MUE process was initiated on January 1, 2015 and employed an ongoing review strategy, in which all 4F-PCC use was reviewed within three to seven days of order placement. In the event that orders did not adhere to institutional guidelines, an electronic message was generated with provider education and asking for provider comments regarding 4F-PCC use. All 4F-PCC orders placed between August 1 and December 31, 2014 and those between February 1 and June 30, 2015 were included in the pre- and post-implementation groups, respectively. The primary outcome was the proportion of guideline-adherent orders. Secondary outcomes were the physician-specific rate of guideline-adherent orders in the post-intervention group and the total number of orders in each study period. **Results:** A total of 66 and 59 4F-PCC orders were placed in the pre- and post-intervention periods, respectively. The rate of appropriate 4F-PCC orders increased from 54.5% to 62.7% following intervention implementation ( $p=0.36$ ). A total of 12 inappropriate orders were identified within each study period, and the number of orders placed and discontinued prior to administration decreased from 18 to 10 within the pre- and post-intervention periods. For physicians with multiple orders during the post-intervention period, the appropriateness of subsequent orders tended to be consistent with that of previous orders. **Conclusions:** The ongoing MUE process developed within this study resulted in a non-significant improvement in the rate of guideline-adherent 4F-PCC use. Further development of MUE strategies and provider-education may optimize guideline-adherent medication prescribing.

### Learning Objectives:

Identify appropriate indications for and contraindications to the use of 4F PCC.

Discuss literature surrounding the use of electronic message interventions to optimize patient care.

### Self Assessment Questions:

Which of the following is a contraindication to the use of 4F-PCC?

- A: Disseminated intravascular coagulation
- B: Current warfarin therapy
- C: Acute kidney injury
- D: History of enoxaparin exposure

Previously published literature has described electronic message-based prescribing intervention strategies in which of the following settings?

- A: Decreasing provider use of national osteoporosis guidelines
- B: Improving secondary coronary prevention therapy prescribing
- C: Transmitting urgent radiologic findings
- D: Improved patient satisfaction

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-469L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## OUTCOMES IN OBESE VERSUS NON-OBESE KIDNEY TRANSPLANT RECIPIENTS THAT RECEIVE BASILIXIMAB INDUCTION IMMUNOSUPPRESSION

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**Purpose:** Every year, over 14,000 kidney transplants are performed in the United States. Despite the number of performed transplants, there remains over 100,000 people on the waiting list for a new kidney. In addition, with the advances in surgical techniques, more patients are eligible for transplantation that previously would not have been. Obese patients are one example of such a patient population. However, many initial clinical and pharmacokinetic trials performed in transplant patients did not include many overweight study subjects, and therefore outcomes in this patient population are often extrapolated from smaller patients. This is particularly true for basiliximab, an interleukin-2 (IL-2) receptor antagonist used for the prophylaxis of renal transplant rejection when used as an induction agent. Therefore, the purpose of this study is to determine if patient weight impacts outcomes in kidney transplant recipients that received basiliximab induction therapy. **Methods:** This study is a retrospective chart review of all kidney transplant recipients that received basiliximab induction immunosuppression between 1/2009 and 9/2015. Patients less than 18 years of age were excluded. Eligible patients will be divided into either the obese (BMI  $\geq 30$  kg/m<sup>2</sup>) or non-obese (BMI  $< 30$  kg/m<sup>2</sup>) cohort based off of their BMI at the time of transplant. The primary endpoint is incidence of acute rejection at Month 6 post-transplant. Secondary endpoints include acute rejection at Month 1, 3, and 12, graft and patient survival at Month 12, GFR at Month 1, 3, 6 and 12, and incidence of infection. **Summary of preliminary results:** To be presented at the Great Lakes Pharmacy Resident Conference. **Conclusions reached:** To be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Explain the steps of T-cell activation in the setting of organ rejection.  
Describe the role of basiliximab as an induction immunosuppressant

### Self Assessment Questions:

Which of the following describes the mechanism of action of basiliximab

- A Depletion of the B and T cells of the immune system
- B: Antagonizes IL-2 receptor
- C: Inhibits the fusion of CD80/86 to CD28
- D: Antibody against CD-52

Which of the following side effects is associated with basiliximab?

- A Anaphylaxis
- B Nephrotoxicity
- C Neurotoxicity
- D Cytokine release syndrome

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-787L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECT OF PHARMACIST AND NURSE PRACTITIONER DIABETES FOCUSED CLINIC VISITS ON DIABETIC OUTCOMES AND STATIN USE WITHIN AN INTERNAL MEDICINE DEPARTMENT

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**Purpose:** Diabetic patients seen by the nurse practitioner or pharmacist within the clinic setting have been shown to have improved patient outcomes overall. The objective of this study is to determine if diabetic patients seen by the nurse practitioner or pharmacist have improved HgbA1c and blood pressure control, and are receiving statin therapy if not contraindicated, compared to patients only seen by their primary provider. The new statin recommendations are based on recent American College of Cardiology (ACC) and American Heart Association (AHA) recommendation updates. **Methods:** A retrospective analysis is being conducted on patients with diabetes who have been seen by a Mayo Clinic Health System provider two times within a nine month period for a diabetes focused visit at the Internal Medicine department. The study group (n=40) includes patients who have been seen by the nurse practitioner or pharmacist for a more team based care approach. The control group (n=40) includes patients who have only been seen by the primary physician. Patients were included if they were at least 18 years old met above visit requirements. Patients were excluded if they were pregnant or breastfeeding, allergic to statins or statin use was contraindicated, were newly diagnosed with diabetes, were receiving higher levels of care such as nursing home or were referred out of primary care for diabetes management. In this study, statin use, HgbA1c levels, and blood pressure are being compared between the two study groups. **Categorical outcomes** at the second visit will be compared between study groups using Pearson's chi-square test. **Continuous outcomes** at the second visit will be compared between study groups using two-sample t-tests or Wilcoxon rank-sum tests, as appropriate for the outcome distribution. **Results:** Results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the benefits of statin therapy in diabetic patients.

Select the appropriate statin therapy based on a patient's atherosclerotic cardiovascular disease (ASCVD) 10 year risk per the ACC/AHA guideline recommendations.

### Self Assessment Questions:

Which is of the following statements is true regarding the use of statin therapy in diabetic patients?

- A Statin therapy has not been shown to effectively reduce cardiovascular risk
- B: Statin therapy is only effective in reducing cardiovascular risk in diabetics
- C: Statin therapy has only been shown to be beneficial in patients with ASCVD
- D: Statin therapy reduces the risk of cardiovascular disease in patients with diabetes

A 55 year old male patient with diabetes has an ASCVD 10 year risk of 36%, what is the correct statin therapy this person should receive if no other contraindications to statin therapy exist?

- A Simvastatin 80 mg
- B Pravastatin 40 mg
- C Atorvastatin 80 mg
- D Fluvastatin 40 mg

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-470L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST-PERFORMED DISCHARGE MEDICATION RECONCILIATION AND PATIENT COUNSELING ON HOSPITAL READMISSION RATES

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Statement of the purpose: Hospital readmissions have a substantial impact on healthcare systems. Medicare reports a 19% all-cause 30-day readmission rate, of which 47% may be preventable. Non-compliance, medication discrepancies, and adverse drug events are common in transitions of care. Most adverse drug events could be prevented with better communication and coordinated care at discharge. As hospitals improve services to reduce hospital readmissions, it is important to consider the role of pharmacists in facilitating medication reconciliation and providing detailed patient counseling upon discharge. These services can reduce drug-related problems as well as improve patient outcomes. Previous studies have shown pharmacist involvement in hospital discharge had a positive impact on decreasing composite inpatient readmissions. The objective of this study is to evaluate how pharmacist involvement in the discharge process will affect the overall 30-day readmission rate when targeting patients with moderate or high readmission risk scores.

Statement of methods used: This study was conducted at Advocate Illinois Masonic Medical Center, a 408-bed teaching hospital serving the Chicago and area. This is a single center, quality improvement study comparing a historical readmission rate to a prospective study population's readmission rate. Patients were eligible for the study if they were determined to be moderate or high risk for readmission using a proprietary scoring tool. Patients involved in the intervention had pharmacist performed medication therapy review and medication reconciliation, as well as medication counseling and education. The primary endpoint is 30-day hospital readmission rate. Disease-specific medication optimization and medication discrepancies are secondary endpoints that will be evaluated in the intervention group only. Additional endpoints to be evaluated in both groups include patient satisfaction, medication knowledge and facilitation of outpatient prescription attainment. Results will be analyzed to determine the significance and feasibility of pharmacist involvement in the discharge process.

Results/Conclusion: To be presented at the GLPRC.

### Learning Objectives:

Recall potential barriers/limitations of implementing a program involving pharmacists at discharge.

Explain what types of pharmacy based services at discharge are useful to patients.

### Self Assessment Questions:

Which of the following is an appropriate service for a pharmacist to perform at discharge?

- A: Schedule follow-up appointments for patient
- B: Remove any remaining IV lines
- C: Provide verbal and written information for new medications
- D: Write new prescriptions for patient's maintenance medication if rec

What are potential areas of improvement in transition of care that might have a positive impact if a pharmacist is involved?

- A: Medication education for patient
- B: Physician satisfaction
- C: Access to medications immediately after discharge
- D: All of the above

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-788L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## NON-BENZODIAZEPINE HYPNOTIC USE IN OLDER ADULTS: EVALUATION OF ADHERENCE TO THE 2012 AND 2015 BEERS CRITERIA AND THE IMPACT OF A COLLABORATIVE MEDICATION SAFETY INTERVENTION PROGRAM

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Purpose: One obstacle clinicians face when caring for older adults with sleep disorders is the lack of safe and effective medication options. The American Geriatrics Society 2015 update to the Beers Criteria included a recommendation to avoid use of non-benzodiazepine hypnotics in older adults due to emerging safety concerns related to over-sedation, fracture risk, and driving impairment. The purpose of this study is to evaluate adherence to this recent recommendation and the impact of a subsequent targeted intervention on medication de-prescribing.

Methods: A retrospective electronic chart review was conducted to assess non-benzodiazepine hypnotic use. The study population included adults 65 years or older with an active prescription for a non-benzodiazepine hypnotic (zolpidem, eszopiclone, or zaleplon) prescribed by a Marshfield Clinic provider between February 3, 2015 to November 2, 2015. Data collected included age, gender, medication name, dose, frequency, refills, days supply, first prescribed date, last prescribed date, and provider. Additionally, patients with a concurrently active prescription for a benzodiazepine medication were identified. Descriptive statistics were used to assess adherence to the 2012 and 2015 Beers Criteria. Providers with patients identified above were selected to receive a guidance statement on the appropriate use of non-benzodiazepine hypnotics in elderly patients. This guidance was developed in collaboration with sleep medicine and medication safety specialists. The impact of this intervention will be assessed 4 months after implementation through an electronic provider survey and electronic chart review. The provider survey will assess perceived barriers to de-prescribing of non-benzodiazepine hypnotics. The chart review will determine if the non-benzodiazepine hypnotic was discontinued and if alternative therapy was initiated.

Results and Conclusion: Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the current American Geriatric Society recommendations regarding non-benzodiazepine sedative hypnotics

Describe the level of evidence supporting use of sedative hypnotics in older adults

### Self Assessment Questions:

Which of the following statements is true regarding the inclusion of non-benzodiazepine hypnotics in the 2015 American Geriatrics Society Beers Criteria?

- A: Non-benzodiazepine hypnotics are to be avoided without consideration.
- B: Non-benzodiazepine hypnotics are considered a safer alternative to benzodiazepines.
- C: Trazodone is listed as a safer alternative treatment option to non-benzodiazepine hypnotics.
- D: Non-benzodiazepine hypnotics are listed as safer alternatives to benzodiazepines.

Which of the following statements is correct?

- A: The elderly population is less susceptible to side effects from sedative hypnotics.
- B: The elderly population is not well represented in most clinical studies.
- C: Pharmacological treatment is preferred to cognitive-based therapies.
- D: Chronic insomnia in older adults is usually not associated with significant daytime impairment.

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-471L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CLINICAL BENEFIT OF SPECIALTY PHARMACY IN KIDNEY TRANSPLANT RECIPIENTS

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**Purpose:** Specialty pharmacy in kidney transplant recipients has shown improved medication adherence, patient satisfaction, and reduced medical and pharmacy costs. However, the impact of specialty pharmacy services on clinical outcomes such as graft rejection, infection rates, and patient and graft survival has not been evaluated. This study assessed the clinical outcomes of kidney transplant recipients at Henry Ford Hospital who utilized specialty pharmacy and compared them to those who utilized a community pharmacy. **Methods:** This was a single-center, retrospective, quasi-experimental study comparing clinical outcomes of kidney transplant recipients who utilized specialty pharmacy services with those utilizing community pharmacy. Adult patients who received a kidney transplant at Henry Ford Hospital between January 1, 2014 through December 31, 2014 and utilized specialty pharmacy services after their transplant were included in the intervention group. The control group included adult patients who received a kidney transplant at Henry Ford Hospital between August 1, 2012 through July 31, 2013 and used community pharmacy services after their transplant. Patients were excluded if they received multiple organ transplants, re-transplants, or did not follow-up at Henry Ford Hospital. The primary outcome was to compare the incidence and severity of biopsy-proven rejection episodes between the two groups 1 year post-transplant. Secondary outcomes studied include incidence of infections, 1-year patient and graft survival, medication adherence based on FK506 (tacrolimus) levels, hospital re-admission rates and length of stay. Comparative statistics, time-to-event analysis, and Kaplan-Meier analysis were used for data analysis. Regression analysis was used to adjust for confounders. This study was approved through the Institutional Review Board at Henry Ford Hospital. **Results and Conclusions:** Research is in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the consequences of graft rejection

Identify the benefits of specialty pharmacy services among transplant recipients

### Self Assessment Questions:

What is a possible consequence of graft rejection?

- A Lower incidence of morbidity and mortality
- B: Re-initiation of dialysis
- C: Reduction in maintenance immunosuppression pill burden
- D: Improved quality of life

Which of the following are possible benefits of using specialty pharmacy services among kidney transplant recipients?

- A Lower incidence of graft rejection
- B Improved medication adherence
- C Reduced medical and pharmacy costs
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-472L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PHARMACIST INVOLVEMENT IN BRIEF ALCOHOL INTERVENTION AFTER HOSPITAL DISCHARGE

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**Purpose:** Patients who drink more alcohol than what is recommended by the guidelines have increased mortality from most causes and an increased risk of hospital admissions from stroke, liver disease, and respiratory diseases. After experiencing a hospitalization from a reversible cause, such as excessive alcohol consumption, it is thought that patients may be more sensitive to the idea of behavioral change and provide a health care practitioner the opportunity to engage a patient in further discussion. This opportunity would be particularly beneficial with the veteran population as excessive alcohol use occurs with a greater prevalence in the veteran population than the general population. This project sought to use pharmacists to complete brief alcohol interventions (BAI) to patients recently discharged from the hospital and assess their alcohol use a year after the initial intervention. **Methods:** A prospective cohort study was started in September 2014. Patients charts were reviewed and the following information collected: gender, baseline alcohol use disorder identification (AUDIT-C) scores, inpatient BAIs completed, alcohol use conditions listed on the active problems list, hospital discharge diagnosis, past/present mental health engagement, and hospice status. Patients with an AUDIT-C score of > 7 and not already connected with specialty mental health services were then contacted within 7-30 after hospital discharge by the pharmacist. The pharmacist completed the BAI and documented responses in the patient chart. Subsequent follow-up was completed or facilitated by the pharmacist. Patient charts were again reviewed to collect information for the primary objective, change in AUDIT-C score one year after the initial chart review. Secondary outcomes included subjective change in alcohol use between hospital discharge and initial telephone call/subsequent contacts and any patient engagement in higher level care. **Results/Conclusion:** The results and conclusion are still pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the components of a brief alcohol intervention (BAI).

Describe the process for developing and implementing a pharmacist-driven substance abuse intervention service.

### Self Assessment Questions:

Which of the following is a component of a brief alcohol intervention?

- A Making the patient feel guilty about their current alcohol use.
- B: Starting a patient on a medication without their permission.
- C: Reviewing the current alcohol use recommendations.
- D: Telling the patient they are an alcoholic.

Which assessment measure was utilized to identify high risk patients?

- A Phq-9
- B Audit-c
- C Gad-7
- D Das-28

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-473L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OPTIMIZING ANTIMICROBIAL THERAPY FOR ACUTE RESPIRATORY TRACT INFECTIONS AND COPD EXACERBATIONS IN OUTPATIENT AND URGENT CARE CLINICS

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**Purpose:** Reducing over-prescribing of antimicrobials is the cornerstone of many stewardship efforts. Antimicrobial stewardship initiatives are intended to improve clinical outcomes, limit emerging bacterial resistance, and reduce excessive costs. Acute upper respiratory tract infections (URI) account for millions of outpatient clinic visits per year. Approximately 41% of visits resulted in antimicrobial prescriptions. Inappropriate antibiotic use for URI is a major contributor to antibiotic-resistance in the US. Studies have shown that integration of evidence-based treatment guidelines into a clinical decision support tool may help providers optimize therapeutic selections. The goal of this project was to assist prescribers in making evidence-based treatment decisions when choosing therapy for selected acute URIs. To realize this goal, a treatment algorithm was used and clinical decision support tools were evaluated as ways to allow for optimization of antimicrobial prescribing. This effort was targeted at patients presenting with acute bronchitis or COPD exacerbation. **Methods:** This was a prospective, multi-clinic project within a healthcare system. Adult patients age 18 and older presenting during the study period to one of three pilot clinic sites (family medicine, internal medicine, urgent care clinic) and an urgent care clinic with a diagnosis of acute bronchitis or COPD exacerbation were included in the analysis. Treatment algorithms and electronic health record alerts were created to notify prescribers when a patient had an entered diagnosis of acute bronchitis or COPD exacerbation. This alert provided an electronic link to the treatment algorithm from which prescribers could select the most appropriate antimicrobial therapy. Data comparison to a retrospective cohort from a similar time period in 2015 was performed to assess intervention impact. The primary outcome was appropriate selection of antimicrobial treatment or non-treatment at the time of patient discharge from clinic. **Preliminary Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Discuss the role of antimicrobials in treating acute bronchitis and COPD exacerbations

Describe interventions to optimize antimicrobial prescribing for acute upper respiratory infections in the outpatient setting

### Self Assessment Questions:

Which of the following is true regarding treatment of acute respiratory tract infections?

- A: All patients who present to the clinic with acute bronchitis should receive antibiotics
- B: No patients presenting to the clinic with acute exacerbation of COPD should receive antibiotics
- C: All patients with acute respiratory tract infections should have a sputum culture
- D: In patients presenting without risk factors for infection, symptomatic treatment is sufficient

Which of the following are clinical decision support tools that can aid providers with prescribing diagnosis-specific antimicrobials?

- A: Condition-specific order sets
- B: Financial support
- C: Best practice alerts
- D: a & c

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-474L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REDUCTION OF NIACIN AND GEMFIBROZIL THERAPY FOR HYPERLIPIDEMIA AND OPTIMIZATION OF HMG-COA REDUCTASE INHIBITORS (STATINS) AT A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** Clinical trials failed to demonstrate significant cardiovascular benefits when niacin is added to statins. Furthermore, niacin therapy raised safety concerns. Routine use of niacin in veterans for hyperlipidemia management is not recommended. Gemfibrozil may be useful in controlling triglycerides, but generally should not be used concomitantly with statins for cardiovascular disease risk reduction. Despite recent trials and guidelines, many patients remain on niacin and/or gemfibrozil without clinically warranted indications. Consequently patients may not achieve recommended statin intensity. The objective of this project is to reduce unwarranted niacin and gemfibrozil use while optimizing statin therapy. **Methods:** The Veterans Integrated Service Network 12 database warehouse was utilized to identify patients with active prescriptions for niacin and gemfibrozil in combination with statins. Using the electronic medical record, chart reviews were conducted to analyze patients lipid therapy. Pre-specified criteria were utilized to determine clinically acceptable versus questionable niacin and gemfibrozil prescriptions. Electronic health record progress notes were developed to ensure consistency in recommendations being documented. Requests for adjustment of lipid-lowering therapy were in accordance with current cholesterol treatment guidelines and a position statement from the Department of Veterans Affairs. Providers were alerted to recommendations via electronic co-signature requests. Recommendations included discontinuation of niacin and/or gemfibrozil, increasing statin intensity, alternative triglyceride management and repeat lipid panel monitoring. The primary outcome was the percentage of recommendations accepted by providers. Secondary outcomes included: niacin and gemfibrozil prescriptions discontinued, and patients reaching target statin intensity. Recommendations were tracked in a Microsoft Excel spreadsheet and acceptance of recommendations was reviewed one month after being made. **Results and Conclusions:** Preliminary results suggest that providers are accepting of pharmacy intervention to modify lipid therapies. Updated results to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify appropriate alternatives for additional triglyceride management in patients already managed on statin therapy

Outline an appropriate hyperlipidemia treatment regimen based on patient risk factors

### Self Assessment Questions:

DH is a 66 yo male with a history of hypertension, hyperlipidemia, diabetes mellitus type II, COPD, and hypothyroidism. Recent fasting lipid panel indicates total cholesterol 241, triglycerides 533, HDL 35, LDL 185.

- A: Increase simvastatin to 40 mg daily, continue gemfibrozil 600 mg daily
- B: Continue simvastatin 20 mg daily, decrease gemfibrozil to 300 mg daily
- C: Stop both gemfibrozil and simvastatin. Start atorvastatin 40 mg daily
- D: Stop gemfibrozil and increase simvastatin to 40 mg daily. Add niacin

Which of the following statements is correct?

- A: Gemfibrozil may be used concurrently with rosuvastatin as no drug-drug interaction exists
- B: Fish oil is a safer alternative for additional triglyceride control in patients on statin therapy
- C: Niacin is more effective in lowering triglycerides than gemfibrozil in patients on statin therapy
- D: Fenofibrate is a preferred option for triglyceride lowering in patients on statin therapy

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-475L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CREATION OF A MONITORING AND ADHERENCE TOOL FOR PATIENTS WITH CHRONIC MYELOGENOUS LEUKEMIA

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**Purpose:** Norton Specialty Pharmacy is currently seeking accreditation from the Utilization Review Accreditation Commission (URAC). Specialty pharmacy accreditation signifies a standard of excellence, commitment to quality improvement, and allows access to critical medications and participation in health plan networks. To receive accreditation, specialty pharmacies must implement patient management services that enable pharmacists to target and manage individual patients. Oncology patients represent the largest percentage of patients using the Norton Specialty Pharmacy. Chronic myelogenous leukemia (CML) was identified as a targeted disease state for creation of monitoring and documentation tools because several studies have shown that strict medication adherence prolongs survival. The purpose of this process improvement project is to create and implement a patient monitoring and adherence tool and process that will set the foundation for establishing more robust disease state management programs. **Methods:** A group of multidisciplinary stakeholders participated in a gap analysis. Literature review and compliance with URAC accreditation standards provided the foundation for gap analysis. Many opportunities were identified for the development of an adherence and monitoring tool that would maximize the potential for positive patient outcomes while providing a sustainable workflow to the pharmacists. A comprehensive plan was proposed for implementation of the tool and process into the electronic medical record. **Results/Conclusion:** Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify key components of patient management programs  
Describe the essential components of a monitoring and adherence tool for patients with CML

### Self Assessment Questions:

**Purpose:** Norton Specialty Pharmacy is currently seeking accreditation from the Utilization Review Accreditation Commission (URAC). Specialty pharmacy accreditation signifies a standard of excellence,

- A Report monthly refill records
- B: Utilize effective communication amongst healthcare providers
- C: Process to document patient management information
- D: B & c

Which of the following is an essential component of a monitoring and adherence tool for patients with CML?

- A Assess for missed doses
- B Discuss recent lab values
- C Identify barriers to treatment
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-476L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST-DRIVEN INITIAL METABOLIC MONITORING OF ANTIPSYCHOTIC MEDICATIONS IN AN INPATIENT BEHAVIORAL HEALTH UNIT

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**Purpose:** Antipsychotic medications have been shown to adversely impact weight, lipids, glucose metabolism and cardiovascular health. The American Diabetes Association, American Psychiatric Association, American Association of Clinical Endocrinologists and the North American Association for the Study of Obesity have created a consensus guideline that provides a framework for baseline and interval metabolic monitoring parameters for patients on antipsychotic medications. Studies have shown that adherence to this consensus statement is suboptimal. The objective of this study is to determine the impact of pharmacist-driven initial metabolic monitoring of antipsychotic medications on rates of adherence to guideline suggested monitoring. **Methods:** This study will examine the rates of compliance with guideline-concordant monitoring of antipsychotic medications 6 months before and after the implementation of pharmacist-initiated pending of labs. A protocol was developed and initiated on December 1, 2015. This protocol allowed pharmacists to order any necessary metabolic monitoring while patients were hospitalized. Retrospective data collection will include the presence of orders for, and completion of monitoring parameters including body mass index, blood pressure, fasting plasma glucose and fasting lipid panel. Those eligible include all behavioral health inpatients that are initiated on new antipsychotic therapy that have not used any antipsychotic medications in the previous three months. Patients will be excluded from the study if they are less than 12 years old or the antipsychotic medication is ordered on an as needed basis. Approval through the Institutional Review Board was obtained prior to data collection. **Results/Conclusions:** Data collection is ongoing. Final results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe adverse metabolic complications that have been associated with antipsychotic use  
Outline suggested baseline and interval monitoring parameters for patients receiving chronic antipsychotic medication therapy as listed in the American Diabetes Association, American Psychiatric Association, American Association of Clinical Endocrinologists and t

### Self Assessment Questions:

Which of the following statements is true for a patient who has taken risperidone for one month?

- A The patient is not due for any metabolic monitoring at this time
- B: The patient is due to for a blood pressure recheck
- C: The patient is due for a fasting plasma glucose level
- D: The patient is due for a height and weight recheck to calculate BM

Antipsychotic medications can:

- A Decrease weight
- B Lower cholesterol levels
- C Increase glucose levels
- D Improve thyroid function

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-477L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **BROADENING THE CRITICAL ACCESS HOSPITAL PHARMACIST'S ROLE TO PROVIDE PHARMACY CARE SERVICES WITHIN THE PATIENT-CENTERED MEDICAL HOME**

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**Purpose:** Pharmacists integrated within multidisciplinary care teams improve outcomes for patients chronic disease management. Pharmacists are equipped to optimize a patient's medication regimen and provide disease state education to help achieve several quality measures. The primary objective of this project is to broaden the current role of the critical access hospital pharmacist into the patient-centered medical home. Secondary objectives include improving patient outcomes, assessing provider satisfaction, and optimizing pharmacist full-time equivalent (FTE) allocation to best serve the region's patients.

**Methods:** This project is exempt from review by the Institutional Review Board. A critical access hospital is staffed by one FTE pharmacist focused on hospital pharmacy operations. Baseline review of both clinic and hospital workflow will be mapped out and integrated for pharmacist time allocation within both settings. Streamlined processes will be defined and implemented to allow the pharmacist to provide services within the patient-centered medical home. The addition of technology for remote verification of pharmaceuticals will support these changes. Pharmacist development will include education and familiarization with treatment management tools associated with identified disease states. Providers at the clinic will be educated on the role of the pharmacist and alerted to the patient population that will qualify for pharmacist review. Patients will be selected based on clinical indicators associated with quality measures, current health system patient data, and provider preferences identified through a survey. The pharmacist's role in the clinic will involve assessing patients, providing both medication and lifestyle education to patients, and communicating recommendations to providers for their consideration. Changes in clinical indicators will be measured post pharmacist intervention, provider satisfaction will be measured through surveys, and pharmacist time in various settings will be recorded and analyzed. **Results and Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Identify evidence based target populations for pharmacist interventions  
Describe the implementation of a pharmacist at an onsite clinic within a critical access hospital

### **Self Assessment Questions:**

Based on targeted disease states, which patients would be able to benefit the most from a pharmacist integrated within the multidisciplinary care team?

- A: Psychiatric patients
- B: Patients with seasonal allergies
- C: Patients with epilepsy
- D: Diabetic patients with an HgA1c above target

What piece of technology that was used to support the implementation of a primary care pharmacist role within our critical access hospital?

- A: Remote IV pharmacy workflow manager
- B: Remote verification technology for all medications
- C: Computerized physician order entry
- D: Bar code medication scanning

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-789L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **DESCRIPTION OF CARDIOTOXICITY ASSOCIATED WITH SUNITINIB IN RENAL CELL CARCINOMA**

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**Purpose:** There is significant variability in the incidence and description of sunitinib-associated cardiac toxicity reported in the current literature. This single center, retrospective review of renal cell carcinoma patients receiving sunitinib aims to further describe sunitinib-related cardiac dysfunction; specifically examining frequency of left ventricular ejection fraction monitoring and patient risk factors for development of cardiotoxicity. **Methods:** The investigators are conducting a retrospective chart review involving 308 patients treated for renal cell carcinoma at the Indiana University Melvin and Bren Simon Cancer Center. The primary endpoint is to identify the incidence of cardiotoxicity associated with sunitinib administration. For the purposes of this research, cardiotoxicity is defined as a decrease in the left ventricular ejection fraction of greater than 10 percentage points, to a value less than 53%. The secondary endpoint is to determine specific risk factors leading to the development of sunitinib-associated cardiotoxic adverse reactions. We also discuss the frequency of cardiac monitoring at our institution and how the results of this study may impact current monitoring practices. **Results/Conclusion:** Data collection is currently ongoing. Analysis and conclusions of the primary and secondary endpoints will be provided at the Great Lakes Residency Conference.

### **Learning Objectives:**

Describe sunitinib's current place in therapy for the treatment of renal cell carcinoma.

Identify potential risk factors for developing sunitinib-associated cardiac dysfunction.

### **Self Assessment Questions:**

Which of the following is NOT an approved indication for sunitinib?

- A: Gastrointestinal stromal tumor
- B: Pancreatic neuroendocrine tumors
- C: Testicular cancer
- D: Renal cell carcinoma

Which of the following are potential risk factors for developing sunitinib-associated cardiotoxicity as determined by current literature?

- A: Coronary artery disease
- B: Hypertension
- C: Congestive heart failure
- D: All of the above

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-478L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **AUTOMATED TRACKING OF ANESTHESIA CONTROLLED SUBSTANCES USE IN OPERATING ROOM (OR) PHARMACIES**

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**Purpose:** Controlled substance management is an important pharmacy process, especially in high usage areas such as operating rooms. Recording and tracking of these drugs is key in assuring regulatory compliance, accurate billing records, and minimizing opportunity for diversion. Automating these processes with the implementation of barcode scanning has the potential to maintain a more organized and accurate drug record, and save pharmacy staff time in processing and maintaining ACSR records. The objective of this study is to implement, evaluate, and compare an automated controlled drug record to a traditional paper record for use in OR pharmacies. **Methods:** A software tool was designed to allow barcode scanning to assist technicians and pharmacists in dispensing, returning, billing, and auditing controlled drugs in an OR pharmacy satellites. Through interviewing an OR pharmacy technician and pharmacist, the processes associated with controlled drug management were identified. A time study was conducted to evaluate these steps in the controlled drug process and compare it to an automated process using barcode scanning. The results were analyzed with the primary outcome being differences in time spent on each step and a secondary outcome being an evaluation of controlled substance compliance reconciliation between the paper ACSR when compared to an electronic ACSR. **Results and Conclusions:** Final results and conclusions are pending completion and will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Recognize the role of barcode scanning in recording and tracking controlled substances in an operating room (OR) pharmacy setting  
Discuss the advantages and disadvantages of implementing barcode scanning to help maintain an Anesthesia Controlled Substance Record (ACSR)

### **Self Assessment Questions:**

An Anesthesia Controlled Substance Record is specific to:

- A the individual picking up the medications; those medications may
- B: the patient case; any medications (controlled and uncontrolled) ne
- C: the operating room; any controlled substance picked up from the p
- D: the patient case; any controlled substances picked from the pharr

Which of the following is correct:

- A An advantage of barcode scanning is it assists with dispensing but
- B An advantage of barcode scanning is it assists with ONLY dispens
- C An advantage of barcode scanning is it assists with dispensing, re
- D Barcode scanning does not assist with either dispensing, returns, i

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-790L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **PHARMACIST DISCHARGE MEDICATION RECONCILIATION PRACTICE STANDARDIZATION: MULTICENTER STUDY OF IMPACT ON READMISSIONS**

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The purpose of this project is twofold: first, to establish the "Best Practice" discharge process at UW Health with the implementation of redesigned discharge workflow, handoff, and other electronic health record (EHR) tools. Second, a University HealthSystem Consortium multicenter study will measure the impact of pharmacist involvement in discharge medication reconciliation. The primary outcome of this study will be pharmacy-identified medication-related problems (MRP) and hospital readmission rates within 30 days of discharge. The secondary outcome is quantification of pharmacist time spent on discharges. The pharmacist discharge section within the EHR will be redesigned to facilitate its usability. The "Best Practice" discharge process will be defined and a training document will be created delineating the expected process. Observational studies will be conducted to collect pharmacist-identified MRP and to quantify time to complete each task in the discharge medication reconciliation process. Inclusion criteria include patients discharged home from the medicine or cardiology units with at least two co-morbid conditions. Data collected retrospectively from the EHR will include patient demographics and 30-day re-admission rates.

Pharmacists identified MRPs on 64% of the 199 patients included in the data collection. Of the MRPs identified, the majority (46%) were categorized as "optimization of drug therapy" which included optimizing drug selection, duration, administration, or frequency. The median amount of pharmacist time spent on one discharge was 22 minutes with 23% of time spent on medication reconciliation, 23% on documentation, 32% on patient counseling, 13% on complex handoff, and 9% on technical tasks. UW Health results will be compared among the participating institutions to evaluate the efficacy of the various pharmacy practice models. Two-thirds of patients benefit from pharmacist interventions that reduce drug-related readmissions. Pharmacist medication-reconciliation is a vital part of the discharge process and ensures that patients are discharged on the safest and most optimized medication therapies.

### **Learning Objectives:**

Recognize the impact of multi-center collaboration on advancing pharmacy practice  
Describe common pharmacist interventions during discharge medication reconciliation

### **Self Assessment Questions:**

The advantage of resident involvement in multi-center studies includes:

- A Having the opportunity to compare and contrast a pharmacy practi
- B: Gathering data from multiple institutions results in less significant i
- C: Eliminating data variability among sites
- D: Bypassing the need for Institutional Review Board (IRB) approval

What is the most common category of medication-related problems identified by pharmacists at UW Health?

- A Drug/product change (i.e. completing prior authorizations)
- B Adverse drug events
- C Optimization of drug therapy (i.e. addition of drug therapy)
- D Patient medication list review (i.e. patient asks question about me

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-791L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REDUCING INTRAVENOUS DRUG WASTE IN THE INTENSIVE CARE UNIT

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**Purpose:** In 2012, 30% of all healthcare expenses were attributed to wasted resources, with one example being drug wastage. Drug wastage is defined by the World Health Organization as drugs issued to the patient but not consumed. Examples of activities leading to inpatient drug wastage include poor communication, missing drug doses, and inefficient pharmacy workflow. Strategies to reduce waste included increasing daily batched compounding, setting standards for timeliness of drug delivery, employing pharmacy technicians to retrieve unused drugs at frequent intervals, and utilizing automatic stop dates. Reducing IV drug waste in the ICU will reduce hospital costs, allow for efficient allocation of resources, and optimize work flow. The objective of this quality improvement (QI) study is to quantify the type and cost of IV compounded drug waste in the ICU, implement a QI plan, and re-quantify IV compounded medication waste to assess the effectiveness of the QI plan. **Methods:** This prospective QI study will evaluate all IV returned compounded drugs in the ICU (excluding controlled substances) during a ten day period in November 2015. Pharmacy technicians, students, and residents will collect wasted drugs at three designated times daily. Drug cost will be recorded as well as the primary cause of wastage with a focus on order verification processes, compounding procedures and prescribing practices. Based on the results, a QI plan will be implemented during the first 2 quarters of 2016. A reassessment will occur after implementation to assess effectiveness of waste prevention strategies. **Results/Conclusion:** Final results and conclusions for initial data collection and QI implementation will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the importance of reducing costs associated with drug wastage  
Identify potential strategies employed to reduce IV drug wastage.

### Self Assessment Questions:

Which of the following will occur as a result of effective waste reduction strategies?

- A: Patient care activities are compromised
- B: Allows for more efficient drug compounding and distribution
- C: Limits the hospitals use of higher-cost medications
- D: Excess pharmacy spending increased

Which of the following has been identified as a strategy to reduce IV drug waste?

- A: Decreasing the number of times pharmacy technicians retrieve un
- B: Increasing the number of batched compounding times
- C: Nursing personnel collect all medications needed for the day at the
- D: Pharmacists collect all unused drugs from nursing units one time

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-792L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## HYPOGLYCEMIA INCIDENCE FOLLOWING INSULIN ADMINISTRATION FOR THE TREATMENT OF HYPERKALEMIA

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Previous studies have demonstrated that patients with end-stage renal disease or acute kidney injury, low body weight (less than 50 kilograms) and no history of diabetes are at increased risk for the development of hypoglycemia after treatment of hyperkalemia with insulin. It is unclear at this time which risk factors are the strongest predictor for the development of hypoglycemia. The objective of this evaluation is to characterize the incidence of hypoglycemia in patients treated with insulin for hyperkalemia with known risk factors (e.g. low body weight, kidney dysfunction, and the absence of a diabetes diagnosis). This evaluation has been submitted to the Institutional Review Board with approval. The electronic medical records of patients who have received insulin for the treatment of hyperkalemia will be reviewed. A sample size of 284 patients was determined to produce a two-sided 95% confidence interval with a width of 0.06. Patients will be included if they are greater than or equal to 18 years old, have a serum potassium greater than or equal to 5.4 mmol/L, received treatment for hyperkalemia with insulin and dextrose, and have a documented blood glucose or point of care blood glucose before and within 6 hours of insulin treatment. Patients with hemolyzed blood samples will be excluded. Demographic data and treatment outcomes will be collected. Primary outcomes will include incidence of hypoglycemia in all patients treated with insulin for hyperkalemia as well as the incidence of hypoglycemia in patients with known risk factors (e.g. low body weight, kidney dysfunction, and the absence of a diabetes diagnosis). The secondary outcomes will include incidence of clinically severe hypoglycemia, documented symptomatic hypoglycemia, and a comparison of the incidence of hypoglycemia between each risk factor group. Collection of information is currently in progress. The final results and conclusions will be presented.

### Learning Objectives:

Define the mechanism of action of insulin in the treatment of hyperkalemia.

Recognize previously identified risk factors for the development of hypoglycemia after hyperkalemia treatment with insulin.

### Self Assessment Questions:

Insulin stimulation of what transporter results in intracellular influx of potassium?

- A: Glucose transporter
- B: Sodium-calcium exchanger
- C: Sodium-proton antiporter
- D: Hydrogen-potassium ATPase

Previously identified risk factors for the development of hypoglycemia after hyperkalemia treatment with insulin include all of the following except:

- A: Diabetes diagnosis
- B: Kidney dysfunction
- C: Low body weight
- D: Absence of diabetes diagnosis

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-925L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF INFlixIMAB INITIAL DOSING IN PEDIATRIC PATIENTS WITH INFLAMMATORY BOWEL DISEASE

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**Purpose:** Pediatric patients with ulcerative colitis have a more severe phenotype compared to the adult population, resulting in more extensive disease and a higher rate of acute, severe exacerbations. Current treatments of inflammatory bowel disease (IBD) in pediatric patients include immunomodulators, 5-aminosalicylic acid, corticosteroids and anti-tumor necrosis factor-alpha agents. Infliximab, a chimeric IgG-1 monoclonal antibody, was the first biologic to be approved in pediatric patients with moderately to severely active IBD. The FDA-approved pediatric dose is 5mg/kg/dose given at weeks 0, 2, and 6 during induction period. However, there has been a push in practice to initiate 10 mg/kg dosing with infliximab in hopes to induce remission faster. This study would like to determine whether this more aggressive, initial dosing of infliximab in IBD flares results in better symptom control in comparison to a more conservative dosing.

**Methods:** This is a retrospective, observational, single-center chart review performed using electronic medical record system. Patients younger than 18 years of age who received infliximab for acute flare of IBD at Comer Childrens Hospital at University of Chicago Medicine from December 1, 2009 to October 31, 2015 were included. The primary endpoint of the study was the efficacy of low dose versus high dose controlling for severity of symptoms (%) at week 12. Baseline characteristics including patients age, sex, ethnicity, type of IBD, disease history, initial Harvey-Bradshaw Index, Pediatric Ulcerative Colitis Activity Index (PUCAI), previous or concomitant use of adjunctive medications, total daily dose of glucocorticoids at time of infliximab infusion, total cost of infliximab during induction, total cumulative infliximab dose once post induction were collected. Symptom control at week 6 and first visit after induction, laboratory improvement and incidence of hepatotoxicity were also assessed.

**Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the management of IBD in pediatric patients.

Describe the measures to evaluate disease activity in IBD.

### Self Assessment Questions:

Which of the following is/are considered effective agents in inducing remission of IBD?

- A: Corticosteroids
- B: Biologics
- C: Antibiotics
- D: A and B

Which of the following is NOT included in the PUCAI?

- A: Stool consistency
- B: Complications including fistula or abscess
- C: Rectal bleeding
- D: Abdominal pain

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-479L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF UTI TREATMENT AND FOLLOW UP INITIATED IN THE ED AT A VA HOSPITAL

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**Purpose:** The Infectious Diseases Society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria recommend against antimicrobial treatment for urinary tract infections (UTIs) in the absence of dysuria, fever, suprapubic pain, or other signs and symptoms of a UTI. Inappropriate antimicrobial treatment of asymptomatic bacteriuria can increase negative outcomes including antimicrobial resistance, adverse drug reactions, and healthcare costs. Antimicrobial stewardship programs (ASPs) are useful tools to help slow the increase in antimicrobial resistance, and emergency departments (EDs) represent a unique setting where ASPs are less commonly utilized. Examples of ASP-led interventions include ED-specific antibiograms, post-prescription culture follow-up, and the coordinated involvement of ED physicians, clinical pharmacists, and microbiology laboratories. These tools have been shown to produce positive outcomes in optimizing ED antimicrobial prescribing leading to decreased hospital readmissions and return ED visits. The primary purpose of this project is to determine the frequency of patients discharged from the ED with appropriate antimicrobial therapy for UTI diagnoses at the Edward Hines, Jr. VA Hospital. Secondary outcomes will be to determine the frequency of patients receiving necessary post-discharge antibiotic interventions and the frequency of antibiotic-related adverse drug reactions.

**Methods:** This study will be a retrospective observational analysis of VA medical, pharmacy, and microbiology data from patients with urine cultures sent to the microbiology laboratory for analysis. All patients with urine cultures sent from the ED will be included. Patients with catheters, on concurrent antimicrobial therapy, prescribed antimicrobial therapy for multiple indications, and those admitted for inpatient treatment will be excluded. Data regarding patient demographics, urinalysis results, UTI symptoms, antimicrobial agents, urine culture results and susceptibilities, and rates of UTI-related readmissions or ED return visits will be collected and analyzed.

**Results and Conclusion:** Data is currently being collected. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define asymptomatic bacteriuria and describe the conditions for appropriate treatment of a UTI

List examples of ASP-led interventions and how these tools can optimize antimicrobial prescribing of UTIs in the ED

### Self Assessment Questions:

Which of the following patients is appropriate for antibiotic treatment of a UTI?

- A: Non-pregnant female with an abnormal urinalysis
- B: Non-catheterized male s/p uncomplicated transurethral resection of prostate
- C: Patient with presence of bacteria in urinalysis without signs or symptoms
- D: Patient with two day history of dysuria and fever

Which of the following is correct regarding potential strategies for ASP implementation in the ED to help improve UTI prescribing?

- A: Use of guided UTI order sets has not been shown to improve outcomes
- B: There is no benefit from the inclusion of a dedicated ED clinical pharmacist
- C: Improved technology through rapid diagnostics and clinical decision support
- D: Implementing timely post-prescription culture follow up is likely to improve outcomes

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-793L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## MINIMIZING UNFRACTIONATED HEPARIN EXPOSURE: A SAFETY IMPROVEMENT PROJECT

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**Purpose:** Approximately 2 million new cases of venous thromboembolism (VTE) occur each year in the United States. There are various advantages of using alternative parenteral anticoagulants to unfractionated heparin including (UFH): minimizing blood draws for monitoring the anticoagulant effect in select patients, subcutaneous route of administration and the potential to treat or overlap therapy if using a vitamin K antagonist as an outpatient. The Antithrombotic Therapy and Prevention of Thrombosis guidelines recommend UFH, low molecular weight heparin (LMWH), and fondaparinux as grade 1B recommendations for the treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE). **Objectives:** The objective of this project is to minimize use of UFH with transition to alternative parenteral anticoagulants to reduce length of stay, cost, laboratory monitoring, and heparin induced thrombocytopenia (HIT). **Methods:** An evidence based algorithm was drafted and implemented suggesting alternative parenteral anticoagulants of UFH. Hemodynamically stable patients with confirmed acute DVT/PE were included in the project. Patients with end stage renal disease were excluded. Primary outcome measurements included duration of UFH and length of hospital stay. Secondary outcome measurements included amount of laboratory monitoring, evidence of bleed, evidence of HIT and 30 day hospital readmission rates. **Results/Conclusion:** Retrospective data is being analyzed to determine baseline unfractionated heparin use and associated average length of stay at Aurora Health Care. Use of UFH, hospital length of stay, and laboratory monitoring will be evaluated pre and post implementation of treatment algorithm. Potential cost savings will be estimated based on amount of laboratory tests and length of hospital stay. Results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Name three parenteral anticoagulants recommended by the 2012 Antithrombotic Therapy and Prevention of Thrombosis Guidelines for treatment of acute VTE

List two benefits of using alternative parenteral anticoagulants compared to use of unfractionated heparin

### Self Assessment Questions:

1. The 2012 Antithrombotic Therapy and Prevention of Thrombosis Guidelines make a 1B recommendation for which parenteral anticoagulants for the treatment of deep vein thrombosis and pulmonary embolism

- A Ufh
- B: Ufh, lmwh
- C: UFH, LMWH, fondaparinux
- D: LMWH, fondaparinux

2. Which of the following benefits of using alternative parenteral anticoagulants over UFH has been shown in literature?

- A Decreased mean cost per patient hospital stay
- B Decreased risk of bleed
- C Decreased risk of HIT
- D Increased length of hospital stay

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-480L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE REVIEW OF THE PRESCRIBING AND MANAGEMENT OF GENE-TARGETED ORAL CHEMOTHERAPEUTICS IN NON-SMALL CELL LUNG CANCER (NSCLC)

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**Purpose:** Lung cancer is the leading cause of cancer-related death in the United States. In recent years, the utilization of gene-targeted oral tyrosine kinase inhibitors has influenced treatment of advanced and metastatic NSCLC. In 2013, erlotinib was the first of these agents to become FDA approved as first-line therapy for metastatic NSCLC, and incorporated into National Cancer Care Network (NCCN) NSCLC treatment guidelines. The recent emergence of these medications, their high price, and indications specific to tumor mutation status all warrant evaluation of prescribing patterns and management trends. The purpose of this study is to analyze utilization of gene-targeted oral chemotherapy agents in NSCLC within the Marshfield Clinic system, as well as the management of these patients, with the goal of improving patient care. **Methods:** This retrospective study included patients 18 years of age and older with a diagnosis of NSCLC who were initially prescribed a gene-targeted oral chemotherapy agent by a Marshfield Clinic Oncology specialist between May 15, 2013 and August 20, 2015. Patients whose total use of a gene-targeted oral chemotherapy agent was less than 14 days were excluded. During this timeframe, 55 unique patients met the inclusion criteria. A proposal was submitted and approved by the Institutional Review Board. Data collected included patient demographics, duration of lung cancer diagnosis, number of patients on each of the oral chemotherapy agents, stage and histology of NSCLC, tumor mutations tested and those which are present, date of initiation of gene-targeted oral chemotherapy, date adverse event was reported and subsequent intervention for drug-linked adverse events, date and reason for dose reduction or discontinuation, and sequence in NSCLC treatment (e.g. first-line, second-line). Descriptive statistics were utilized to analyze the data. **Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify appropriate indications for the use of gene-targeted oral chemotherapy agents in non-small cell lung cancer

Describe how pharmacist intervention has the potential to improve care for patients using these gene-targeted oral chemotherapy agents

### Self Assessment Questions:

Which histology of non-small cell lung cancer (NSCLC) is most likely to contain an epidermal growth factor receptor (EGFR) or anaplastic lymphoma kinase (ALK) mutation?

- A Squamous cell
- B: Large cell
- C: Adenocarcinoma
- D: Mixed histology

In which way(s) can a pharmacist potentially improve patient care as it relates to oral chemotherapy agents?

- A By creating, improving, and/or updating patient education material
- B By providing education to providers on data and trends in adverse
- C By creating standardized guidelines for adverse event management
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-481L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF HEART FAILURE MANAGEMENT IN PRIMARY CARE CLINICS AT A VA MEDICAL CENTER, PART 2

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Data was collected on approximately 200 patients with a qualifying ICD-9 CHF diagnosis who were managed by primary care teams within the Indianapolis VA Medical Center. This data was collected during a twelve month period from July 2014 to June 2015 and included patient demographics, NYHA Functional Class, CHF diagnostic results, signs and symptoms of heart failure, medications used in the treatment of heart failure and if target dose were achieved, adherence to therapy, use of medicines known to exacerbate heart failure and number of emergency department visits, urgent care visits, or hospital admission encounters related to CHF complications in addition to all-cause and CV related mortality. Currently, clinical pharmacy specialists have scope of practice to care manage patients with diabetes, hypertension, dyslipidemia, hypothyroidism and tobacco use. The goal of this study is to incorporate care management of patients with CHF based on the results of the data collected above. Part two of this study will involve developing education and training for the clinical pharmacy specialists in primary care to effectively manage patients with CHF, education for the patients, creation of a CHF note template and check-out orders for referrals from providers.

### Learning Objectives:

Define the elements encompassed in the proposed educational and training materials for clinical pharmacy specialists in primary care  
Discuss the clinical opportunities identified retrospectively for implementation of clinical pharmacy specialist heart failure management

### Self Assessment Questions:

The CHF-management training program for primary care clinical pharmacy specialists will include background knowledge necessary to interpret which of the following?

- A: Serum electrolytes
- B: Echocardiograms
- C: Brain natriuretic peptide levels
- D: A, B, and C

Educational materials for clinical pharmacy specialists participating in CHF management referencing indication, dosing, adverse drug reactions, monitoring, and pertinent counseling points will cover a

- A: Beta-blockers
- B: Aldosterone antagonists
- C: Antiplatelet agents
- D: Vasodilators

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-482L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ASSESSING THE NUMBER AND TYPES OF CLOSE CALLS AT THE VISN 11 PHARMACY CALL CENTER

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Purpose: The Veterans Integrated Service Network (VISN) 11 of the Department of Veterans Affairs (VA) has developed a centralized call center to process prescription refill requests and renewals for its seven medical centers and affiliated community-based outpatient clinics. Currently, the call center lacks a systematic process for evaluating errors that do not reach the patient, also referred to as "close calls". This project will serve to implement a standardized close call reporting process and develop a way to evaluate data to identify the root causes of close calls. Methods: This quality improvement study will identify the most common types of close calls that occur at the call center. The initial step of this project included developing a close call reporting form using the current close call data, as well as anticipating types of close calls that may occur at the VISN 11 Pharmacy Call Center. A write-in option was available for occurrences not listed on the form. The goal of this form was to make it specific to the call center environment and user-friendly in terms of minimizing the length of needed items for reporting, thereby improving the chances for increased reporting. The close call reports will be collected, categorized by occurrence, and analyzed to identify areas of improvement within the call center. Prior to form distribution, staff has been engaged to gain acceptance and promote participation in the process. Staff opinions will be sought and incorporated at all stages of the project. Analysis of the process and subsequent results will then commence. Results:

Results to be presented at Great Lakes Pharmacy Residency Conference  
Conclusion: Conclusions to be presented at Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Identify the top 3 root causes of close calls from preliminary results made by the pharmacy call center staff

Discuss methods of incentivizing staff to reduce close calls at the VISN 11 pharmacy call center

### Self Assessment Questions:

What is one of the top 3 close calls from preliminary results reported by VISN 11 pharmacy call center staff?

- A: Incorrect patient selected in CRM
- B: Medications placed in wrong queue
- C: Refills available, but refill requested and sent via CPRS
- D: Refill requested for renewal at outside pharmacy and renewed into

What type of incentive has been determined to potentially reduce close calls for the call center staff?

- A: Day off
- B: Free lunch
- C: Extra vacation day
- D: Overtime

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-926L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CLINICAL PHARMACIST IMPACT ON ANTIBIOTIC TREATMENT FOR SEPSIS IN THE EMERGENCY DEPARTMENT

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**Purpose:** As the Emergency Department (ED) serves as an entry point for many patients presenting with sepsis, the presence of an ED clinical pharmacist may have a beneficial impact on these patients. At our institution, an ED clinical pharmacist is present, on average, 12 hours per day, five days per week. The objective of this study was to determine if the presence of a clinical pharmacist in the ED had a positive impact on appropriateness of antibiotic therapy and time to antibiotic administration in patients presenting with sepsis. **Methods:** This study was approved by our Institutional Review Board. This was a prospective study with data collected in a retrospective manner via chart review. Patients presenting with an ED diagnosis of sepsis were included and obtained through an electronic medical record system report. Patients that presented while the ED clinical pharmacist was present were stratified into the treatment group, while all other patients fell into the control group. Primary endpoints evaluated were appropriateness of antibiotic therapy and time to antibiotic administration. Appropriateness of antibiotic therapy was defined as initiation of an antimicrobial with activity against the ultimately cultured pathogen. Secondary endpoints included in-hospital mortality, intensive care unit length-of-stay, and hospital length-of-stay. Data collected included: diagnosis of sepsis and suspected source(s) of infection at time of presentation, time zero (defined as ED arrival time or time of sepsis alert called in ED), empiric antibiotics selected, time antibiotics ordered, time antibiotics administered, and finalized culture data. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the impact the presence of a clinical pharmacist has on the provision of sepsis care in the Emergency Department  
Discuss the benefits of utilizing possible source of infection to guide antibiotic selection

### Self Assessment Questions:

Every hour delay in the initiation of antimicrobial therapy in septic shock is associated with what percent increase in mortality?

- A: 3%
- B: 8%
- C: 20%
- D: 25%

Which antibiotic was utilized most in instances where "over-coverage" against a patients suspected source of infection occurred?

- A: Cefepime
- B: Ceftriaxone
- C: Levofloxacin
- D: Vancomycin

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-483L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ADHERENCE TO GUIDELINE BASED TREATMENT FOR PATIENTS ADMITTED TO THE HOSPITAL WITH COMMUNITY ACQUIRED PNEUMONIA

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**PURPOSE:** Initiation of appropriate empiric antimicrobial therapy is critical for patients requiring hospitalization for community acquired pneumonia (CAP). Current evidence demonstrates decreased mortality, length of hospital stay, and health care costs in patients treated with appropriate antibiotics. Guideline based treatment protocols have shown mortality benefits and lower readmission rates, however room for improvement remains in adhering to evidence based protocols. The objectives of this study are to analyze compliance rates for empiric antibiotic selection based on the Infectious Diseases Society of America/American Thoracic Society (IDSA/ATS) Consensus Guidelines for the management of CAP in adults, to compare initial antibiotic choice with listed drug allergies, and to examine appropriateness of conversion from intravenous (IV) to oral (PO) therapy. **METHODS:** This retrospective review was approved through the Institutional Review Board. Patients 18 years or older admitted to Gundersen Lutheran Medical Center with a diagnosis of CAP started on IV antibiotics were included in this study. Patients were identified via electronic health record documentation of ICD-9 diagnosis codes specific for CAP. Exclusion criteria included patients directly admitted to the critical care unit or requiring antibiotic treatment for concurrent infections. Patients were categorized by empiric antimicrobial therapy initiated on admission

Empiric antibiotic selection, duration of treatment, and changes in drug or route were assessed using the medication administration record during the inpatient stay. Listed drug allergies were collected from the electronic medical record. Other parameters to assess appropriateness of conversion from IV to oral therapy were also collected. The primary outcome measure is the time to transition from IV to oral antibiotics between groups. Secondary outcome measures are provider adherence to IDSA/ATS guidelines, appropriateness of empiric therapy based on listed medication allergies, and total duration of treatment.

**RESULTS:** Data collection and analysis is ongoing. Results will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify empiric antibiotic treatment regimens recommended by the IDSA/ATS CAP treatment guidelines.

Recognize benefits of initiating appropriate empiric antibiotic therapy and de-escalating therapy.

### Self Assessment Questions:

According to the IDSA/ATS CAP treatment guideline, which of the following is considered first-line empiric antibiotic regimen for inpatient, non-ICU treatment of CAP?

- A: Ciprofloxacin 500 mg orally every 24 hours
- B: Ceftriaxone 2 gm IV q24h + azithromycin 500 mg IV every 24 hours
- C: Doxycycline 500 mg orally every 12 hours
- D: Piperacillin-tazobactam 3.5 gm IV every 8 hours + levofloxacin 750 mg IV every 24 hours

Which of the following is a benefit of treating CAP patients according to IDSA/ATS CAP treatment guidelines?

- A: Increased length of hospital stay
- B: Decreased mortality
- C: Increased hospital admission for 'low risk' patients
- D: Higher readmission rates

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-484L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## DEVELOPMENT OF AN EMERGENCY DEPARTMENT ANTIMICROBIAL SURVEILLANCE PROGRAM

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**Purpose:** To evaluate the results of emergency department (ED) drawn urine cultures and empiric antimicrobial selections by ED providers in the treatment of urinary tract infections in order to ensure appropriate antimicrobial use, provide optimal coverage of identified pathogens, identify a need for real-time culture monitoring, and improve patient outcomes. **Methods:** Data collection and analysis was completed via the Roudebush VA Medical Centers Decentralized Hospital Computer Program (DHCP) and Computerized Patient Record System (CPRS) medical record applications. Primary data collected for the project included the results of all urine cultures drawn in the emergency department during a 90 day period and the antimicrobial agents used to treat these infections. Additional data collected included the patients presenting complaint, the presence of additional infections or indications for antibiotics, and the patients admission status. **Preliminary results:** Analysis of preliminary data indicates a drug-bug match rate of 88% during the 90 day period. Additional data indicate that fluoroquinolones are the most frequently used empiric therapy, with ciprofloxacin comprising 32% of all treatment courses. **Conclusions reached:** Conclusions to be presented at Great Lakes Pharmacy Residency Conference

### Learning Objectives:

List the most common drug used to treat urinary tract infections at the Roudebush VAMC

Select the percentage of patients with cultures that received antimicrobial agents providing adequate coverage for identified organisms

### Self Assessment Questions:

Based on study findings, what is the most commonly utilized agent for the empiric treatment of urinary tract infections at the Roudebush VAMC?

- A Trimethoprim/sulfamethoxazole
- B: Amoxicillin
- C: Ciprofloxacin
- D: Nitrofurantoin

What percentage of patients received antimicrobial agents that provided adequate coverage of culture results?

- A 20-30%
- B 40-50%
- C 60-70%
- D 80-90%

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-485L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PEDIATRIC ACUTE KIDNEY INJURY PREVENTION TOOL IMPLEMENTATION

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**Purpose:** Nephrotoxic medications (NTMx) are an increasingly common cause of acute kidney injury (AKI) in hospitalized pediatric patients. The purpose of this quality improvement project is threefold: to increase prospective renal function monitoring in patients at high-risk of NTMx-AKI, which is currently lacking within our childrens hospital; to decrease NTMx-AKI intensity; and to expand institutional awareness of NTMx through increased communication between providers and pharmacists.

**Methods:** An automatic trigger function tool was built within the electronic health record (EHR) to facilitate prospective renal function monitoring in high-risk pediatric patients. This tool flags all pediatric patients prescribed  $\geq 3$  NTMx simultaneously, who received an intravenous aminoglycoside for  $\geq 3$  days and patients who need follow-up. Upon notification, pharmacists are able to evaluate whether a baseline serum creatinine was drawn and the need for subsequent daily serum creatinine values to appropriately monitor for increases in serum creatinine and AKI. Additionally, prior to the launch of the trigger tool, pediatric medical residents were surveyed to assess the opinion of other healthcare providers on the pharmacists role in prospective monitoring. **Results:** Survey results indicate that the majority of pediatric medical residents feel that regular renal function monitoring is important, are very comfortable with pharmacists recommending renal function monitoring, and believe that this initiative will have a positive impact on their patients, with the primary concern being lack of IV access. **Conclusion:** Utilizing an EHR trigger system to identify NTMx exposure and establish the incidence of NTMx-AKI in our hospitalized pediatric patients is an effort welcomed by pediatric residents. Having established our rate of NTMx AKI, we will be able to work on methods to reduce it by increasing acceptance of this effort by all health care providers within the hospital and improving communication between pharmacy and medical providers.

### Learning Objectives:

Recognize the benefits of pharmacists regularly monitoring renal function in pediatric patients at high risk for developing nephrotoxin induced acute kidney injuries.

State the two circumstances that flag pediatric patients as high risk for developing nephrotoxin induced acute kidney injuries.

### Self Assessment Questions:

Which of the following is an institutional benefit of pharmacists identifying patients at high-risk of developing nephrotoxin induced acute kidney injury?

- A Creates a protocol for pharmacists to be able to order kidney function
- B: Reduces the use of nephrotoxic medications
- C: Elevates the awareness of the medical staff regarding nephrotoxic
- D: Identifies the physicians whose prescribing results in the highest risk

Which scenario would automatically flag a patient within the electronic health record as high risk for developing a nephrotoxin induced acute kidney injury?

- A Patient on enalapril and ganciclovir without fluids running
- B Patient starting IV tobramycin for a cystic fibrosis exacerbation
- C Patient on lisinopril and tacrolimus who finished a 5 day course of
- D Patient who is on lithium at home who presents with decreased uric acid

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-927L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## VALUE ADDED BY PHARMACISTS IN A PATIENT-CENTERED MEDICAL HOME

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**Purpose:** The purpose of this study was to demonstrate the value added by pharmacists in a patient-centered medical home (PCMH). The primary objective was to identify and quantify the types of interventions made by pharmacists in this setting. Secondary objectives were to determine the number of pharmacist recommendations accepted, the number of interventions resulting in reimbursement, and average time spent per encounter.

**Methods:** For this prospective, descriptive study, participants included pharmacists (n=8) employed at five PCMH locations. Over 20 business days, pharmacists completed a Qualtrics survey after each intervention made, characterizing and detailing the outcome(s) of that specific encounter.

**Results:** A total of 581 surveys were submitted. Patients were 45% male, mean age 58 years, 67% Caucasian, 97% insured, and were prescribed ~14 home medications. Twenty-nine percent of encounters were scheduled, 71% occurred unpredictably. Encounters included individual pharmacy visits (13%), multidisciplinary team visits (32%), drug information requests (23%) and communication by phone or secure portal (30%). The most common health-related interventions (N=878) included diabetes management (130), diabetes education (88), anticoagulation (105), comprehensive medication reviews (71), mental health (52), hypertension (50), and transitions of care (45). The majority of interventions involved shared-decision making between the patient, provider, and/or the patient. Of 918 pharmacist recommendations made to providers, 830 (90%) were implemented. Of 412 pharmacist recommendations made to patients, 393 (95%) were accepted. Forty percent of encounters resulted in reimbursement. The average time spent per encounter was 20 minutes.

**Conclusion:** Pharmacists are highly accessible and involved in managing many health-related problems as integral members of the PCMH healthcare team. Recommendations made by pharmacists were implemented at high rates, demonstrating the value added by pharmacy services in this setting. Pharmacists should continue to advocate for provider status so that the value added by pharmacists is financially recognized.

### Learning Objectives:

Identify the types of interventions made by pharmacists in a patient-centered medical home (PCMH).

Describe the value added by pharmacists in the PCMH model of care.

### Self Assessment Questions:

Which of the following is a major barrier for pharmacists in the ambulatory setting?

- A Inadequate training
- B: Continuing education
- C: Billing and reimbursement
- D: Insufficient workspace

Which of the following CPT codes is used to bill "incident to"?

- A 99211
- B 99212
- C 99495
- D 99605

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-972L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OPTIMIZATION OF NICU PHARMACY PRACTICE

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**Purpose:** Providing pharmaceutical care for critically ill newborns in a neonatal ICU (NICU) can be challenging. Aurora Health Care (AHC) has seven hospitals that provide NICU pharmaceutical care. A standardized competency for pharmacists and pharmacy technicians training for a NICU position is not in use. Site practice resources need to be organized and made available across the system. Additionally, inconsistencies have been identified between the electronic tools and practice resources. The purpose of this project was to improve NICU education materials, standardize practice resources, and optimize electronic tools at AHC. **Methods:** In an effort to catalog current NICU pharmacy practice, an assessment of current education materials, practice resources, and electronic tools across AHC was performed. A survey was designed and sent to pharmacy directors, pharmacy clinical coordinators, staff pharmacists, and pharmacy technicians directly involved in current AHC NICU services or those directly overseeing such services. Survey results were utilized to highlight gaps in current NICU practice at AHC and identify areas for improvement. Training competencies for both pharmacists and pharmacy technicians were developed to educate new NICU pharmacy caregivers. Site practice resources were organized and made available across the AHC system. Further, inconsistencies with expiration dates and storage requirements found between the electronic tools and practice resources were addressed. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List three areas for improvement when optimizing NICU pharmacy practice.

Describe methods an organization may consider using to educate pharmacy caregivers.

### Self Assessment Questions:

What areas were considered for improvement when optimizing NICU pharmacy practice at AHC?

- A Electronic tools, staffing model, practice resources
- B: Education materials, practice resources, electronic tools
- C: Practice resources, education materials, drug purchasing
- D: Education materials, staffing model, electronic tools

Which of the following methods may be used to educate NICU pharmacy caregivers?

- A Education is not necessary
- B Hands-on training
- C Computer-based training module
- D B and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-794L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF SEPSIS-DIRECTED ORDERSET IMPLEMENTATION ON ACHIEVEMENT OF SEVERE SEPSIS AND SEPTIC SHOCK BUNDLE MEASURES

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**Purpose:** The Centers for Medicare & Medicaid Services (CMS) have issued new measures for the care of severe sepsis and septic shock, as part of the Hospital Inpatient Quality Reporting program. Reporting requirements began with discharges on or after October 1, 2015. These measures are part of a management bundle, in which all benchmarks must be met in order to be labeled as achieved. Identification of severe sepsis and septic shock populations are met with certain criteria, and bundle measures are based on two time periods: three hours after diagnosis and six hours after diagnosis. The utilization of separate rolling time clocks requires that care teams strive for early detection, and that they be diligent about when orders are carried out. The objective of this evaluation is to assess how implementation of sepsis-directed ordersets affect achievement of severe sepsis and septic shock measures at Columbus Regional Health. **Methods:** A retrospective review will be conducted on patients treated for severe sepsis, with or without septic shock, who will have been discharged between October 1 2015 and March 13, 2016. Excluded from this analysis are: 1) patients transferred from another hospital; 2) patients who expired within 180 minutes of presentation; 3) patients with directives for comfort care documented within six hours of presentation; and 4) patients with documented or witnessed refusal of treatment. Achieved measures will be compared before and after implementation of sepsis-directed ordersets. Measures will include blood culture collection, appropriate antibiotic administration, fluid bolus administration, and repeat lactate levels. **Results:** Final results and conclusions are pending and will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the benchmark measures included in the CMS severe sepsis bundle.

Discuss barriers to achievement of sepsis bundle measures in the treatment of patients with severe sepsis, with or without septic shock.

### Self Assessment Questions:

When treating severe sepsis in an inpatient setting, which of the following measures should be achieved within three hours after presentation?

- A Administering 50ml/kg of crystalloid fluid as a bolus
- B: Obtaining a repeat lactate level
- C: Obtaining blood cultures prior to antibiotic administration
- D: Obtaining an x-ray of the suspected area of infection

Which of the following is not a barrier to the achievement of sepsis bundle measures?

- A Lack of communication between hospital departments
- B Prompt identification of patients with severe sepsis
- C Hesitancy to administer fluid boluses to patients already fluid-over
- D Separate rolling time clocks for treatment of severe sepsis and septic shock

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-486L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF AN ACUTE KIDNEY INJURY TRIGGER TOOL IN A COMMUNITY HOSPITAL SETTING

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**Purpose:** The incidence of acute kidney injury (AKI) is approximately 5% in hospitalized patients, and may be even higher among patients in intensive care units and patients with pre-existing renal impairment. AKI is often multifactorial, but receipt of multiple nephrotoxic drugs can increase patient risk. The purpose of this project is to implement a tool within the electronic medical record system that helps identify patients who have received multiple nephrotoxic drugs, and educate the pharmacy staff on how this tool will mitigate nephrotoxin-associated AKI. **Methods:** An acute kidney injury trigger tool (AKITT) was built within an electronic medical record. This tool automatically generates a real-time list of patients who have received one of the following nephrotoxic drug combinations: vancomycin plus intravenous (IV) aminoglycoside antibiotic, vancomycin plus ketorolac, vancomycin plus IV contrast dye, IV aminoglycoside plus ketorolac, or IV aminoglycoside plus IV contrast dye. The tool only detects patients who have received these nephrotoxic drugs within certain time periods of one another. Pharmacists will be educated on the use of the tool. Prior to the education, a "pre-test" will be administered to the clinical pharmacists to assess baseline comfort levels and knowledge regarding AKI. Then, clinical pharmacists will be required to attend one of four live education sessions and complete a post-test to gauge changes in knowledge and/or attitudes toward AKI. Clinical pharmacists will begin to use the tool in their daily practice: initial feedback on the tool will be obtained, and modifications will be made as appropriate. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss risk factors for nephrotoxin-associated acute kidney injury.

Outline the process for implementing a tool to monitor patients at an increased risk for nephrotoxin-associated acute kidney injury.

### Self Assessment Questions:

Which of the following drug combinations will result in an increased risk of acute kidney injury?

- A Vancomycin and acetaminophen
- B: Gentamicin and levothyroxine
- C: Vancomycin and IV contrast dye
- D: Gentamicin and warfarin

The acute kidney injury trigger tool is designed to:

- A Identify patients at risk for acute kidney injury due to receipt of sepsis bundle
- B Identify patients who have received IV contrast in the past 7 days
- C Monitor serum creatinine daily and generate alerts when acute kidney injury is detected
- D Identify patients with active vancomycin orders and no documented renal impairment

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-795L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REDUCTION OF NEAR MISS OCCURRENCES THROUGH PROCESS IMPROVEMENT

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Near misses are unplanned events that do not result in injury, illness or harm to a patient, but have the potential to do so if not discovered prior to dispensing. Reducing the number of near misses could decrease the risk of patient harm since any near miss is one step away from a true miss (e.g., medication error). The purpose of this project is to implement an intervention in the order entry process to reduce the frequency of near misses. Each near miss comes with time and resource costs associated with correcting the error, resulting in interruptions of work flow and less time for patient care. By reducing the number of near misses, time and cost savings could be realized through increased efficiency within the pharmacy workflow. Near miss baseline data was collected from Diplomats error reporting database for the month of September 2015. The highest-frequency category was determined to be "incorrect directions." An assessment of the order entry process was conducted to formulate an intervention in the form of process improvement, training, education or a combination thereof. Thirty days post-intervention data will be obtained to determine if reductions in the specific error category have been achieved. These two data sets will be used to determine the relative risk and risk difference before and after the applied intervention. To accurately capture the time and financial costs of correcting the errors associated with near misses, a mean time of correction and documentation will be calculated through personnel observation. These mean times will be used to calculate the average time and cost of error corrections, both before and after the intervention described above. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Define the term "near miss" and explain its significance in the prescription filling process.

Identify errors that have the potential to cause patient harm if not caught before arriving to the patient.

### Self Assessment Questions:

Which of the below answers correctly defines a "near miss," per the Institute for Safe Medication Practices?

- A: An event, situation or error that took place, but was captured before
- B: An event, situation or error that took place and was not captured before
- C: An event, situation or error that took place and did not pose a risk
- D: An event, situation or error that took place, posing a risk of harm to the patient

Which of the below errors in the prescription filling process has the greatest potential to harm a patient?

- A: The doctor's fax number has been entered incorrectly into the system
- B: The prescription origin (fax, e-script, verbal, hand-written) has been entered incorrectly
- C: The wrong dosage form of the correct drug was entered
- D: Patient has a working phone number on file, but their email address is not

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-928L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFICACY AND TOLERABILITY OF WEEKLY VERSUS DAILY GLP-1 AGONISTS IN PATIENTS WITH TYPE 2 DIABETES

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Purpose: GLP-1 agonists for the treatment of type 2 diabetes are gaining popularity due to benefits of weight loss and the potential to improve patient adherence. Due to insurance formularies, patients are often limited to coverage of a once daily agent and one of the once weekly agents. While head to head trials have been performed to compare single agents to each other, no studies exist to compare daily therapies versus weekly therapies as a group. The primary objective of this study is to compare tolerability and efficacy of once daily GLP-1 agonists to that of once weekly GLP-1 agonists to determine if significant differences exist. Methods: A retrospective chart review of patients who received GLP-1 agonists at Indiana University Health Family Medicine Clinics from September 1, 2014 to August 31, 2015 was conducted to analyze efficacy and tolerability between once daily and once weekly agents. Patients greater than 18 years old who received once daily liraglutide or once weekly albiglutide, dulaglutide, or exenatide were included in this study. Data collected includes baseline characteristics, weight and A1C at initiation of therapy, and weight and A1C at a minimum of 3 months of therapy. Results/Conclusion: Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Review the benefits of GLP-1 agonists in patients with type 2 diabetes. Identify tolerability concerns with GLP-1 agonists.

### Self Assessment Questions:

Which of the following is a potential benefit of GLP-1 agonist in patients with type 2 diabetes?

- A: Increase in HgA1C
- B: Decrease in weight
- C: Decrease in HgA1C
- D: Both B and C

Which of the following is the main tolerability concern with GLP-1 agonists?

- A: Gastrointestinal Upset
- B: Headache
- C: Hypoglycemia
- D: Weight gain

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-487L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## UPDATING AND STANDARDIZING MULTIPLE PGY1 PHARMACY RESIDENCY PROGRAMS WITHIN A HEALTH SYSTEM

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Purpose ASHP is responsible for establishing and conducting a standardized accreditation process for pharmacy residency training programs. ASHP's most recent revision to the PGY1 Pharmacy Residency Standard occurred in 2014. Residency programs accredited by ASHP are required to implement this standard by July 1, 2016. Aurora Health Care currently has three PGY1 Pharmacy Residency Programs at sites within the organization. The objective of this project is to align the model of all three PGY-1 Pharmacy Residency Programs conducted at Aurora Health Care for compliance with the 2014 ASHP Pharmacy Residency Standards and establish consistency across our programs. Methods The new ASHP standards were reviewed to gain a fundamental knowledge base. A gap analysis was performed of all 3 programs, comparing current operations with the newly approved PGY1 Pharmacy Standard to identify target areas of intervention. Documents and processes identified were standardized across all 3 PGY-1 Pharmacy Residency programs. Feedback from the residency program directors and preceptors was obtained. New processes were prepared, an action plan was put into place, and education was provided. Finally, the gap analysis was re-reviewed to ensure all areas of the newly approved PGY1 Pharmacy Standard were addressed. Results Results of the gap analysis revealed the need to update and standardize processes including learning experience descriptions, initial assessments, our system residency policy, preceptor application process, and information distributed to prospective candidates. Residency program director consensus was reached and education was provided. Conclusion All Aurora Health Care PGY1 Pharmacy Residency Programs have been transitioned to the ASHP 2014 PGY1 Pharmacy Standard.

### Learning Objectives:

Name two areas that could be assessed for compliance with the Newly Approved PGY1 Standard.

Describe one benefit of having three PGY1 Pharmacy Residency Programs standardized within a health system.

### Self Assessment Questions:

What are two areas that could be standardized during a transition to the Newly Approved PGY1 Pharmacy Standard?

- A: Learning experience descriptions and preceptor qualifications
- B: Square footage in the residency offices and resident pager number
- C: Cafeteria menus and resident parking spaces
- D: Learning experience preceptors and all learning experiences offered

What is a benefit to standardization between PGY1 Pharmacy Residency Programs within a health system?

- A: Residency program dependence
- B: Increased efficiency
- C: Collaboration between residents
- D: Increased preceptor applications

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-796L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## YOUR BONE MARROW OR MINE: EVALUATION AND STANDARDIZATION OF CHRONIC GRAFT VERSUS HOST DISEASE MANAGEMENT

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Chronic graft versus host disease (cGVHD) is a major complication of allogeneic stem cell transplantation. Despite prophylaxis, cGVHD occurs in approximately 40% of allogeneic stem cell transplant recipients and remains a leading cause of non-relapse death after transplantation. Patients who develop cGVHD are not only at an increased risk of mortality but also significant morbidity, and they commonly require admission to the hospital to control symptoms, infections, and side effects of treatment. Despite advances in understanding and diagnosing cGVHD, there remains a lack of consensus about the best management approach, especially for patients who are refractory to steroids. The purpose of this project is to standardize current management of cGVHD to improve patient outcomes, promote adherence to the guideline recommendations, and reduce costs. A retrospective chart review of patients who have received an allogeneic bone marrow transplant is being conducted to evaluate medication use for the treatment of cGVHD and subsequent outcomes. Included criteria include a diagnosis of cGVHD between 6/1/2013 and 6/1/2015 to target 80 patients. The primary outcome is the number of patients alive, in remission, and off immunosuppression at the time of review. Adherence to cGVHD national quality measures, adverse effects and costs of medication therapy will also be evaluated. A gap analysis will be conducted comparing local institutional practices with published evidence. Based on these findings, a clinical practice guideline will be developed to guide the prescribing and monitoring of medications for the treatment of cGVHD. Following approval and implementation of the guideline, adherence to the guideline recommendations will be assessed. This project will create efficiencies and improve patient safety through standardization of the management of cGVHD and improved adherence to quality measures. It may also reduce costs by minimizing variation in the prescribing of the high-cost medications used for cGVHD management.

### Learning Objectives:

Describe potential barriers to devising, gaining consensus, and implementing a chronic graft versus host disease clinical practice guideline.

Outline the strategy used for constructing a standardized approach to steroid-refractory chronic graft versus host disease.

### Self Assessment Questions:

Which of the following was a barrier encountered during the writing of this cGVHD clinical practice guideline?

- A: Clinical practice that was already standardized
- B: Institutional resources
- C: Lack of interest from physicians and other health care providers
- D: Lack of high-quality published evidence

Which of the following was crucial to constructing a standardized approach to managing steroid-refractory chronic graft versus host disease?

- A: Consideration of payer mix
- B: Electronic medical record
- C: Physician support and opinions
- D: Robust published evidence

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-488L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REDUCING MISSING MEDICATIONS AND REWORK UTILIZING LEAN PRINCIPLES AT A TERTIARY MEDICAL CENTER

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Purpose: As the cost of health care continues to rise, health systems are placing greater emphasis on streamlining operational efficiency. Increased use of technologies including automated dispensing machines (ADMs), computerized provider order entry (CPOE), and barcode medication administration (BCMA) has decreased medication turnaround time from ordering to administration. Despite these improvements, missing medications continue to be a barrier to providing optimally efficient patient care. The purpose of this project is to reduce missing medications by developing standardized processes to optimize medication access. Methods: This quality improvement project has been exempt from review by the Institutional Review Board. All inpatient units were included with the exception of intensive care and pediatric units. Medications that require nurses to send redispense requests as part of routine practice will also be excluded. The five phases of Lean Six Sigma methodology, define, measure, analyze, improve, and control (DMAIC), will be used to drive this process improvement project. The first stage will be to identify nurse champions and evaluate current nursing and pharmacy processes involving missing medications and delivery of medications. Missing medication and ADM metrics reports will also be assessed. The second stage will involve updating medications stocked in ADMs as well as developing and piloting a standardized nursing and pharmacy process for missing medications and delivery of medications. Improvements will be made to address any barriers identified. Process maps and training materials will be developed and reviewed periodically to maintain consistent and accountable practices among nursing and pharmacy personnel. The primary objective is to reduce missing medications by developing standardized processes to improve access to medications. Secondary objectives include reducing pharmacy rework and waste, optimizing use of ADMs, and expanding the pharmacy technicians role within the medication use process. Results and Conclusions: Data collection and analysis are ongoing and will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List reasons for missing medications

Define the five phases of the Lean Six Sigma methodology of DMAIC

### Self Assessment Questions:

Missing medications may be a result of the following:

- A: Improper delivery
- B: Standard administration times
- C: Changes to the medication order
- D: A and C

The five phases of the Lean Six Sigma methodology of DMAIC includes

- A: Describe, Measure, Analyze, Improve, and Control
- B: Define, Measure, Analyze, Improve, and Control
- C: Define, Measure, Analyze, Implement, and Control
- D: Define, Measure, Adjust, Improve, and Control

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-797L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CHARACTERISTICS OF PATIENTS ACCEPTING AND DECLINING PARTICIPATION IN A TRANSITION OF CARE SERVICE PROVIDED BY A COMMUNITY PHARMACY

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Purpose: To identify characteristics of patients who accept or decline an optional appointment for a transition of care service provided by an independent community pharmacist in partnership with a local hospital. A secondary objective is to identify the most common reasons a patient may decline the service. Methods: A transition of care service is offered by a community pharmacy to patients discharged from the cardiac unit of a local hospital. Eligible patients have a LACE score  $\geq 5$ , live in Wisconsin, and have plans for home discharge. Eligible patients are approached by the community pharmacist at the hospital prior to discharge to explain and offer the service. Once discharged home, the community pharmacist calls interested patients to schedule an appointment. Any patient can schedule the appointment to be conducted at the community pharmacy or by phone. Depending on location, patients may also have the option to schedule the appointment at their home, doctors office, or by rural telehealth. Data collection for eligible patients includes: LACE score, age, gender, geographic home location, and reason for refusing the service. The chi-squared test and logistic regression will be used to compare characteristics between those who accept or decline the service. Reason for decline will be assessed using content analysis. Initial themes include no perceived benefit and perceived barriers. Results/Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain why transition of care services are important to the healthcare community.

Identify the most common reasons a patient may decline participation in an optional transition of care appointment.

### Self Assessment Questions:

According to the Health Belief Model, which of the following reasons for declining participation would be classified in the category of "No Perceived Benefit"?

- A: It is too expensive
- B: I am too busy with other doctor's appointments
- C: My doctor takes care of everything
- D: I don't have a phone for you to reach me once I am home

According to CMS, what is the current national rate for hospital-wide readmissions that hospitals are compared to?

- A: 17.3%
- B: 15.2%
- C: 19.8%
- D: 14.5%

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-798L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INTRABDOMINAL INFECTION MICROBIOLOGY AND RISK FACTOR EVALUATION: A RETROSPECTIVE, SINGLE CENTER, COHORT STUDY

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**Purpose:** Intra-abdominal infections (IAI) significantly contribute to intensive care unit (ICU) infectious mortality. The current Surgical Infection Society (SIS) and Infectious Disease Society of America (IDSA) guidelines are dated and a literature dearth exists for guidance in the treatment of complicated secondary and tertiary IAI. Increasing antibiotic resistance necessitates cautious use of empiric broad-spectrum antibiotics; however, septic patients without adequate empiric therapy are at increased risk for mortality. The main purpose of this study is to describe IAI microbiology and identify risk factors for recurrence and antibiotic resistance. **Methods:** This retrospective, single center, cohort study included IAI diagnosed patients  $\geq 18$  years of age with at least one intra-abdominal culture. Secondary IAI was defined as peritoneal infections secondary to intra-abdominal lesions or trauma. Tertiary IAI was defined as a secondary IAI that did not improve or recurred 48 hours following successful source control procedure. Primary peritonitis diagnosis, incarcerated, and pregnant patients will be excluded. Patients admitted from September 2012 through October 2015 were eligible for inclusion and were identified via electronic medical record (ICD-9 codes) and microbiology results. Infection recurrence and multi-drug resistant organism risk factors were assessed via multivariate logistic regression. Factors identified on univariate analysis with  $p$ -value  $< 0.2$  were included. **Results/Conclusions:** 100 patients have been included in the study and 287 have been excluded. Preliminary data has been collected for 33 patients with an average age of 53 years and majority of both male patients and healthcare-associated intra-abdominal infections. Forty-four microbiological organisms have been isolated in 26 patients, with seven subjects demonstrating negative cultures. The most prevalent organisms include: *Escherichia coli*, *Enterococcus* species, and *Candida glabrata*, of which six were deemed multi-drug resistant organisms. Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the epidemiology of intra-abdominal infections.

Define key terms (complicated intra-abdominal infection, recurrent intra-abdominal infection, source control, and multi-drug resistant organism) and describe how they are inter-related.

### Self Assessment Questions:

Which organism is most likely to be implicated in community-acquired intra-abdominal infections?

- A: *Staphylococcus aureus*
- B: *Fusobacterium* species
- C: *Escherichia coli*
- D: *Pseudomonas aeruginosa*

Which of the following terms is matched with the correct definition?

- A Source control: a procedure to drain infected foci, control ongoing
- B Secondary IAI: the presence of an elevated ascitic fluid absolute p
- C Multi-drug resistant organisms: Microorganisms that are resistant t
- D Tertiary IAI (recurrence): secondary IAI that does not improve or r

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-489L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DESIGNING AND IMPLEMENTING A PHARMACIST-DRIVEN PROCESS FOR INPATIENT NOVEL ORAL ANTICOAGULANT EDUCATION

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**Purpose:** Utilization of the novel oral anticoagulants has increased due to their demonstrated safety and efficacy. In addition, the lack of required INR monitoring and dietary restrictions makes these medications desirable to patients as compared to warfarin therapy. Prescribing of these agents is likely to continue to increase as evidence based guidelines are now defining their place in therapy. The Institute for Safe Medication Practices (ISMP) lists the novel oral anticoagulants as high-alert medications, which indicates that these medications have a heightened risk of causing significant patient harm when they are used erroneously. Research demonstrates that pharmacist-provided anticoagulation medication education increases adherence and improves patient satisfaction with their healthcare experience. The purpose of this process improvement project is to develop and implement a standardized inpatient workflow for pharmacist-provided medication education for inpatients on novel oral anticoagulants. **Methods:** This is a four week pilot project to assess pharmacists ability to implement the standardized, pharmacist-provided medication education for inpatients on novel oral anticoagulants. New documentation tools for the electronic medical record were created and pharmacists were provided educational tools and training for this pilot. The standardized process includes identifying patients requiring education on novel oral anticoagulants, conducting a medication history, and completing the documentation tools in the electronic medical record. Data is being collected during the pilot to assess the pharmacists compliance with the new workflow, amount of time required for each step of the process, and number of interventions identified by the pharmacist during the medication review. The results of this project will identify recommendations for improvement prior to system-wide implementation. **Results/Conclusions:** Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Discuss the rationale for implementing pharmacist-provided medication education for the novel oral anticoagulants

Describe patients that benefit most from pharmacist-provided medication education

### Self Assessment Questions:

All of the following are reasons that pharmacists might provide medication education for the novel oral anticoagulants EXCEPT:

- A All novel oral anticoagulants are on the ISMP high-alert medication
- B Improved patient adherence and satisfaction with their healthcare
- C Increased prescribing of the novel oral anticoagulants
- D Dietary restrictions and INR monitoring requirements

Which patient would benefit most from medication counseling provided by a pharmacist?

- A Patient who reports adherence to therapy at home
- B Patient that is able to identify signs and symptoms of a bleed/clot
- C Patient who is newly started on agent in hospital
- D Patient that is able to recall indication for agent

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-799L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CHALLENGING THE CHALLENGE OF BETA-LACTAM ALLERGIES

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**Purpose:** Beta-lactam antibiotics account for some of the most commonly reported drug allergies, but upon further review are often not true allergies or patients have subsequently tolerated beta-lactam therapy. Many of these patients receive non-beta-lactam antibiotics unnecessarily, which may be associated with decreased efficacy, increased toxicity, promotion of bacterial resistance, and increased costs. The objective of this project is to modify nursing, pharmacy technician, pharmacist, and prescriber practices in order to improve allergy histories and documentation, and to educate about antibiotic selection in an attempt to reduce unnecessary avoidance of all beta-lactams in patients with a reported beta-lactam allergy. **Methods:** A multidisciplinary approach was taken involving nursing, pharmacy technicians, pharmacists, and providers. Nurses were re-educated on proper documentation of allergy reaction types and pharmacy technicians were trained to perform focused beta-lactam allergy and tolerance histories. Pharmacists were asked to help document allergy reactions, perform historical profile reviews for previously tolerated beta-lactams, and intervene on unnecessary avoidance. Providers were educated on current cross-reactivity rates and antibiotic selection options. To facilitate selection of appropriate antibiotics in these patients a treatment approach flowchart was developed based on current literature and feedback from infectious diseases and allergy physicians. The primary outcomes to be assessed are the percentage of beta-lactam allergic patients with documentation of the reaction type and the percentage of beta-lactam allergic patients receiving non-beta-lactams. All processes were implemented as of January 4th 2016. A pre- and post-comparison including 100 patients in each group will be made to assess the impact of the interventions on these outcomes.

**Results/Conclusions:** Data collection is currently in progress. Results and conclusions will be presented at Great Lakes Residency Conference

### Learning Objectives:

Describe three potential consequences of incomplete or inaccurate beta lactam allergy documentation.

Identify scenarios where beta-lactam therapy may remain a suitable option in patients with reported beta-lactam allergies

### Self Assessment Questions:

Which of the following is a potential consequence of incomplete or inaccurate beta-lactam allergy documentation?

- A Increased use of non-beta-lactams such as fluoroquinolones, vancomycin
- B: Decreased adverse events associated with antibiotic therapy
- C: Decreased efficacy in certain situations
- D: A and C

In which of the following scenarios might it be acceptable to use a beta-lactam in a patient with a reported beta-lactam allergy?

- A Reported allergic reaction is diarrhea
- B Reported allergic reaction is anaphylaxis
- C Reported allergic reaction is rash, patient tolerated structurally similar
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-800L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF RISK FACTORS FOR MISSED SCHEDULED APPOINTMENTS IN AN HIV CLINIC

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**Purpose:** The goal of HIV treatment is to achieve viral suppression in order to increase survival rates and reduce the risk of HIV transmission. In the United States, a model known as the HIV continuum of care, has summarized a direct association between several vital stages of HIV treatment. In order to benefit from the positive outcomes of treatment, the continuum outlines several steps that include diagnosis, linkage to care, retention in care, antiretroviral therapy, and viral suppression. The HIV continuum of care concluded that there is a direct correlation of retention in care to decreased viral loads. This study seeks to evaluate the presence of risk factors associated with missed clinic visits which will allow the clinic to better address needs of patients and improve retention in care. **Methods:** A retrospective cohort study was completed that examined risk factors for missed clinic visits in patients who met predefined study criteria and were treated at the Indiana University Health LifeCare Program during the period of January 1, 2015 and July 1, 2015. Missed clinic visits are defined as patients who did not show up to clinic for a scheduled appointment at specified time. Descriptive statistics will be performed for continuous variables and categorical variables. The primary outcome is to identify significant risk factors associated with missing a scheduled appointment in an HIV clinic. Secondary outcomes include the comparison of medication adherence rates by MPR and the proportion of patients with undetectable viral load between patients who missed a clinic visit during the study period versus those who did not. **Results/Conclusions:** Data collection is pending and results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

State the significance and impact of the HIV continuum of care.

Identify barriers that prevent engagement in care of patients who are HIV infected.

### Self Assessment Questions:

Select which of the following statements is TRUE regarding retention in HIV Care?

- A Described by HIV Care Continuum
- B: Directly correlated with VL
- C: Directly correlated with increased survival
- D: All of the above

Which of the following are barriers that may prevent patients getting access to HIV care?

- A Low health literacy
- B Cost of medications
- C Lack of access to reliable transportation
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-490L02-P

Activity Type: Knowledge-based Contact Hours: 0.5

**PHARMACIST REVIEW OF MEDICATION RECONCILIATION COMPLETED BY PHYSICIANS AND NURSING STAFF AT HOSPITAL DISCHARGE**

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Medication reconciliation at discharge is an important aspect of patient care, with the potential to prevent adverse drug events and hospital readmissions. Currently, physicians at Frankfort Regional Medical Center evaluate a patient's medications prior to discharge to determine appropriate drug therapies to continue once they have left the hospital. Pharmacy personnel will assess these records for accuracy and intervene as necessary. The purpose of this study is to measure the impact of pharmacist involvement in the discharge medication reconciliation process. Upon approval of an exempt IRB application by the Sullivan University College of Pharmacy Institutional Review Board, a prospective, single center, observational cohort study will begin at Frankfort Regional Medical Center in Frankfort, Kentucky. Only the records for patients admitted to the hospital's general medicine and inpatient surgery services will be reviewed, with all OB, NICU, pediatric, outpatient surgery, psychiatric, hospice and emergency room patients excluded. Pharmacy personnel, including both pharmacy students and pharmacists, will follow-up with providers to address issues identified during review of the physician-completed medication reconciliation, as well as ask patients to relay their interpretation of their drug regimen post-discharge. Data to be collected will include drug name, formulation, route, strength, and dosing regimen. Assessments by pharmacy personnel will focus on identifying duplications of therapy, incorrect drug regimens, and any potential serious adverse effects as a result of the patient's discharge instructions. Summary of (preliminary) results to support conclusions: Observations at this time of the study include: Most common drug with one or more discrepancies: Omeprazole. Most common discrepancy: incorrect dosing regimen. Total admissions: 80. Total errors: 28. Conclusions reached: To be presented.

**Learning Objectives:**

Explain how the Joint Commissions 2015 National Patient Safety Goals relate to the discharge medication reconciliation process  
Discuss the role pharmacists can play in the discharge medication reconciliation process at Frankfort Regional Medical Center

**Self Assessment Questions:**

Which of the Joint Commissions 2015 National Patient Safety Goals relates to the discharge medication reconciliation process?

- A Identify patients correctly
- B: Improve staff communication
- C: Prevent infection
- D: Use medicines safely

Which of the following can be a pharmacist's role in the transition of patient care?

- A Complete discharge medication reconciliations
- B Coordinate physical therapy/occupational therapy
- C Obtain prior authorizations
- D Write medication orders

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-929L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

**TOTAL VERSUS ADJUSTED BODY WEIGHT DOSING OF VANCOMYCIN IN OBESE PATIENTS: A RETROSPECTIVE REVIEW OF SAFETY AND EFFICACY**

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Purpose: The current Infectious Disease Society of America guidelines recommend initial vancomycin dosing utilizing total body weight (TBW) and then adjusted based on serum concentrations. Limited evidence suggests that the safety and efficacy of this strategy must be different in obese patients due to the altered physiological changes that occur in this population. The purpose of this study is to determine whether dosing vancomycin based on TBW or adjusted body weight (AdjBW) in obese patients has any impact on acute kidney injury (AKI) or clinical outcomes. Methods: This study was a retrospective chart review of electronic medical records of patients treated with intravenous vancomycin. Patients were included if they were 18 years of age or older, had a BMI greater than or equal to 30 kg/m<sup>2</sup> and received intravenous vancomycin for suspected or confirmed infection for at least 48 hours. Patients were excluded if they had underlying renal impairment (baseline serum creatinine (SCr) greater than or equal to 2.5 mg/dL or on dialysis) or were pregnant. The primary objective was to compare the incidence of acute kidney injury (doubling or more in SCr or a glomerular filtration rate (GFR) decrease greater than or equal to 50% per the RIFLE criteria) between obese patients who received vancomycin dosed on TBW versus AdjBW. Secondary objectives included percent of troughs within goal, hospital and intensive care unit length of stay, and in-hospital mortality. Results/Conclusions: Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Recognize the current Infectious Diseases Society of America recommendations for initial dosing of vancomycin in obese patients.  
Describe physiological changes that occur with obesity which may present challenges when evaluating the pharmacokinetics of vancomycin in this population.

**Self Assessment Questions:**

The Infectious Diseases Society of America recommend initial dosing of vancomycin utilizing which body weight in obese patients?

- A Total body weight
- B: Lean body weight
- C: Adjusted body weight
- D: Ideal body weight

Which of the following is a physiological alteration seen in obese patients which may alter the pharmacokinetics of vancomycin?

- A Altered volume of distribution
- B Altered protein binding
- C Altered vancomycin clearance
- D All of the above are potential physiological alterations seen in obese patients

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-491L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EMPLOYER SOLUTIONS: THE VALUE OF EMPLOYER-BASED PHARMACY SERVICES

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**Purpose:** Rising healthcare costs have increased the demand for employers to develop creative and novel population health management strategies. Implementation of on-site employer-based clinics has been one initiative to improve care while decreasing costs. These clinics are able to provide efficient, convenient care, but are currently lacking pharmacy involvement to promote the most effective, evidence-based treatment choices. Ministry Medical Group is currently expanding employer-based clinics and intends to leverage pharmacy resources to support prescribers, optimize convenience, and enhance associate satisfaction. The purpose of this project is to pioneer pharmacy services within employer-based clinics of Ministry Health Care. **Methods:**

This quality improvement initiative is exempt from review by the Institutional Review Board. Pharmacists will create drug information resources based on common conditions encountered at employer-based clinics to help providers select the most appropriate medication regimen based on efficacy and cost to the patient. Initial interventions will be piloted within a clinic in close proximity to Ministry Saint Josephs outpatient pharmacy to facilitate immediate feedback. An expedited pharmacy workflow will be created to prioritize clinic prescriptions and enhance patient convenience. Knowledge gained from the interactions with this clinic will be used to assess ways to maximize the benefits from pharmacy involvement at other employer-based clinic sites. As services are developed, consideration will be given to establishing remote prescription dispensing at these sites to improve patient access to needed medications. A business plan for implementation will be developed which includes consideration of pharmacy and clinic workflow, medication inventory management, and the technology needed for pharmacists to perform remote consultations. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Recognize the benefits of developing pharmacy services within employer-based clinic sites

Identify barriers to improving patient care in the clinic setting

### Self Assessment Questions:

Which of the following is a benefit of developing pharmacy services within employer-based clinic settings?

- A: Increased pharmacy revenue and cost to the associate
- B: Improved associate access to pharmacy knowledge and resources
- C: Greater potential for pharmacists to achieve provider status
- D: Reduced communication with clinic prescribers

Which of the following was the most significant barrier preventing pharmacists from providing direct patient care in our on-site clinic?

- A: Prescriber resistance to pharmacy involvement
- B: Lack of an on-site pharmacist
- C: Incomplete pharmacist knowledge of the patient populations served
- D: Pharmacy hours did not match clinic hours of operation

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-801L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF HOME PSYCHOACTIVE MEDICATIONS ON SEDATION REQUIREMENTS IN MEDICAL ICU PATIENTS

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**Purpose:** Critically ill patients receive sedation for facilitation of mechanical ventilation, anxiolysis and comfort during procedures. Deep sedation is associated with negative cognitive effects and poor patient outcomes, as compared to light sedation. National guidelines offer the suggestion of restarting home psychoactive medications in order to prevent delirium and facilitate light sedation while minimizing traditional sedatives. However, virtually no data exist to support this recommendation other than the theory of minimizing the potential for withdrawal from these agents. The present study investigates how restarting or withholding home psychoactive medications impacts sedation requirements in medical ICU patients. **Methods:** This study is a single-center, retrospective chart review of adult patients admitted to the University of Kentucky Chandler Hospital's medical ICUs between January 2011 and January 2015. Included patients were taking selective serotonin reuptake inhibitors, serotonin/norepinephrine reuptake inhibitors, anti-psychotics, benzodiazepines, gabapentin, or pregabalin prior to admission, were intubated prior to or on arrival to the medical ICU, and received benzodiazepine-based sedation for the first 7 days of their ICU stay. Patients were excluded if deep sedation was indicated for alcohol withdrawal, ARDS, or status epilepticus, or did not meet other inclusion criteria. Two patient cohorts are defined: patients who were restarted on more than half of their home psychoactive medication regimens within the first 72 hours of their ICU stay, and patients who were restarted on these regimens after 72 hours in the ICU, if at all. The primary objective is to compare average total daily doses of benzodiazepine-based sedation during the first 7 days of patients' ICU stay between these cohorts. Secondary outcomes include lengths of stay, ventilator days, and onset of delirium. This study has been approved by the University of Kentucky Institutional Review Board.

**Results:** There were 1462 patients screened for inclusion. Preliminary results will be presented.

### Learning Objectives:

Describe the rationale for and potential concerns with restarting home psychoactive medications in the ICU setting.

Review the findings of a retrospective comparison of sedation requirements in medically critically ill patients restarted on home psychoactive medications earlier vs. later or never in their ICU stay.

### Self Assessment Questions:

Withdrawal symptoms from psychoactive medications, including benzodiazepines, anti-psychotics, selective serotonin reuptake inhibitors, and serotonin/norepinephrine reuptake inhibitors, may occur as e

- A: 5-6 weeks
- B: 2-4 weeks
- C: 5-7 days
- D: 1-4 days

What is a theoretical benefit of restarting home psychoactive medications?

- A: Reduction in rates of QTc prolongation
- B: Mitigation of agitation
- C: Decreased mortality in the cardiac ICU population
- D: Ability to achieve deeper levels of sedation

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-492L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF EXPANDING OUTPATIENT INFUSION SERVICES AT A GROWING ACADEMIC MEDICAL CENTER

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**Purpose:** The healthcare system has seen growth in ambulatory services to properly manage chronic disease states and prevent hospital re-admissions. This trend has been in response to the Affordable Care Act as well as the increased prescribing of specialty medications and infusion therapies. Optimization of outpatient infusion clinic facilities to meet the needs of increasing infusion therapy volume leads to increased patient satisfaction and decreased wait time as well as financial incentives for the institution. The objective of this study was to quantify the number of infusion chairs needed to meet the needs of the University of Kentucky (UK) patient population and evaluate the financial impact of expanding outpatient infusion services. **Methods:** A single-center retrospective cohort study was conducted from August 1, 2014 to August 1, 2015. Patients were identified using a query of the electronic medical record (EMR) in collaboration with the clinic managers and their staff. Patients were included if they were  $\geq 18$  years of age; prescribed an outpatient intravenous (IV) infusion medication by a UK prescriber for the treatment of multiple sclerosis, inflammatory bowel disease, rheumatoid arthritis, gout, lupus, or immunodeficiency; and required an infusion of natalizumab, cyclophosphamide, vedolizumab, infliximab, rituximab, certolizumab, abatacept, tocilizumab, omalizumab, belimumab, pegloticase, or IV immunoglobulin. Patients receiving outpatient IV therapy for treatment of malignancy were excluded. Data extracted from the EMR included age, medical record number, ambulatory clinic visited, IV infusion medication prescribed, location of infusion, expected length of infusion treatment, approximate number of infusions annually, and the patient's insurance provider. This study was approved by the local institutional review board. **Results & Conclusions:** Data collection and analysis are on-going and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Explain implications of provider based vs. non-provider based clinics on 340B drug pricing eligibility.

Describe predicted trends in specialty medications and infusion based therapies.

### Self Assessment Questions:

1. Prescriptions that originate from what designated clinic are considered eligible for 340B drug pricing based on the Health Resources and Services Administration's proposed 340B Drug Pricing Omnibus

- A Non-provider based clinics
- B Provider based clinics
- C Unregistered outpatient clinics
- D Both A&B

Specialty medication drug spend is predicted to increase to what percent of total drug spend by 2017?

- A 22%
- B 44%
- C 66%
- D 88%

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-802L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DOSE ROUNDING AND WASTE BILLING IN AMBULATORY CHEMOTHERAPY INFUSION CLINICS

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As oncology-related health care expenditures continue to increase, health systems are investigating cost reduction and revenue generation initiatives with net neutral or positive impact on clinical outcomes and patient safety. The University of Chicago Medicine (UCM) operates two outpatient oncology infusion center pharmacies servicing approximately 3,700 patient encounters on a monthly basis. Per Pharmacy & Therapeutics approved protocol, internally credentialed pharmacists are permitted to round chemotherapy doses within 10% for adult patients. Published literature demonstrates routine dose rounding to the nearest vial size achieves cost savings through reduction of drug wastage. Payers including Centers for Medicare and Medicaid Services reimburse health-systems for biologic chemotherapy drug waste given specified requirements are met. The purpose of this study is to analyze current dose rounding and waste billing activity in the outpatient oncology infusion center pharmacies, and to determine total and medication-specific financial opportunity associated with increased standardization of these practices. This study will be submitted to the University of Chicago Investigational Review Board for review. A report will be generated with chemotherapy dispensing history from the two oncology infusion center pharmacies from March to October 2015 using the electronic medical record. Data collection will also include patient weight, height, gender, prescriber, cancer diagnosis, treatment date, drug, dose ordered, dose administered, charge information and vial size used for dispensing. Protected health information will be de-identified for data record keeping. Available drug vial sizes and cost per milligram for each medication based on institution acquisition costs will be noted. Frequency of rounding chemotherapy doses per protocol to the nearest vial size will be assessed, and further opportunity for cost savings will be reported. Waste billing activity will be evaluated using Centers for Medicare and Medicaid Services criteria, and further opportunity for revenue generation will be reported.

### Learning Objectives:

Identify opportunities for standardizing dose rounding practices in ambulatory infusion center pharmacies without compromising efficacy or patient safety

Describe the advantages of waste billing eligible IV chemotherapy medications in ambulatory infusion center pharmacies

### Self Assessment Questions:

Which of the following agents are high cost and worth exploring dose rounding opportunities?

- A Vancomycin
- B Bevacizumab
- C Gentamicin
- D Dexmedetomidine

Which of the requirements must be met for Centers for Medicare and Medicaid Services to reimburse health-systems for chemotherapy drug waste?

- A The vial must be a single-use vial
- B The units billed must correspond with the smallest dose (vial) available
- C The left-over amount does not have to be discarded and may be used
- D A & B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-803L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## UTILIZATION OF AN ELECTRONIC PATIENT PORTAL FOR ORAL CHEMOTHERAPY MONITORING IN AN OUTPATIENT ONCOLOGY CENTER

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**Background:** Use of oral chemotherapy agents has continued to increase. Patients utilizing these medications are at risk for severe adverse events and medication adherence concerns, and may have less frequent monitoring compared to infusion-based treatments. Currently, patients who have an oral chemotherapy medication filled through our specialty pharmacy receive a follow-up call to assess adherence, toxicities, and barriers to obtaining medications. Utilization of our institutions electronic patient portal to provide a survey to assess adherence and adverse effects could potentially increase and improve patient monitoring. The purpose of this project is to develop and implement an electronic survey to improve monitoring of patients receiving oral chemotherapy. **Methods:** An electronic patient survey will be created and incorporated into the institutions electronic, patient portal. While awaiting the surveys implementation into the patient portal, the survey will be delivered through e-mail. Initially, the survey will be sent to patients receiving capecitabine, as these patients have shown to be at risk for adverse reactions and non-adherence due to complex regimens. The survey will be used to assess problems obtaining the medication, adherence, and side effects. The survey will be distributed with each new cycle of capecitabine or bi-weekly for patients receiving capecitabine with radiation. Upon receipt of survey responses, each survey will be reviewed for need for pharmacist intervention or follow-up. Data will be collected to assess patient responses and usefulness of the survey. For patients who do not respond to the survey, a second attempt will be made electronically, and if no response, the patient will receive a follow-up call for monitoring. The primary endpoint of this study is the rate of patient responses. Secondary endpoints will include the number of pharmacist interventions, rate of emergency department visits or hospital admissions related to capecitabine use, and frequency of adverse reactions and problems with medication adherence.

### Learning Objectives:

Discuss potential benefits for utilization of an electronic patient portal for monitoring of patients receiving oral chemotherapy

Explain possible obstacles to implementation of a monitoring assessment tool into an electronic patient portal

### Self Assessment Questions:

Utilization of an electronically delivered patient assessment survey may be used to assess \_\_\_\_\_

- A Adverse effects
- B: Medication adherence
- C: Prescribing Errors
- D: A & b

2. Which of the following may be potential barriers to the use of a patient assessment survey through an electronic patient portal?

- A Approval and implementation by the institution's health informationist
- B Patients' knowledge and skill utilizing the electronic patient portal
- C Patients' willingness to complete an electronic assessment
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-930L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS PNEUMONIA RISK FACTOR IDENTIFICATION

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**Purpose:** Risk factors for acquiring methicillin-resistant Staphylococcus aureus (MRSA) pneumonia are broad and non-specific. Many institutions use general risk factors for acquiring multidrug resistant organisms (MDRO) to determine need for anti-MRSA therapy, however many hospitalized patients will have at least one risk factor for MDROs and will thus receive anti-MRSA therapy. This may result in high rates of unnecessary patient exposure to anti-MRSA agents. At Froedtert Hospital, use of these agents is higher compared to similar University HealthSystem Consortium hospitals despite low rates of MRSA infections. Accordingly, better identification of risk factors to help guide early identification of patients who would benefit from anti-MRSA therapy could reduce patient exposure to unnecessary therapies and potentially reduce toxicities and excess cost. **Methods:** The primary objective of this study is to identify risk factors associated with MRSA pneumonia. A retrospective single center chart review of patients from 2011-2015 with laboratory-confirmed pneumonia will be conducted. Risk factors for patients with MRSA pneumonia will be compared to those in patients with non-MRSA pneumonia. Significant risk factors for acquiring MRSA pneumonia will be determined via logistic regression analysis.

**Results:** There are currently no preliminary results to report. **Conclusion:** Expected results of this project include the identification of MRSA pneumonia risk factors which can eventually be incorporated into practice to help identify patients who would benefit from empiric anti-MRSA therapy.

### Learning Objectives:

Review current literature on methicillin-resistant Staphylococcus aureus pneumonia

Describe need for evidence based risk factors for methicillin-resistant Staphylococcus aureus

### Self Assessment Questions:

Which of the following statements regarding MRSA pneumonia is correct?

- A There are currently no well-defined risk factors for MRSA pneumonia
- B: MRSA pneumonia is of low incidence and of little clinical concern
- C: IDSA guidelines have clear guidance for empiric MRSA pneumonia
- D: New literature suggests daptomycin is underutilized for MRSA pneumonia

Which of the following statements regarding MRSA risk factors is correct?

- A MRSA nares swabs have excellent positive predictive value for MRSA
- B There is little concern for external validity of risk factor identification
- C Fluoroquinolone use may be a risk factor for MRSA
- D Hemodialysis is an evidence based risk factor for MRSA pneumonia

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-493L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF STANDARD VERSUS HIGH DOSE QUETIAPINE FOR THE TREATMENT OF ICU DELIRIUM

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**Purpose:** Patients who develop delirium during their intensive care unit (ICU) stay have a higher mortality rate compared to patients who do not develop delirium. The primary target of delirium treatment has been the imbalance of dopamine within the brain in critical illness. Antipsychotics, dopamine-2 receptor antagonists, are frequently used for delirium treatment despite little supportive evidence. Patients treated with quetiapine had decreased time to resolution of delirium compared to placebo in one prospective trial of 36 ICU patients. Prospective trials of olanzapine and ziprasidone failed to find any benefit on a daily delirium severity index and a composite of coma-free and delirium-free days, respectively. Literature is lacking in quetiapine dose titration and the maximal effective quetiapine daily dose. The purpose of this study is to compare the percentage of delirium-free ICU days between patients treated with standard dose versus high dose quetiapine. **Methods:** This is a single center, retrospective chart review of critically-ill adult patients admitted to the medical or surgical ICUs that received quetiapine for at least 48 hours following at least one positive Confusion Assessment Method for the ICU (CAM-ICU) assessment. Treatment groups will be stratified by the quetiapine maximum total daily dose, standard dose (less than 400 mg) and high dose (400 mg or greater). The primary endpoint is the percentage of delirium-free ICU days, defined as a consecutive 24-hour period during the ICU admission with no CAM-ICU positive assessments. Secondary end points include time to delirium resolution, total administered doses of sedatives, analgesics and antipsychotics, incidence of QTc prolongation, percent of time deeply sedated, and the rate of in-hospital mortality. Categorical variables will be compared with the Chi squared or Fisher's exact test while continuous variables will be compared using the student's t-test or Wilcoxon rank-sum test as appropriate. **Results:** Data collection is ongoing.

### Learning Objectives:

Describe the characteristics and definition of ICU delirium.  
Identify the primary pharmacologic target of delirium treatment.

### Self Assessment Questions:

Which of the following is a feature of the Confusion Assessment Method for the ICU (CAM-ICU) that is necessary for a diagnosis of delirium?

- A: Acute onset of mental status changes
- B: Combativeness
- C: Disorganized thinking
- D: Altered level of consciousness

What is the main mechanism of action of the second generation antipsychotics?

- A: D2 receptor antagonist
- B: D2 receptor agonist
- C: D2 receptor and serotonin receptor agonist
- D: D2 receptor and serotonin receptor antagonist

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-494L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PILOT STUDY: EVALUATION OF A PHARMACIST-MANAGED ORAL CHEMOTHERAPY MONITORING CLINIC

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**Purpose:** Over the past few years, there have been increases in both production and clinical use of oral chemotherapy, providing patients with more non-invasive treatment options and ease of administration compared to intravenous chemotherapy. However, there is a misconception that oral chemotherapy agents are safer and less toxic than intravenous agents, which can lead to a decrease in monitoring. Furthermore, intravenous chemotherapy is administered in a controlled environment, whereas oral chemotherapy can be taken in the patient home, where compliance can become an issue. There are published literature supporting the role of pharmacists in improving oral chemotherapy adherence, decreasing adverse effects, and increasing laboratory monitoring. The purpose of this pilot study is to determine the frequency and types of interventions made when a pharmacist is available to evaluate patients on oral chemotherapy in the outpatient setting of the Chalmers P. Wylie Veterans Affairs Ambulatory Care Center. **Methods:** A list of patients currently on oral chemotherapy will be assembled through a Fileman report generated from the Veteran: Health Information Systems and Technology Architecture (VITSA). Using the criteria set by the Pharmacy Benefits Management monitoring guidelines for oral chemotherapy, these patients will be assessed for appropriate follow-up of laboratory monitoring. For patients who are initiated on oral chemotherapy, the ordering oncologist or the pharmacist who reviews the prior authorization request for the medication will notify the pharmacist. These patients will be scheduled into the pharmacist-managed chemotherapy monitoring clinic for medication education and laboratory monitoring. The pharmacist will also conduct medication reconciliations, determine drug-drug interactions, assess compliance, manage adverse effects, obtain additional laboratory work, and educate all new and current patients on their medications, as well as safe handling and disposal. The frequency and types of interventions made by the pharmacist will be collected during telephone encounters and in-person clinic time. **Results/Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify misconceptions regarding oral chemotherapy.  
Describe how pharmacists can impact patient adherence to oral chemotherapy.

### Self Assessment Questions:

Which of the following is a misconception regarding oral chemotherapy?

- A: Oral chemotherapy must be taken in a controlled environment to be effective.
- B: Oral chemotherapy dosing can be complex.
- C: Oral chemotherapy requires close laboratory monitoring.
- D: Oral chemotherapy is safer and less toxic than intravenous chemotherapy.

Which of the following is the correct pharmacist intervention that can help increase patient adherence to oral chemotherapy?

- A: Switch patients to intravenous chemotherapy, as it can be administered in a controlled environment.
- B: Educate patients upfront on adverse effects and provide strategies to manage them.
- C: Provide patients the medication package insert to read over and discuss with them.
- D: Advise patients to continue taking their oral chemotherapy despite missed doses.

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-495L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF WEIGHT-BASED UNFRACTIONATED HEPARIN DOSING IN OBESE PATIENTS FOR TREATMENT OF VENOUS THROMBOEMBOLISM (VTE)

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Purpose: Unfractionated heparin (UFH) is a first line agent for the treatment of VTE including deep vein thrombosis and pulmonary embolism (DVT/PE). While total body weight has been identified as the most accurate predictor of heparin requirements in non-obese patients, it has been associated with supratherapeutic levels in obese patients. Current research has not identified the most accurate dosing regimen for obese patients which has led to a relative discordance on UFH dosing policies across institutions in this population. The purpose of this study is to identify the most precise weight-based empiric heparin dose associated with therapeutic PTTs in obese patients based on three different weights. Methods: This is a retrospective cohort study evaluating heparin dosing in the obese population. All patients received UFH therapy for either confirmed or suspected DVT/PE and achieved at least one therapeutic activated partial thromboplastin time (aPTT). Non-obese patients were matched in 1:1 to an obese patient separated into three cohorts based on body mass index (BMI). Data collection included weight (actual, adjusted, and lean), BMI, sex, confirmed or presumed DVT/PE, initial UFH dose and first dose to achieve a therapeutic level (units/kilogram/hour of actual, adjusted, and lean body weight), number of dose adjustments to achieve a therapeutic aPTT, and bleeding requiring either reversal of anticoagulation or discontinuation of heparin. The average therapeutic UFH dose based on actual and lean body weights and time to achieve therapeutic aPTT will be evaluated for each BMI category through analysis of variance (ANOVA) statistical testing. Exclusion criteria include pregnant woman, patients under the age of 18 those that did not receive an initial bolus dose of UFH, and those with a baseline aPTT above 50 seconds. Results: This study is still in process. Final results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review current literature pertaining to UFH dosing in obese patients.  
Discuss possible dosing methods to optimize UFH dosing in obese patients.

### Self Assessment Questions:

What is TRUE about current literature describing UFH dosing in obese patients?

- A: The Chest guidelines recommend using adjusted body weight to
- B: No evidence currently demonstrates that the dose of UFH, in terms
- C: No guideline recommendations are given about dosing UFH in the
- D: The Chest guidelines recommend against using UFH in the obese

Which of the following is FALSE about the kinetics of UFH?

- A: The volume of distribution of UFH is 0.07 L/Kg.
- B: UFH distributes to about 5.5% of total body weight
- C: Intravenous UFH has a "first dose effect" that rapidly distributes ar
- D: Best evidence supports that UFH maintains to the vascular space.

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-496L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING ANTICHOLINERGIC BURDEN AND MEDICATION INTERVENTIONS BASED ON TELE-NEUROPSYCHOLOGICAL ASSESSMENTS IN A RURAL GERIATRIC VETERAN POPULATION

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Purpose: The Madison VA utilizes the Geriatrics Research Education and Clinical Center (GRECC)-Connect Program to offer care and recommendations through telehealth consults to patients residing in rural areas with limited geriatric specialty services. Initially, this clinical team consisted of a geriatrician, psychiatrist, pharmacist, nurse case manager, and social worker specializing in geriatrics. A neuropsychologist was added to this specialty service to help address the mental and cognitive concerns expressed in this vulnerable patient population who have travel limitations to the main facility. Administration of a full battery of tests is key to the neuropsychology component of the service, however assessment of anticholinergic risk and medication intervention recommendations as they relate to these tests has not yet been evaluated. The purpose of this study is to determine the correlation between neuropsychological assessment results and anticholinergic burden in this rural geriatric veteran population. Methods: A retrospective chart review will be completed for all patients referred to the GRECC-Connect service for tele-neuropsychological testing between March 2014 and January 2016. Standard baseline data will be collected, including patient age, gender, race, marital status, highest level of education, service connection, time period of service, and total number of medications. The primary objective of this study is to correlate patients Anticholinergic Risk Scale (ARS) scores with their neuropsychological assessment results. These tests assess memory, executive functioning, verbal ability, attention, visuospatial functioning, and depression severity. Secondary objectives include evaluating medication interventions recommended by the interdisciplinary team following neuropsychological testing. This will include measuring the number of medication recommendations made and the rate of acceptance at 3 months following the visit. Medications assessed will include anticholinergics, dementia medications, and antidepressants. Dementia medications will then be stratified by subsequent dementia diagnosis. Results/Conclusions: To be presented

### Learning Objectives:

Describe the correlation between anticholinergic burden and neuropsychological test results in patients referred to the GRECC-Connect service for memory concerns.

List the cognitive domains assessed through neuropsychological testing during GRECC-Connect consults.

### Self Assessment Questions:

Which of the following is correct regarding the Anticholinergic Burden Scale (ABS) scores?

- A: ABS scores are associated with an increased risk of anticholinergic
- B: ABS scores are associated with risk of central anticholinergic side
- C: The ARS ranks medications on a 5-point scale based on anticholin
- D: Some side effects predicted by a high ARS score include dizziness

Which of the following test correctly matches the cognitive domain(s) listed below?

- A: Trails A - visuospatial functioning and depression
- B: Repeated Battery for the Assessment of Neuropsychological Statu
- C: The clock drawing test - attention and language
- D: Mini Mental Status Exam - depression

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-497L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INTERFACING THE PHYSICIAN ELECTRONIC ORDER ENTRY SYSTEM WITH AN AUTOMATED COMPOUNDING DEVICE TO ENHANCE THE PARENTERAL NUTRITION MEDICATION USE PROCESS

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**Purpose:** The purpose of this quality improvement project is to interface the computerized physician order entry (CPOE) system with an automated compounding device to enhance the efficiency, quality and safety of parenteral nutrition (PN) admixtures. **Methods:** A literature review was conducted for parenteral nutrition compounding best practices and compared to the current medication use process through direct observation. Manual calculations performed by prescribers and decision support tools within compounding software were evaluated. A taskforce was assembled to develop new decision support tools within CPOE system and approve the medication use process post implementation. These tools included medication warnings, order sets, and monitoring reports. Standard calcium and phosphate curves were validated using calculation software. A file transfer process was developed from the CPOE system to SQL server for the automated compounding device. Time studies were conducted and medication errors were documented for each step of the PN workflow process pre and post implementation. Automated decision support alerts were collected from compounding software and CPOE system pre and post implementation. **Results:** Preliminary results will be presented at Pharmacy Residency Great Lakes Conference. **Conclusion:** Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define the risks associated with manual transcription of parenteral nutrition orders into compounding software systems  
Identify benefits of interfacing a CPOE system with an automated compounding device

### Self Assessment Questions:

Which of the following steps would be eliminated by interfacing the computerized physician order entry system with an automated compounding device?

- A: Aseptic production of the parenteral nutrition compound
- B: Manual transcription
- C: Delivery of the parenteral nutrition compound to the patient
- D: Pharmacist verification of the parenteral nutrition compound

What is the key benefit of creating an interface between the computerized physician order entry system with an automated compounding device?

- A: Increased patient safety and efficiency gains
- B: Parenteral nutrition ingredient drug cost savings
- C: Elimination of drug shortages
- D: Elimination of the parenteral nutrition compound delivery to the patient

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-931L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PHARMACY STUDENTS PERSPECTIVES ON THE INTRODUCTION OF A MEDICATION SYNCHRONIZATION LECTURE BASED ON THE THEORY OF PLANNED BEHAVIOR

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**Purpose:** To assess students knowledge, behavior, and attitudes towards medication synchronization prior to and after receiving a lecture on medication synchronization. **Methods:** A pre- and post-then-pre survey was administered to second and third year pharmacy students at Purdue University in the fall of 2015. The survey, based on Theory of Planned Behavior constructs, was developed to assess knowledge, behavior, and attitudes towards medication synchronization. An exemption approval was received from Purdue University's Institutional Review Board. The survey included 19 five-point Likert style items (Strongly Agree (1) to Strongly Disagree (5)) and demographic questions. During the week prior to a scheduled lecture on medication synchronization, an in class pre-survey was distributed. After students attended the lecture, the post- survey was distributed, which was constructed in a post-then-pre format to account for potential responsive shift bias. Participants could enter a drawing for the chance to win one of five \$25 gift cards. Repeated measures ANOVA tests were computed to compare mean responses at pre, "post-then-pre" pre, and "post-then-pre" post time points for each Likert item and mean summary scores for the five questions based on each of the three Theory of Planned Behavior constructs. **Results:** While the sample size (n=15) was limited and no items differed statistically significantly, the results show a trend that students had a more favorable attitude, mean "pre survey" 12.29, mean "post-then-pre" pre survey, 13.07, mean post-then-pre post survey, 11.07 and normative beliefs, 14.2, 13.2, and 13.2, and greater perceived behavioral control, 15.33, 17.13, and 15, respectively, after attending the medication synchronization lecture. **Conclusion:** As colleges and schools of pharmacy strive to prepare graduates to be practice ready, the introduction of the concept of medication synchronization is important to help shape students attitudes, normative beliefs and behavioral intentions on incorporating and promoting this concept in pharmacy practice.

### Learning Objectives:

Define medication synchronization and discuss organizations that support this concept.

Describe the strategies used in the research design including theoretical framework, recruitment, and survey design.

### Self Assessment Questions:

Which of the following statements is correct?

- A: APhA-ASP encourages the incorporation of medication synchronization
- B: Medication synchronization is just a different name for a pharmacy
- C: Medication synchronization questions are now appearing on the NABP exam
- D: All colleges and schools of pharmacy currently incorporate medication synchronization

Which of the following statements is correct?

- A: The Purdue University IRB states that pharmacy students are required to attend medication synchronization lectures
- B: The Theory of Planned Behavior was used to assess pharmacy student attitudes
- C: The post-then-pre survey approach increases response shift bias
- D: Pharmacy students were given the option to participate in a survey

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-805L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PATIENT SATISFACTION OF CLINICAL PHARMACIST SERVICES IN THE AMBULATORY CARE SETTING

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**Purpose:** The number of patients with chronic disease states requiring longitudinal care is continuously increasing. Pharmacist participation in ambulatory clinics has grown to meet demands and provide services to these patients. An important measure to assess reliably for pharmacists in this setting is patient satisfaction. A validated patient satisfaction survey is the optimal way to gather data regarding this measure. This data can be employed to support reimbursement for pharmacist services, as evidence to encourage expansion of clinical pharmacist services, and to identify areas of improvement in patient-pharmacist relationships and quality of care. The objective is to provide support of clinical pharmacist services in the ambulatory care setting at St. Vincent Hospital and to support the adoption of the Patient Satisfaction with Pharmacist Services Questionnaire 2.0 (PSPSQ 2.0) as the primary survey to be used for assessment of ambulatory care clinical pharmacist services. **Methods:** This prospective survey study has been approved by the St. Vincent Institutional Review Board. The survey will be disseminated to four ambulatory care sites connected with St. Vincent Hospital. The study includes adult patients aged 18 or older with English or Spanish as a first language who have a chronic drug therapy management appointment with a pharmacist at one of the study sites between November 1st, 2015 and January 29th, 2016. Informed consent will be given prior to survey administration. Demographic information will be collected in conjunction with survey results. The primary outcome is patient satisfaction which will be determined by the mean overall satisfaction score on the PSPSQ 2.0. The mean overall satisfaction score will be compared between the sites using a Student's t-test and a significance level of  $\alpha = 0.05$ . **Results and Conclusions:** Data collection is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Explain the importance of utilizing a validated survey across all ambulatory care settings to evaluate patient satisfaction with pharmacy services.

Discuss how the results of a standardized patient satisfaction survey can impact pharmacist services.

### Self Assessment Questions:

Which of the following is a reason ambulatory care pharmacists should use a validated survey to evaluate their services?

- A Validated surveys guarantee a positive outcome
- B: Responders are more likely to be honest on a validated survey
- C: Validated surveys have been scientifically proven to assess the quality of pharmacist services
- D: Information from validated surveys is the only information recognized by payers

Which of the following is a way pharmacist services can be impacted by patient satisfaction data?

- A Support for the expansion of pharmacists' scope of practice
- B Evidence to support reimbursement of clinical pharmacist services
- C Development of a survey for specific to a clinical pharmacist service
- D Identification of pharmacists who are exceeding clinical expectations

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-806L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF A HEPARIN PROTOCOL WITH FIXED DOSE ADJUSTMENTS

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**Purpose:** Current guidelines suggest achievement of therapeutic activated partial thromboplastin time (aPTT) in less than 24 hours is associated with decreased mortality. A weight-based nomogram may be more effective at reducing recurrent thromboembolism rates compared to fixed-dose nomograms. The 428-bed community hospital being studied uses a single heparin protocol with weight-based bolus and infusion dosages and fixed dosage adjustments. The protocol utilizes partial thromboplastin time (PTT) to monitor heparin therapy. This study seeks to determine if patients on the current heparin protocol achieve therapeutic PTT within 24 hours of initiation. It will evaluate the need of implementing a protocol with weight-based dose adjustments.

**Methods:** A retrospective chart review was performed to evaluate the heparin protocol efficacy. Patients were included if they were 18 to 89 years old and were on the heparin protocol for at least 48 hours. Primary outcomes included number of patients with therapeutic PTT at 24 hours and mean time to therapeutic PTT with weight-based subcategories. Additionally, the mean heparin rate adjusted for body weight at therapeutic PTT was evaluated. Secondary outcomes include required heparin dose adjustments based on weight and number of adjustments to the heparin infusion prior to the therapeutic rate.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the pharmacokinetic and pharmacodynamic properties of heparin.

Describe the significance of achieving therapeutic activated or partial thromboplastin time within 24 hours of heparin therapy initiation.

### Self Assessment Questions:

Which of the following describes the clearance of heparin?

- A Heparin clearance via the renal route is part of saturable clearance
- B: Heparin clearance is mostly by a slow saturable route
- C: Heparin bound to endothelial cell receptors is part of saturable clearance
- D: Heparin bound to antithrombin is a mechanism of first-order clearance

Which of the following statements regarding heparin protocols is true?

- A Patients on weight-adjusted heparin regimens are more likely to receive therapeutic PTT
- B Patients on the same doses of subcutaneous and intravenous heparin achieve therapeutic PTT
- C Patients on fixed-dose heparin regimens have lower rates of venous thromboembolism
- D Patients on continuous intravenous heparin should receive the same bolus dose

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-498L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PIPERACILLIN-TAZOBACTAM VERSUS CEFEPIME INCIDENCE OF ACUTE KIDNEY INJURY IN COMBINATION WITH VANCOMYCIN AND TOBRAMYCIN IN PEDIATRIC CYSTIC FIBROSIS PATIENTS

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**Background:** Cystic fibrosis (CF) patients often receive prolonged courses of broad spectrum antibiotics, such as piperacillin-tazobactam or cefepime in combination with vancomycin and tobramycin. Due to the propensity for vancomycin and tobramycin to cause acute kidney injury (AKI), the objective of this study was to determine the difference in AKI between patients receiving piperacillin-tazobactam or cefepime. Previous studies in non-CF pediatric patients have suggested an increased incidence of AKI with vancomycin and piperacillin-tazobactam. **Methods:** Charts of cystic fibrosis patients receiving vancomycin were retrospectively evaluated from 12/01/2008 to 06/30/2015. IRB approval was obtained from our institution for this retrospective cohort study. Pediatric patients aged 30 days to 18 years who received intravenous vancomycin, tobramycin, and piperacillin-tazobactam or cefepime were included. AKI was defined as a decrease in serum creatinine by at least 25%. The primary outcome was difference of AKI incidence in patients receiving piperacillin-tazobactam or cefepime, as defined by modified pRIFLE criteria. **Results:** Seventy-eight patients were included with a median (interquartile range) age 11 years (7-16) and weight 36.6 kg (23.7-49.9). AKI was identified in 56.5% (22/39) of patients receiving piperacillin-tazobactam therapy and 15.4% (6/39) of patients receiving cefepime therapy ( $p \leq 0.0001$ ). There was no statistical difference in length of admission (13 vs. 11,  $p=0.207$ ), days to maximum SCr (5 vs. 4,  $p=0.482$ ), nor FEV1 percent predicted or admission (64% vs. 67%,  $p=0.661$ ). The maximum vancomycin trough measured for piperacillin-tazobactam was 23 (11-24) vs. 15 (12-19) for cefepime ( $p=0.0324$ ). **Conclusions:** AKI occurred in nearly 57% of patients with piperacillin-tazobactam therapy versus 15% of patients with cefepime therapy. This study suggests that piperacillin-tazobactam therapy in combination with vancomycin and tobramycin in pediatric CF patients may cause a greater incidence of AKI.

### Learning Objectives:

Identify appropriate antibiotic coverage for treating *Pseudomonas aeruginosa* in a patient with a cystic fibrosis exacerbation.  
Relate the modified pRIFLE criteria to the severity of acute kidney injury in a pediatric patient.

### Self Assessment Questions:

Which of the following pairs of antibiotics is the best option to double cover *Pseudomonas aeruginosa* in a patient with cystic fibrosis?

- A: Gentamicin and Tobramycin
- B: Vancomycin and Cefepime
- C: Cefepime and Piperacillin-tazobactam
- D: Tobramycin and Cefepime

What is the minimum percentage decrease in estimated creatinine clearance (CrCl) needed to have acute kidney injury, as defined by the modified pRIFLE criteria?

- A 10%
- B 25%
- C 50%
- D 75%

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-499L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING IMPACT OF POOP (PROPHYLACTIC BOWEL ORDER PRESCRIBING) CLINICAL DECISION SUPPORT (CDS) TOOL ON ADHERENCE TO BOWEL REGIMEN PRESCRIBING FOR PATIENTS STARTED ON OPIOID ANALGESICS IN AN ONCOLOGY

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**Background:** Constipation is the most frequent opioid adverse effect in advanced cancer, occurring in 25-50% of patients, and may cause significant discomfort. National Comprehensive Cancer Network (NCCN) Adult Cancer Pain guidelines recommend prescribing a prophylactic bowel regimen with opioid prescribing. An appropriate bowel regimen according to guidelines contains either a stimulant laxative or polyethylene glycol. A previous study at the University of Chicago Medicine showed 34.2% of all adult patients admitted to the hematology/oncology service who were prescribed opioids received a prophylactic bowel regimen despite guideline recommendations. Based on these results, a clinical decision support (CDS) tool, integrated into the electronic medical record (EMR) system, was created to aid pharmacists in identifying patients who are in need of a prophylactic bowel regimen. **Purpose:** The aim of this study is to evaluate how the implementation of a bowel regimen CDS tool impacts prescribing of prophylactic bowel regimens and rate of constipation. **Methods:** Single-center, retrospective, cross-sectional, chart review, evaluating eligible adult oncology patients receiving opioids on the hematology/oncology service. Patients will be classified as receiving a prophylactic bowel regimen, defined as any scheduled or as needed laxative ordered within 24 hours of opioid therapy initiation or no prophylactic bowel regimen. Patients will then be allocated to either: 1.) pre-implementation of the bowel regimen CDS tool group or 2.) post-implementation of the bowel regimen CDS tool group. Baseline characteristics will include patient-, disease-, and medication-specific information. The primary endpoint is the proportion of patients prescribed a prophylactic bowel regimen. Secondary endpoints include the percentage of patients who utilized rescue laxative therapy and the mean frequency of pharmacist interventions associated with bowel regimen drugs. **Results/Conclusion:** Data collection and analysis are pending and will be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Describe the incidence of opioid-induced constipation in patients who utilize opioid therapy  
Identify appropriate prophylactic bowel regimens in cancer patients receiving opioid therapy

### Self Assessment Questions:

What percentage of opioid users experience opioid-induced constipation according to the meta-analysis of 15 randomized, placebo-controlled trials of patients on opioids?

- A ~10%
- B ~20%
- C ~40%
- D ~80%

Which of the following is considered an appropriate prophylactic bowel regimen according to the NCCN Guidelines?

- A Docusate alone
- B Polyethylene glycol
- C Psyllium
- D Cholestyramine

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-500L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **PATIENT CHARACTERISTICS ASSOCIATED WITH AVOIDANCE OF HOSPITAL ADMISSION IN ADULTS RECEIVING INTRAVENOUS MAGNESIUM SULFATE FOR AN ASTHMA EXACERBATION IN THE EMERGENCY DEPARTMENT**

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**Purpose:** The Global Initiative for Asthma 2015 recommends the use of two grams of intravenous (IV) magnesium sulfate (MgSO<sub>4</sub>) over twenty minutes during an asthma exacerbation for adults with a forced expiratory volume in one second less than 25 to 30 percent predicted, or if the patient is not responding to initial treatment and has persistent hypoxemia. The objective of this study is to define patient characteristics that are associated with avoidance of hospital admission when IV MgSO<sub>4</sub> is administered in the emergency department (ED) for an asthma exacerbation. **Methods:** This is a retrospective cohort study approved by the Institutional Review Board at Akron General Medical Center. A generated report from the ED electronic medical record was utilized to identify adult patients who received two grams of IV MgSO<sub>4</sub> over twenty minutes in the ED for an asthma exacerbation between 3/31/2013 to 12/31/2015. Characteristics of admitted patients will be compared to those of patients discharged directly from the ED to determine association with avoidance of admission. Patient characteristics collected for analysis included baseline demographics, vital signs, number of bronchodilators utilized, and histories of intubation, tobacco use, or hospitalization secondary to asthma in the past twelve months. The primary outcome of this study will be the proportion of patients who received IV MgSO<sub>4</sub> in the ED for an asthma exacerbation and avoided hospital admission. The odds of hospital admission avoidance for each patient characteristic will then be analyzed. The proportion of patients admitted to the ICU that received IV MgSO<sub>4</sub> in the ED will also be determined along with the odds of ICU admission based on each patient characteristic collected for the primary outcome. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### **Learning Objectives:**

Describe the prevalence of asthma in the United States.  
Describe the Global Initiative for Asthma 2015 recommendations for the utilization of IV MgSO<sub>4</sub> administration during an asthma exacerbation.

### **Self Assessment Questions:**

Per the Centers for Disease Control and Prevention estimation, how many adults suffer from asthma in the United States?

- A: 7.2 million
- B: 18.7 million
- C: 53.6 million
- D: 97.1 million

What is the dose of IV MgSO<sub>4</sub> recommended by the Global Initiative for Asthma 2015 for patients at least 18 years of age presenting to the emergency department with an asthma exacerbation?

- A: 500 mg
- B: 2 grams
- C: 4 grams
- D: 6 grams

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-501L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **IMPLICATIONS OF THE PRESENCE OF AN EMERGENCY MEDICINE PHARMACIST DURING CRITICAL CARE TRAUMA PATIENT RESUSCITATION**

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**Purpose:** The purpose of this project was to determine the impact on patient outcomes due to the presence of an emergency medicine pharmacist (EMP) during critical care trauma patient resuscitation. Current literature has shown that the presence of an EMP is associated with decreased time to medication procurement, decreased medication errors, and overall cost avoidance. However, there is no current literature evaluating the impact of an EMP specifically in critical care trauma patient resuscitation. **Methods:** This study was submitted and approved by the Institutional Review Board. This study was a retrospective chart review evaluating adult trauma patients presenting to the critical care area (CCA) at the University of Louisville Hospital from July 2014 to December 2014. The study group consisted of patients presenting to the CCA with a trauma diagnosis between the hours of 0800 and 2159, as these are the times that an EMP was consistently present. Patients presenting outside of these time parameters were included in the control group. Primary outcomes include triage time to antibiotic administration, triage time to rapid sequence intubation (RSI), time from RSI to the provision of sedation, triage time to analgesia, and triage time to anticoagulation reversal. The cost avoidance associated with the presence of an EMP was evaluated as a secondary outcome. Data was collected from CCA records, the computerized physician order entry system, and the current pharmacy intervention reporting system. Data was analyzed using descriptive statistics. **Results:** To be presented at Great Lakes Pharmacy Residency Conference (GLPRC). **Conclusions:** To be presented at GLPRC.

### **Learning Objectives:**

Identify the effects of the emergency medicine pharmacist (EMP) on outcomes in critical care trauma patients presenting to the emergency department (ED)  
Define cost avoidance as a method of reporting financial data and its role in expressing the value of pharmacists

### **Self Assessment Questions:**

Which of the following roles of pharmacists in the ED have been shown to improve patient outcomes?

- A: Decreased time to antibiotics in the trauma patient population
- B: Decreased time to analgesia in the trauma patient population
- C: Decreased time to percutaneous coronary intervention in the general ED population
- D: Decreased time to renal replacement therapy in the general ED population

The cost avoidance model for reporting financial data is based on:

- A: Tangible dollars saved from an implemented service.
- B: Intangible dollars saved from an implemented service.
- C: Net profit from an implemented service.
- D: Net loss from an implemented service.

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-807L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PHARMACIST-DRIVEN MEDICATION MANAGEMENT FOR PATIENTS WITH DIABETES IN AN OUTPATIENT PRIMARY CARE

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**Purpose:** Based on education and training, a pharmacist is uniquely suited to review medication profiles and provide medication management to patients in primary care practice. The objective of this study is to evaluate the impact of a post-graduate year 1 (PGY-1) pharmacy resident presence on improving diabetes-related health outcomes in a patient centered medical home model (PCMH) used in an outpatient family practice clinic over the course of three months. **Methods:** The Institutional Review Board approved this pilot a quality improvement study which focused on improving patient care through interactions with a pharmacist. Patients were included if they had diabetes and met inclusion criteria including provider and nurse care coordinator discretion. Patients were excluded if their diabetes was managed by an outpatient Endocrinology provider. A pharmacist worked with half of the physicians in a family practice clinic to provide medication management under the clinic's current protocol and used the remaining physicians and patients as a control group. The target population included patients with diabetes who had: poor glycemic control (HbA1C > 8%) or medication adherence, a recent diagnosis, hospitalization within the last 30 days, or financial, health literacy or other physical barriers. Pharmacist-patient interactions were documented in the patients' electronic medical record by the provider or pharmacist. The primary outcomes to be evaluated were change in: glycosylated HbA1C, appropriate statin and aspirin use, and blood pressure control. Secondary outcomes to be evaluated included number of additional patient contacts, fraction of recommendations accepted by providers, and clinic staff satisfaction with the service. **Results/Conclusions:** Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify barriers to implementing a new pharmacy service in an outpatient primary care clinic

Recognize potential medication interventions a pharmacist could make in patients with diabetes

### Self Assessment Questions:

What was considered to be the largest barrier to implementation of our pharmacist-driven service in an outpatient clinic?

- A: Provider buy-in and expectations
- B: Patient sample size
- C: Patient willingness to meet with a pharmacist
- D: Clinic flow allowing patients time to see a pharmacist

Potential pharmacist interventions for patients with diabetes could include which of the following?

- A: Observing glucose trends and recommending medication adjustments
- B: Using drug insurance formularies to guide therapy recommendations
- C: Educating patients on proper medication administration techniques
- D: All of the above are potential interventions

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-502L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## DEVELOPMENT OF A RISK SCORE FOR MAJOR BLEEDING ASSOCIATED WITH NOVEL ORAL ANTICOAGULANTS

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**Statement of Purpose** Use of target-specific oral anticoagulants (TSOACs) is increasing as clinicians become more familiar with the drugs, insurance coverage broadens, and the number of indications expands. However, while risk scores have been developed for patients with atrial fibrillation (AF) taking warfarin, a risk score for major bleeding associated with TSOACs for AF or other indications has not been developed. The objective of this study is to determine independent risk factors for TSOAC-associated major bleeding for use in developing a risk score. **Statement of Methods Used** In this retrospective study, electronic medical records were used to identify patients who were initiated on rivaroxaban, edoxaban, apixaban, or dabigatran between 1/1/2013 and 5/31/2015 and who were readmitted for any reason within 60 days. Patients with a primary readmit diagnosis of major bleeding were identified. A control group of patients who also received a TSOAC, but did not experience major bleeding, was matched to the bleeding group. Data including demographic information, past medical history (PMH), vital signs, laboratory values, and medications was collected.

**Summary of Results** A total of 2617 patients were started on a TSOAC and 63 (2.4%) were readmitted for a major bleed within 60 days. These patients were matched to 250 patients who used a TSOAC, but did not experience a major bleed. There were no differences in baseline characteristics between the bleeding and non-bleeding groups. A bivariate analysis identified independent five risk factors for major bleeding in patients taking a TSOAC. These included: race (white,  $p=0.037$ ), alcohol use (>8 drinks/week,  $p=0.013$ ), PMH of PCI ( $p<0.001$ ), aspirin use ( $p=0.002$ ), NSAID use ( $p=0.016$ ).

**Conclusions Reached** White race, consumption of > 8 alcohol drinks/week, PMH of PCI, and aspirin and NSAID use increased the risk for major bleed in patients studied. This data will be used to generate a risk score for major bleeding associated with TSOACs.

### Learning Objectives:

Describe the need for a bleeding risk score for the target-specific oral anticoagulants (TSOACs).

Identify independent risk factors for bleeding in patients taking TSOACs

### Self Assessment Questions:

True or false: a validated bleeding risk score for patients taking TSOACs currently exists.

- A: True
- B: False
- C: N/a
- D: N/a

Based on this research, which of the following does NOT increase the risk for bleed in a person taking a TSOAC?

- A: Being Asian
- B: Having a past medical history of PCI
- C: Consumption of more than 8 alcoholic drinks per week
- D: Use of NSAIDs

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number      0121-9999-16-932L05-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## IMPACT OF EARLY BENZODIAZEPINE USE ON LEVEL OF ADMISSION FOR ALCOHOL WITHDRAWAL

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**Background:** Alcohol withdrawal is a significant burden to the health care system, with approximately 20% of all hospital admissions having a component of alcohol withdrawal. Current practice guidelines recommend benzodiazepines as the first line therapy for the treatment of alcohol withdrawal. Despite being a widespread issue, optimal benzodiazepine dosing for alcohol withdrawal in the emergency department nor the impact of such dosing on level of admission have not been described in the literature. The aim of this study is to examine the relationship between cumulative benzodiazepine dose in the emergency department and level of admission. **Methods:** This retrospective case series will evaluate patients with a primary diagnosis of alcohol withdrawal presenting to the emergency department at an academic medical center from 2010-2015. Patients admitted to the general floor and medical ICU will be matched based upon the Rapid Emergency Medicine score (REMS). The primary outcome will compare the difference in the cumulative benzodiazepine dose between the different levels of admission. The secondary analysis will seek to assess the validity of REMS in patients with alcohol withdrawal.

**Results:** In progress. **Conclusions:** In progress.

### Learning Objectives:

Recognize the burden that alcohol withdrawal places on the health care system.

Identify the mainstay of therapy for patients with alcohol withdrawal

### Self Assessment Questions:

Which of the following drug classes is the first line treatment for alcohol withdrawal?

- A Centrally acting alpha-2 agonists
- B: Beta-blockers
- C: Benzodiazepines
- D: Barbiturates

Approximately how many hospital admissions have a component of alcohol withdrawal?

- A 5%
- B 20%
- C 40%
- D >50%

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-503L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PROCALCITONIN AS A BIOMARKER IN ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AND LOWER RESPIRATORY TRACT INFECTION

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**Purpose:** Lower respiratory tract infections (LRTIs) commonly cause adult hospitalizations and are often associated with acute exacerbation of chronic obstructive pulmonary disease (AECOPD). According to the Center for Disease Control, 20-50% of all antibiotics prescribed in United States acute care hospitals are either unnecessary or inappropriate. The purpose of this study is to assess the use of procalcitonin (PCT), which is produced in response to various endotoxins released by bacteria, as a guide to the initiation and de-escalation of antibiotic therapy in patients who present with LRTI and/or AECOPD. **Methods:**

This prospective study will be conducted in the Medical Surgical ICU (MSICU) at Presence Saint Joseph Medical Center from February 1, 2016 thru March 31, 2016. All non-pregnant patients greater than 18 years of age with a suspected LRTI and/or AECOPD will be enrolled in the study. A pharmacist-driven PCT protocol will be used to recommend an appropriate course and duration of antibiotic therapy in these patients. Baseline PCT levels will be drawn upon admission or suspicion of infection with subsequent levels ordered per protocol. This data will be collected and analyzed to help determine appropriate choice and duration of antimicrobial therapy. Recommendations will be made by the pharmacist according to protocol and patient clinical status. Physicians and midlevel providers will be educated regarding the role of PCT, antibiotic complications, and the use of PCT algorithms to guide antibiotic therapy. Data collection, ordering of PCT, and record keeping will be performed by a pharmacist in the MSICU. Primary endpoints include days of antibiotic therapy and length of hospital stay. Secondary endpoints include serum PCT levels and direct cost of antibiotics.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the effectiveness of procalcitonin as a biomarker of infection in patients with suspected lower respiratory tract infection and/or acute exacerbation of chronic obstructive pulmonary disease  
Discuss the impact of a pharmacist-driven procalcitonin algorithm to help guide antibiotic therapy

### Self Assessment Questions:

Why is procalcitonin useful when treating infection?

- A It is a marker of viral infection
- B: PCT levels decrease in response to a declining bacterial load
- C: Along with other markers of infection, PCT helps reduce antibiotic
- D: B and C

In which of the following situations would procalcitonin monitoring be useful?

- A Determination of the length of antibiotic therapy in respiratory infection
- B Monitoring response to antibiotic therapy
- C Differentiation of bacterial from viral respiratory infections
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-504L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ESTABLISHMENT OF A FRACTURE LIAISON SERVICE AT A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** In 2014, the National Osteoporosis Foundation (NOF) estimated that 54 million US adults 50 years and older have osteoporosis and low bone mass. By 2025, the burden of osteoporosis in the US is projected to increase by nearly 50 percent and incur a cost of \$25.3 billion. In 2014 only 38.1 percent of females with a prior history of fracture enrolled in an HMO Medicare plan were tested or treated for osteoporosis. The purpose of this study is to establish and evaluate a Fracture Liaison Service (FLS) to identify Veterans with a prior history of hip fracture not currently treated for osteoporosis. **Methods:** A Veterans Integrated Service Network (VISN) database will be established to identify patients at the William S. Middleton Memorial Veterans Hospital in Madison, WI with prior history of hip fracture who are not currently on treatment for osteoporosis and do not have a dual-energy X-ray absorptiometry (DXA) in the last three years. A prospective review of electronic health records (EHRs) will be performed to determine if osteoporosis work-up is warranted. If further evaluation is needed, an individualized letter will be sent to the patient and primary care provider (PCP) detailing the additional laboratory tests and/or imaging required. The FLS coordinators will facilitate the evaluation by ordering the additional testing prior to the patients next PCP visit. Impact of the service will be evaluated by determining proportion of patients started on osteoporosis treatment. Additional metrics to be evaluated include proportion of patients started on calcium and vitamin D supplements and proportion of patients for whom the recommended interventions were not implemented. **Results and Conclusions:** The study is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the impact of osteoporosis and osteoporotic fractures on individuals and the healthcare system.

Identify appropriate osteoporosis work-up and treatment for patients with a history of a hip fracture.

### Self Assessment Questions:

According to the NOF Clinicians Guide to Prevention and Treatment of Osteoporosis, what is the adequate amount of calcium intake for adults age 50 or older recommended to help reduce fracture risk?

- A: At least 1,200mg per day of elemental calcium
- B: At least 1,500mg per day of elemental calcium
- C: At least 800mg per day of elemental calcium
- D: At least 1,000mg per day of elemental calcium

According to the meta-analysis previously discussed, what is the increased risk of a subsequent fracture in individuals with an initial fracture?

- A: 23%
- B: 97%
- C: 86%
- D: 56%

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-505L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF ORAL ASPIRIN TO OTHER CHEMOPROPHYLAXIS AGENTS FOR VENOUS THROMBOEMBOLISM PROPHYLAXIS IN HOSPITALIZED PATIENTS STATUS POST TOTAL KNEE ARTHROPLASTY

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**Purpose:** The American Academy of Orthopedic Surgeons guidelines include oral aspirin as one of the recommended chemoprophylaxis options for patients at standard risk of venous thromboembolism (VTE) following hip or knee replacement. The objective of this study was to compare patient outcomes between those given aspirin versus other chemoprophylaxis agents following total knee arthroplasty (TKA) at Swedish Covenant Hospital (SCH). **Methods:** In this retrospective data collection study, electronic medical records were used to evaluate outcomes of patients status post TKA. Baseline data collection included age, gender, body mass index, comorbidities, hemoglobin levels, and serum creatinine levels. All subjects were randomly selected from a list of patients having TKA surgery at SCH between January 2014 and November 2015. The primary outcome measured the incidence of VTE. The secondary outcomes included the incidence of major and clinically relevant bleeding, thirty-day readmission rate, and average length of stay following surgery and readmission, if applicable. The Fisher exact and Mann-Whitney tests were used to evaluate outcome significance.

**Results:** A total of 150 patients, 75 patients in each study group, were evaluated. For the primary outcome of VTE, one patient (1/75) developed a pulmonary embolism in the aspirin group ( $p=1$ ). For the secondary outcomes, one patient (1/75) developed an upper GI bleed four days after surgery in the other chemoprophylaxis group ( $p=1$ ). One patient (1/75) in the aspirin group was readmitted secondary to pulmonary embolism ( $p=1$ ) and one patient (1/75) in the other chemoprophylaxis group was readmitted secondary to GI bleed ( $p=1$ ). The average length of stay was 3.8 days in the aspirin group and 4.5 days in the other chemoprophylaxis group ( $p<0.0001$ ). **Conclusion:** Results showed there was no difference in terms of VTE or bleeding risk between the two study groups. A statistically significant shorter average length of stay was seen in the aspirin group.

### Learning Objectives:

Recognize risk factors for venous thromboembolism following total knee arthroplasty

Describe the mechanism of action for currently available VTE chemoprophylaxis agents

### Self Assessment Questions:

Which one of the following is a risk factor for venous thromboembolism?

- A: Use of beta-blockers
- B: Immobility or bed rest
- C: Male
- D: Hyperlipidemia

Which of the following agents inhibits both COX 1 and COX 2 via acetylation and results in decreased formation of thromboxane A2?

- A: Rivaroxaban
- B: Warfarin
- C: Aspirin
- D: Dabigatran

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-506L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF PHARMACIST MONITORING OF A RAPID BLOOD PATHOGEN IDENTIFICATION PANEL BY NUCLEIC ACID AMPLIFICATION (NAAT)

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**Purpose:** The U.S. Food and Drug Administration (FDA) recently approved a blood pathogen identification test called the FilmArray Blood Culture Identification (BCID) Panel. This panel utilizes multiplex PCR-based nucleic acid amplification (NAAT). The BCID panel is able to detect 27 organisms including gram-positive bacteria, gram-negative bacteria, yeast, and antibiotic resistance genes. For most of the target organisms, the test has a sensitivity and specificity that is greater than 95%. Since the utilization of the BCID panel at this facility, there have been misinterpretations which could lead to increased hospital stay, incorrect prescribing of antibiotics, and additional hospital admissions. The purpose of this project is to evaluate the impact of pharmacist education and monitoring on the utilization of the BCID panel.

**Methods:** This single-centered study involved pharmacist provided education in addition to retrospective and prospective review of BCID panel results. Nursing education included a stepwise process and flow sheet to assist with interpretation of the results. The physician hospitalist group education involved a similar process for interpreting results and explanation of the changes implemented by the lab. Review of the BCID panels were completed with a focus on the correct interpretation of the results. The primary outcome is the number of misinterpretations of the results and interventions made by pharmacists. Data collection included organism(s) detected by the BCID panel, antibiotics being used at the time of the results, and interventions made by pharmacists. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the BCID panel and highlight its role in guiding antibiotic therapy.  
Discuss the impact of pharmacist education on the utilization of the BCID panel.

### Self Assessment Questions:

According to the package insert for the FilmArray Blood Culture Identification (BCID), the sensitivity and specificity for the majority of the target organisms is what percentage range?

- A >95%
- B: 85-95%
- C: 65-75%
- D: 55-65%

Which of the following are advantages to using the FilmArray Blood Culture Identification (BCID) Panel?

- A Results provide the final susceptibilities of the blood pathogen
- B Results allow for selection of antibiotics toward a specific microorganism
- C Results provide opportunities for de-escalation of antibiotics
- D B & c

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-507L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING EFFICACY, SAFETY AND TOLERABILITY OF NOVEL ANTIVIRALS IN TREATMENT OF VETERANS WITH CHRONIC HEPATITIS C

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**Purpose:** More than three million Americans are chronically infected with the Hepatitis C virus (HCV). The true prevalence of the virus in Veteran population is unknown. A recent study suggests that it is more prevalent among the current Veteran population using the Veterans Affairs (VA) system than the United States population as a whole. The standard of care for Hepatitis C has changed significantly with the development of novel direct-acting antiviral agents. While these agents are associated with significant acquisition costs, the safety, efficacy and tolerability profiles are favorable in comparison to treatment of HCV infection-related complications. **Methods:** Veterans seen by the VA Illiana Liver Treatment Clinic will be reviewed to assess the efficacy of the current standard of care in comparison to previous regimens. A retrospective chart review of patients treated with ledipasvir-sofosbuvir, sofosbuvir plus ribavirin and peg-interferon alfa-2a plus ribavirin will be conducted to evaluate utilization of newer treatment options recently added to the VA National Formulary. Provider adherence to treatment guidelines will be evaluated as well. Veterans with genotype 1a and 1b infection, with varying treatment experience and stages of cirrhosis will be included. Those with other genotypes or presence of co-infections will be excluded from review. The primary endpoint of the study is the sustained virologic response (SVR) at 12 weeks post-antiviral treatment. Secondly, study will capture outcomes such as long-term health outcomes, quality-adjusted life-years (QALYs) gained, incremental cost-effectiveness ratios and costs per sustained virologic response. Clinical outcomes will be stratified by age, race, stage of liver disease and presence of cirrhosis. Primary and secondary endpoints will be analyzed based on chart review. Sustained virologic response will be analyzed from initial consultation appointment and post-treatment follow up appointment. **Results and Conclusions:** Collection of information is currently in progress. Final results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Recognize the clinical symptoms, pathophysiology and significant laboratory findings for patients with Hepatitis C.  
Describe common side effects and adverse events related to antiviral therapy with various treatment modalities.

### Self Assessment Questions:

Incidence of fatigue is highest in patients treated with which of the following regimens?

- A Ledipasvir-sofosbuvir
- B: Sofosbuvir plus ribavirin
- C: Peg-interferon alfa-2a plus ribavirin
- D: All regimens are associated with similar incidence of fatigue

During which interval is serum HCV-RNA clinically indicated?

- A Baseline
- B During treatment and upon completion of treatment
- C Follow-up appointments
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-508L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A PHARMACY TELEPHONE TOBACCO CESSATION CLINIC AT ALEDA E. LUTZ VA

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Purpose Tobacco use is connected to many disease states seen in the veteran population, many of whom turned to tobacco during their time in the service. Tobacco use is the number one cause of preventable death causing over 400,000 deaths annually. Benefits of quitting tobacco use are immediately seen, supporting the VAs mission to help veterans quit smoking as soon as possible. Benefits range from improvement in lung function, lowering of blood pressure, and decreasing risk for stroke and cancer. While about half the population that smokes wishes to quit, only about 3-5% of quit attempts are successful. Veterans utilizing pharmacotherapy to quit would benefit from consistent follow up from a pharmacist who can evaluate their progress, adjust their medications, and provide support. The purpose of this clinic is to assist veterans that wish to quit smoking by utilizing pharmacotherapy and connecting veterans to other resources that may be helpful to them.

Methods The Pharmacy Tobacco Cessation Clinic (PTCC) was broadcasted to providers during meetings. Veterans were referred to the PTCC by providers in both the main Aleda E. Lutz facility and its community-based outpatient clinics (CBOCs). A pharmacist receives the consult to PTCC and contacts the veteran confirming interest and obtaining a tobacco-use history. The pharmacist evaluates the veterans history, comorbid conditions, and preferences and selects the appropriate pharmacotherapy. Veterans may or may not have been prescribed a medication by their provider prior to entering the clinic. The pharmacist continues to contact the veteran in intervals of 2 to 4 weeks, based on veterans needs and/or preference. Results/Conclusion

Results will be presented at the 2016 Great Lakes Pharmacy Resident Conference, taking place April 27-29.

### Learning Objectives:

Review administrative steps to implement the Pharmacy Tobacco Cessation Clinic at the Aleda E. Lutz VAMC.

Describe impact of pharmacists role by comparing Aleda E. Lutz VAMC: quit rate to national average

### Self Assessment Questions:

Which of the following Nicotine Replacement therapy modalities is most effective?

- A: Nicotine patch
- B: Nicotine gum
- C: Nicotine lozenge
- D: All of the above

Which of the following is not true regarding varenicline?

- A: It is dose-adjusted based on hepatic function
- B: It can cause vivid dreams
- C: A common side effect is nausea
- D: Varenicline cannot be paired with nicotine replacement or bupropion

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-509L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING THE OUTCOMES OF A PHARMACIST DRIVEN PROTOCOL THAT TRANSITIONS WARFARIN PATIENTS TO A DIRECT ORAL ANTICOAGULANT

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PURPOSE: Time in therapeutic range (TTR) is a method of measuring the effectiveness of warfarin therapy. A TTR less than 70% has been associated with less effective therapy. Transitioning eligible patients to a direct oral anticoagulant (DOAC) may increase the number of patients who are therapeutically anticoagulated. While the pharmacists at the anticoagulation clinic have the scope of practice to transition appropriate warfarin patients to a DOAC; current standard of practice is to only do so after consultation with the patients PCP. The goal of this process improvement project is to determine if implementing a pharmacist driven protocol to transition eligible warfarin patients to a DOAC will improve average clinic TTR. METHODS: A structured query language (SQL) report will be run quarterly that identifies warfarin patients with a 6-month average TTR <60%. The patients will then be chart reviewed to see if they are eligible to be transitioned to a DOAC. If the patient is eligible, they will be contacted. If they are agreeable to being switched, their PCP will be notified and they will be transitioned. Patients who are switched will be chart reviewed at their 3 month final clinic visit to determine if they were successfully converted. The average clinic TTR will be measured prior to the implementation of this protocol, and 3 quarterly reports after the protocol has been implemented. RESULTS (PRELIMINARY): The quarterly SQL report from April and August 2015 identified 145 patients (35%) who were eligible for conversion from Warfarin to a DOAC. 74% of the patients who were eligible for conversion to a DOAC were able to be contacted to determine interest in a switch of medication. A total of 30 patients have been converted to a DOAC based on pharmacy protocol. Final results will be presented at GLPRC. CONCLUSIONS: To be presented at GLPRC.

### Learning Objectives:

List potential limitations of a pharmacist driven protocol to transition Warfarin patients to a DOAC to improve average clinic TTR

Identify patients who are appropriate for DOAC conversion based on a pharmacist driven protocol

### Self Assessment Questions:

Which of the following is not a limitation to the success of improving average clinic TTR?

- A: Inability to obtain enough patient's approval to switch anticoagulation
- B: Potential for PCP's to disapprove the conversion of agents
- C: Too short of a time frame to assess benefit of protocol
- D: Inability of clinic to identify patients who may be eligible for conversion

Which patient would be eligible for conversion to a DOAC based on the pharmacist driven protocol implemented?

- A: 90 yo male with DVT who is on dialysis
- B: 78 yo female with AFIB who has a bio-prosthetic heart valve
- C: 65 yo male with AFIB who has a CrCl of 70mL/min
- D: 68 yo female who is on antiretroviral therapy for HIV infection

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-808L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF INTRAVENOUS ACETAMINOPHEN AND ITS EFFECTS ON OPIOID USE FOLLOWING SURGERY

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**Purpose:** Intravenous acetaminophen is frequently used post-operatively to reduce opioid use while maintaining adequate pain control. Intravenous acetaminophen is FDA approved for management of mild-to-moderate pain, management of moderate-to-severe pain with adjunctive opioid analgesics, and reduction of fever. Following a sudden price increase of more than 140 percent in 2014, many healthcare systems re-evaluated their use of intravenous acetaminophen. The studies designed to reassess its cost-effectiveness have shown variable results that are often inconsistent with the findings of the trials that achieved the medications FDA approval. This study evaluated the appropriateness of intravenous acetaminophen use within St. Elizabeth Healthcare. **Methods:** Patients who received intravenous acetaminophen within the first 48 hours after orthopedic and/or general surgery procedures were compared to patients with the same type of surgeries who did not receive any intravenous acetaminophen to evaluate if intravenous acetaminophen reduced post-operative opioid use while maintaining adequate pain scores. Data was collected through a retrospective chart review. Patients were excluded from the study if they had more than one procedure, exhibited chronic opioid use prior to the procedure, received any NSAIDs or corticosteroids in the week prior to surgery, had less than three reported pain scores in the first 48 hours after surgery, were less than 18 years old or greater than 80 years old, were mentally disabled, pregnant, or were incarcerated. Patients were also evaluated to determine if they would have been candidates for the use of IV ibuprofen in the place of IV acetaminophen.

**Results/Conclusion:** Data collection is currently ongoing. Final results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the pharmacokinetics of acetaminophen with various routes of administration.

Discuss other intravenous non-opioid analgesics that have an indication for management of moderate to severe pain with adjunctive opioid analgesics.

### Self Assessment Questions:

How do the plasma concentrations of acetaminophen three hours after administration in healthy adults compare between intravenous, oral, and rectal administration of acetaminophen?

- A The plasma concentration following intravenous administration is 50% higher than oral administration.
- B The plasma concentration following intravenous administration is 50% lower than oral administration.
- C The plasma concentration following intravenous administration is 50% higher than rectal administration.
- D The plasma concentration following intravenous administration is 50% lower than rectal administration.

Which of the following medications have an indication for management of moderate to severe pain with adjunctive opioid analgesics?

- A Oral celecoxib
- B Intravenous ibuprofen
- C Intravenous ketorolac
- D Oral diclofenac

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-510L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REVIEW OF POTENTIALLY INAPPROPRIATE BENZODIAZEPINE USE IN ELDERLY VETERANS AT A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** The Beers Criteria and Screening Tool of Older People's Prescriptions (STOPP) identify benzodiazepine use as potentially inappropriate in older adults due to increased risk of falls, cognitive impairment, and mortality. The main objective of this project was to determine the prevalence of potentially inappropriate benzodiazepine use in elderly Veterans at the Robley Rex Veterans Affairs Medical Center (RRVAMC). A secondary objective was to provide education to prescribers based on prescribing patterns. **Methods:** This retrospective cohort analysis involved Veterans 75 years and older with an active benzodiazepine prescription at RRVAMC as of September 15, 2015. Prescriptions for short-term use or end-of-life care were excluded. Chart review was used to determine the prevalence of potentially inappropriate prescribing using criteria from Beers and STOPP. In addition, the prevalence was determined for potentially inappropriate indications and adverse drug event (ADE) risk factors. To identify prescribing patterns, the number of prescriptions that met criteria was compiled for each RRVAMC provider. **Results:** Out of 238 elderly Veterans with benzodiazepine prescriptions, 102 were randomly selected for analysis. Five were excluded, three of which for short-term use. Therefore, 97% were used long-term. Other potentially inappropriate criteria included: long-acting agent or agent with long-acting metabolites (31%), inappropriate indication (56%), and use in patients with dementia (13%). Only 26% of providers attempted a dose reduction in the preceding year. The most common primary indications were: anxiety (48%), insomnia (34%), and dementia with agitation (5%). When indicated for anxiety or insomnia, 44% of Veterans had not previously been prescribed a safer alternative. The following ADE risk factors were also identified: concurrent opioid use (33%), chronic obstructive pulmonary disease (28%), dementia (13%), and post-traumatic stress disorder (5%). **Conclusion:** A high prevalence of potentially inappropriate benzodiazepine prescribing was identified using Beers and STOPP criteria. Provider education is warranted to improve prescribing appropriateness.

### Learning Objectives:

List criteria used to identify potentially inappropriate benzodiazepine prescribing in the elderly

Name safer alternatives to benzodiazepines for older adults

### Self Assessment Questions:

Which of the following is a true statement?

- A The Beers criteria indicate that benzodiazepine use in the elderly is appropriate.
- B The Beers criteria indicate that benzodiazepine use in the elderly is inappropriate.
- C STOPP criteria indicate that the use of long-acting benzodiazepines is appropriate.
- D STOPP criteria indicate that benzodiazepines may be safely used in the elderly.

Which of the following is considered a safer alternative to benzodiazepines for the treatment of insomnia in the older adults?

- A Zolpidem
- B Diphenhydramine
- C Trazodone
- D Amitriptyline

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-933L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

**EFFICACY OF ANTIMICROBIALS AGENTS IN RESOLVING ASYMPTOMATIC BACTERIURIA IN PATIENTS WITH FLUOROQUINOLONE AND SULFAMETHOXAZOLE-TRIMETHOPRIM RESISTANT ENTEROBACTERIACEAE PRIOR TO A PLANNED UROLOGIC PROCEDURE**

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**Purpose:** Sepsis occurs in around 25-80% of patients with untreated asymptomatic bacteriuria that are undergoing a urologic procedure with high risk for mucosal bleeding. Studies have shown that pre-procedural prophylaxis with antimicrobials is beneficial for preventing bacteremia and sepsis in these patients. Fluoroquinolones and sulfamethoxazole-trimethoprim (SMX/TMP) have been studied in the setting of asymptomatic bacteriuria. The purpose of this study is to evaluate the efficacy of antimicrobial agents utilized in the veteran population for the treatment of asymptomatic bacteriuria prior to a planned urologic procedure when the urine culture demonstrates an Enterobacteriaceae isolate that is resistant to sulfamethoxazole-trimethoprim (SMX/TMP) and fluoroquinolones. **Methods:** This study is a retrospective, electronic chart review of patients at Jesse Brown VA Medical Center receiving antimicrobial therapy to eradicate bacteria in the urine prior to a planned urologic procedure. Microbiology reports will be utilized for culture data including susceptibility information. Study participants will be generated by obtaining a micro laboratory list of subjects who had a urine culture displaying organism(s) resistant to SMX/TMP and fluoroquinolones between January 1, 2009 and August 17, 2015. This study is IRB and R&D committee approved. **Results:** Collection and analysis of the data is ongoing. Results and conclusions will be presented at the Great Lakes Residency Conference

**Learning Objectives:**

Outline indications for the treatment of asymptomatic bacteriuria in various patient populations.

Review treatment options for patients with a sulfamethoxazole-trimethoprim and fluoroquinolone resistant asymptomatic bacteriuria.

**Self Assessment Questions:**

Which asymptomatic patients bacteriuria should be treated ?

- A) A 35 year old man that presents to the genitourinary clinic (GU)
- B) A 65 year old man presents to the GU clinic for a transurethral r
- C) A 32 year old man presents to the emergency department with c
- D) A 70 year old man presents to the GU clinic for a transurethral r

A 62 year old male with prostate cancer is being seen today in the genitourinary clinic for a transurethral resection of the prostate. As part of his pre-surgical management the physician orders a uri

- A Levofloxacin
- B Cefuroxime
- C Sulfamethoxazole- trimethoprim
- D Imipenem-cilastatin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-511L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**EFFICIENCY ANALYSIS OF A BARCODE ENABLED INTEGRATED MEDICATION TRACKING SYSTEM AT A LARGE ACADEMIC MEDICAL CENTER**

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**Purpose:** Improving the hospital medication distribution system is needed to ensure prompt administration of time-critical medications. Lack of a medication tracking system can result in inefficiencies in the medication distribution process and potential delayed medication administration times. Previous medication tracking systems described in the literature have not been integrated within the electronic health record (EHR). Recent improvements to EHR systems now provide the first opportunity to track medications using one electronic software system. The objective of this study is to perform an efficiency analysis of a barcode enabled integrated EHR medication tracking system for time-critical medications dispensed from the pharmacy to the Emergency Department (ED) at a large academic medical center. **Methods:** A retrospective review will be conducted to evaluate the efficiency of an integrated EHR medication tracking system on all time-critical medications dispensed to the ED. Pre (November 17 to December 16, 2015) and post (January 19 to February 17, 2016) implementation study periods will be compared. Data collection will include the following operational efficiency measures; (1) average STAT medication turnaround times; (2) re-dispensed missing medications; (3) total number of MAR messages received related to missing medications, and (4) quantifying the number and duration of phone calls. Pharmacy technicians will document the number and duration of phone calls received related to missing medications. Monthly internal EHR reporting data will be used to evaluate other operational efficiency measures. Frequencies and descriptive statistics will be used to summarize outcomes of interest, and statistical differences between outcomes of interest will be examined between the pre and post implementation periods. **Results:** The results will be used to help determine if a barcode enabled integrated EHR medication tracking system can improve the operational efficiencies of pharmacy workflow processes. Final results and conclusions are pending and will be presented at the Great Lakes Residency Conference.

**Learning Objectives:**

Identify processes affected by the absence of a medication tracking system.

Explain the operational efficiencies that may be produced with the use of a barcode enabled integrated medication tracking system.

**Self Assessment Questions:**

Which of the following is an example of a process that is affected by the absence of a medication tracking system?

- A Decreased phone calls
- B: Re-dispensed medications
- C: Increased administration times
- D: Improved nurse satisfaction

Which of the following operational efficiencies can potentially be reduced with the implementation of an integrated medication tracking system?

- A Medication administration times
- B Pharmacy technician staff
- C Nursing satisfaction
- D Barcoding scanning

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-809L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE COHORT ANALYSIS OF PATIENTS PRESCRIBED STATIN THERAPY WITH OR WITHOUT DIAGNOSIS OF HEPATITIS C AFTER MYOCARDIAL INFARCTION, ISCHEMIC STROKE, OR TRANSIENT ISCHEMIC ATTACK

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**Purpose:** Current guidelines for treatment of hepatitis C written by the Infectious Diseases Society of America and American Association for the Study of Liver Diseases recommend therapy with HMG-CoA reductase inhibitors in patients with compensated liver disease when indicated. The purpose of this study is to compare statin prescribing patterns in patients with and without diagnosed hepatitis C by comparing proportions of patients prescribed statin therapy after a major cardiovascular event including myocardial infarction, ischemic stroke, and transient ischemic attack. **Methods:** The study is an Institutional Review Board approved, single-center, retrospective chart review with a source population of patients discharged alive with a primary discharge diagnosis identified by the International Statistical Classification of Diseases and Related Health Problems coding system (ICD-9 code) for myocardial infarction, ischemic stroke, or transient ischemic attack. Hepatitis C patients will be identified by discharge ICD-9 code or documentation on the admission history and physical. Exclusion criteria include statin therapy prior to hospitalization, listed allergy to statins, hospital discharge to hospice, and current pregnancy. The primary outcome is the difference in proportions of patients prescribed statin therapy based on the presence or absence of hepatitis C diagnosis. Secondary aims include identification of predictor characteristics associated with statin avoidance by prescribers, as well as comparison of the presence of statin therapy for each individual discharge diagnosis and intensity of statin therapy for hepatitis C patients compared to those without the diagnosis. Predictor characteristics include transaminase, bilirubin, INR, LDL, and CPK levels, documented active alcoholism, current treatment for hepatitis C, documentation of clinical markers of acute liver decompensation, and medical insurance status.

**Results/Conclusion:** Results and discussion to be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Select the appropriate times for liver enzyme follow up when considering addition of statin therapy.

Explain clinical scenarios where statin therapy is contraindicated.

### Self Assessment Questions:

Which of the following is the most appropriate time to test liver enzyme levels when initiating therapy with a statin?

- A: A week after statin initiation to get a baseline for the patient
- B: Routinely, every 6 months while on therapy
- C: When a patient exhibits clinical signs or symptoms of liver damage
- D: Routinely, every year while on therapy

In which of the following cases is statin therapy contraindicated?

- A: Chronic hepatitis C infection
- B: Increase in transaminase levels explainable by a known cause
- C: Compensated liver cirrhosis
- D: Acute liver failure

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-512L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPLEMENTATION OF BARCODE SCANNING FOR NON-STERILE PRODUCTS AT A COMMUNITY HOSPITAL HEALTH SYSTEM TO FACILITATE CLOSED LOOP MEDICATION MANAGEMENT SYSTEM

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**Purpose:** Barcode scanning reduces medication errors and improves patient safety in the hospital setting by ensuring that the correct product reaches the correct patient. This tool improves the closed loop medication management (CLMM) system, which incorporates technology into the ordering, distribution, administration and monitoring of patient care. CLMM consists of the following steps: provider uses computerized physician order entry (COPE) with clinical decision support (CDS) to place an order; pharmacy receives, processes and dispenses the order using automated dispensing cabinets or manually picking the medication with barcode verification; medication is delivered to the patient; nurse administers the medication utilizing bedside barcode scanning; patient care team monitors for medication response. The electronic medical record captures digital sign offs by pharmacy technicians and pharmacists. The purpose of this project is to implement barcode scanning to ensure all prepared items that leave the pharmacy are dispensed correctly. This will decrease the number of misfilled medications and improve patient safety. **Methods:** This project requires the planning and implementation of a quality assurance measure and is exempt from review by the Institutional Review Board. Barcode scanning will be implemented for products at all four inpatient pharmacies, one operating room pharmacy, and three outpatient oncology infusion sites prior to dispensing. A task force including pharmacy managers, pharmacists, and technicians will decide on workflow changes and assist with electronic health record system build for the preparation of each type of product dispensed from the pharmacy. Data will be collected to track the impact of scanning on the number of nursing wrong medication alerts, post-implementation barcode scanning compliance and adverse events.

**Results/Conclusions:** The results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the benefits of barcode scanning for non-sterile products

Describe the pre- and post- implementation challenges

### Self Assessment Questions:

Which step is not part of the closed-loop medication management system?

- A: Physician completes medication reconciliation and updates the pa
- B: Provider places an order by using the computerized physician ord
- C: Pharmacy receives, processes, and fills the order
- D: Nurse administers the medication

What is a benefit of implementing barcode scanning?

- A: Decrease in number of misfilled medications
- B: Decrease in preparation time for technicians
- C: Decrease in checking time for pharmacists
- D: Decrease in cost for implementation

Q1 Answer: A      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-934L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PROVIDER VIEWS ON IMPACT AND ROLE OF PHARMACY STUDENTS IN FEDERALLY-QUALIFIED HEALTH CENTERS

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**Purpose:** This study will evaluate non-pharmacist healthcare providers' views of advanced pharmacy practice experience (APPE) student involvement in federally-qualified health centers (FQHCs). The study objectives are to examine the current level of APPE pharmacy student participation in the clinics, providers' comfort level of student involvement, and providers' perceptions of the benefit to patient care in the clinics. **Methods:** An 87-item electronic survey was developed using Qualtrics and employed a skip logic process. Providers in clinics with APPE students will be asked about the students' level of participation, provider comfort level regarding student participation, and perceived benefit of student participation. Providers without APPE students will be asked how they would rate their comfort level and perceived benefit if students were available in their clinic. The study is a two-phase study. The first phase focuses on clinics located in Indiana. Clinic directors of FQHCs in Indiana will be contacted by email and encouraged to forward the survey link to their provider staff to participate. For the second phase of the study, simple random sampling will be used to identify a sample of FQHCs in the U.S. Descriptive and parametric statistics will be performed for data analysis. **Results and Conclusion:** Preliminary results and conclusions from the first phase of the study will be presented at the Great Lakes Conference.

### Learning Objectives:

Describe potential ways that APPE students can contribute to patient care in FQHCs  
Discuss the role FQHCs have in providing care to patients

### Self Assessment Questions:

Which of the following is an example of a way APPE students increase patients' access to medications?

- A: Completing a MAP application with the patient
- B: Educating the patient on appropriate inhaler use
- C: Adjusting the patient's insulin dose for high blood sugars
- D: Reviewing a patient's medication list with the patient

Which of the following describes a requirement for a clinic to be designated as an FQHC?

- A: The clinic serves only uninsured or cash-paying patients
- B: The clinic serves an underserved area or population
- C: The clinic provides services only in rural areas or populations
- D: The clinic provides services free for uninsured patients

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-810L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## DEMONSTRATING THE VALUE OF MEDICATION THERAPY MANAGEMENT SERVICES TO PATIENTS IN THE RETAIL PHARMACY SETTING TO INCREASE SERVICE UTILIZATION

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**Purpose:** Medication therapy management (MTM) services have demonstrated improved clinical outcomes, lower healthcare expenditures, and improved patient satisfaction<sup>1,2</sup>. The Centers for Medicaid and Medicare services (CMS) requires that all Part D plans offer MTM services to eligible beneficiaries; however, less than 30% of beneficiaries participate<sup>3</sup>. For patients without MTM coverage, utilization is even lower. Patient-identified barriers to participation include cost, lack of time, uncertainty about pharmacist education or qualifications, and poor marketing. Current patient recruitment methods may not provide a clear explanation of the services' value if the pharmacists' unique perspective is not promoted or terms unfamiliar to the patient are used. This project will evaluate the effects of a recruitment protocol designed to address patient-identified barriers to MTM service utilization in a retail pharmacy setting. **Methods:** This is a prospective quasi-experimental study. Subjects are eligible if they have taken 5 or more medications for chronic conditions for at least 3 months prior to the review date and will be identified by their current pharmacy medication profile. To introduce the service, the pharmacist will provide a scripted explanation of MTM services and a brochure for the subject. The subject will be called within 4 weeks of speaking to the pharmacist on-site and will be asked to participate in the previously discussed MTM service. Follow-up steps will be tracked and participation or reasons for denial of participation will be recorded. The primary outcome will be the differences in patient utilization of MTM services at the primary site versus secondary control sites during the study period. Data will be analyzed using Fisher's Exact test. Secondary outcomes will include an analysis of patient-provided reasons for utilizing or deferring MTM services. **Results/Conclusion:** Research is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the benefits of comprehensive medication reviews offered by pharmacists  
Identify barriers to patient utilization of MTM services

### Self Assessment Questions:

Medication Therapy Management (MTM) services:

- A: Improve clinical outcomes
- B: Have a neutral return on investment
- C: Are utilized by almost 100% of eligible patients
- D: Are only offered in ambulatory care and clinic settings

Which of the following was identified by patients as a barrier to participating in MTM programs?

- A: The service is not offered by the pharmacy
- B: The patient feels that they fully understand their medication regimen
- C: They are confused by the phrase "Medication Therapy Management"
- D: Those who participated in the service did not find it helpful or valuable

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-811L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## AN EVALUATION OF THE INCIDENCE AND MANAGEMENT OF BK VIRUS WITHIN AN ACADEMIC MEDICAL CENTER

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**Purpose:** Although risk factors and incidence of BK virus infections and BK virus associated nephropathy (BKAN) have been published previously, much of the data is based on single center or a small, demographically homogeneous multi-center patient population. The objective of this study is to characterize the incidence of BK viremia and biopsy-proven BK viruses associated nephropathy, identify risk factors for BK viremia and BKAN, as well as identify current surveillance and management strategies within an academic medical center that contains a large African American and Hispanic patient population. **Methods:** This study is a retrospective, cohort chart review of kidney transplant recipients who were transplanted between 01/01/2009 and 01/01/2014. Primary endpoints include BK viremia > 500 copies/mL and biopsy-proven BK-virus associated nephropathy. Secondary endpoints include the incidence of BK viruria, high-grade viremia (defined as > 10,000 copies/mL), patient survival, graft survival, incidence of rejection, and retransplantation. Additionally, physician management strategies for BK viremia and BK-virus associated nephropathy will be recorded and analyzed. Baseline characteristics and collected data will be analyzed using chi-squared test and Fisher's exact test for categorical variables, and a student t-test or Mann-Whitney U test for continuous variables. Cox proportional hazards regression models will be used to determine risk factors for the development of BK viremia and other outcomes. Time-to-event analyses for the primary outcomes will be visualized using Kaplan-Meier curves and evaluated using the log-rank test. **Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify risk factors for the development of BK virus infection in the renal transplant population

Outline an optimal monitoring algorithm for the identification and treatment of BK virus associated nephropathy

### Self Assessment Questions:

All of the following are independent risk factors for developing BK virus infection, except:

- A: African American Race
- B: Lymphocyte-depleting Induction Immunosuppression
- C: Hispanic Race
- D: All of the above are risk factors

What is the most appropriate indication for treatment of BK virus associated nephropathy?

- A: BK viremia > 10,000 copies/mL
- B: Biopsy findings consistent with BK virus nephropathy
- C: Urine BK virus load > 10,000 copies/mL
- D: A and C

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-513L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT OF AN INTENSIVE CARE UNIT SPECIFIC PATIENT ACUITY AND WORKFLOW PRIORITIZATION TOOL

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**PURPOSE:** Froedtert & the Medical College of Wisconsin Health System currently utilizes a dynamic electronic scoring tool (iClipboard) to prioritize pharmacist workflows throughout the hospital. Evaluation of the iClipboard tool identified gaps within certain populations, including intensive care unit (ICU) patients. The goal of this project was to design and implement a scoring tool within the electronic health record (EHR) tailored to ICU patient populations. The tool will generate an individualized patient score based on medication types ordered and administered, labs, and culture results. The new ICU-specific scoring tool will improve pharmacist workflows and quality of patient care as perceived by ICU pharmacists. A secondary goal of this project will be to design a tool capable of generating a score that correlates with ICU patients pharmacotherapy complexity. **METHODS:** A pre-implementation survey was electronically distributed to 60 ICU pharmacists to evaluate the iClipboard and collect feedback for the new ICU scoring tool. These responses (response rate: 59%) were utilized to design, build, and implement the ICU scoring tool in the EHR. A random sample of patient chart snapshots was distributed to multiple ICU pharmacists, along with a survey assessment of pharmacist perceived patient acuity and time it would take to complete profile assessment. The score generated by the ICU scoring tool was validated by comparing pharmacist perception of acuity, Acute Physiology and Chronic Health Evaluation II, Sequential Organ Failure Assessment, Simplified Acute Physiology Score, and Injury Severity Score to the iClipboard score, and the ICU specific score. Correlation coefficients (R2) were calculated to describe the relationship between multiple acuity tools and scores. **RESULTS/CONCLUSION:** Pre-implementation responses indicated that overall pharmacist satisfaction with the current scoring tool was 3.34 on a Likert Scale (1=strongly disagree, 5=strongly agree). Interventions are ongoing and post-intervention results will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe how components of ICU specific patient care are prioritized using an electronic scoring tool within an electronic health record.

Explain the rationale and process for assigning a validated, dynamic pharmacotherapeutic complexity score to patients in an ICU setting.

### Self Assessment Questions:

1. Which aspect of patient care specific to the ICU population was factored into the pharmacotherapeutic complexity score generated by the ICU scoring tool?

- A: Neurological monitoring
- B: Presence of discharge orders
- C: Cardiovascular monitoring
- D: A and C

Which previously validated acuity scores were utilized in the validation of the ICU iClipboard score?

- A: Apache II & SOFA
- B: SOFA & Apache IV
- C: GSS & sAPS
- D: Apache II & CAM-ICU

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-812L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## FEVER BURDEN POST SUBARACHNOID HEMORRHAGE AND THE INCREASED USE OF ANTIBIOTICS

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**Purpose:** Fever, defined as a body temperature  $\geq 38.3^{\circ}\text{C}$ , is the most common medical complication after subarachnoid hemorrhage (SAH) and is estimated to occur in approximately 72% of SAH patients. Fever in a broad neurocritical care population is only attributed to infection in 50-70% of patients, leaving 30-50% having fevers due to a noninfectious or central causes. Little data is available describing the effects of fever burden, defined as time and extent of fever above  $\geq 38.3^{\circ}\text{C}$ , in the SAH patient population. Our primary objective is to determine if increased fever burden after subarachnoid hemorrhage leads to an increased use of antibiotics. Secondary objectives are to describe what patient characteristics increase antibiotic use, determine how many cases of noninfectious fever were treated inappropriately with antibiotics, and assess the consequences of indiscriminate use of antibiotics in this population, including cost, unnecessary lab tests, and secondary infections. **Methods:** This is a single-center, non-randomized, retrospective observational cohort study in patients  $\geq 18$  years with a diagnosis of aneurysmal or non-traumatic subarachnoid hemorrhage admitted to an adult ICU at the University of Kentucky Albert B Chandler Medical Center between January 1, 2010 and September 1, 2015. Patients were excluded if the SAH was secondary to trauma or arteriovenous malformation rupture or if admitted for  $< 48$  hours. Hourly temperature measurements were collected from the data warehouse from Day 0, date of admission to ICU or date of SAH, through Day 13. Daily fever burden was calculated for each patient by calculating an area under the curve (AUC), utilizing time and extent of fever  $\geq 38.3^{\circ}\text{C}$ . Demographic data and other information pertinent to temperature control and antimicrobial use were also collected. **Results and Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the prevalence of fever in subarachnoid hemorrhage patients. Recognize the potential non-infectious causes of fever in subarachnoid hemorrhage patients.

### Self Assessment Questions:

In a broad neurocritical care population, what percentage of fevers are attributed to infection?

- A: 90-95%
- B: 30-50%
- C: 50-70%
- D: 10-30%

Which of the following are proposed mechanisms of fever in subarachnoid hemorrhage patients? I. hypothalamic or brainstem injury II. blood in the brain III. inflammatory response IV. drug fever

- A: I, iii
- B: ii, iv
- C: I, ii
- D: I, ii, iii

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-514L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF RAPID BLOOD CULTURE IDENTIFICATION ON ANTIMICROBIAL USE AND HOSPITAL COST

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**Purpose:** The purpose of this study is to analyze the impact of implementing a rapid blood culture diagnostic on antimicrobial use and hospital cost within a community hospital. **Background:** The FilmArray Blood Culture Identification (BCID) panel was implemented by an interdisciplinary antimicrobial stewardship team (AST) at Baptist Health Louisville, a 519 bed community hospital. BCID was implemented on December 1, 2015. BCID was completed on all positive blood cultures in addition to current culture and susceptibility methods. All results are followed-up with education and a recommendation by an AST member during daytime hours Monday-Friday, or by a clinical pharmacist on the weekends if a therapy change is warranted. **Methods:** This is a retrospective, single-center study to include a maximum of 240 patients. The first 120 inpatients  $\geq 18$  years of age who had a positive gram stain and BCID result will be included in the test group. The historical control group will consist of 120 patients from the year prior to BCID implementation, matched to the test group according to organism grown. Patients will be excluded if they already had a positive blood culture result during their current hospitalization, died within 24 hours of BCID result, or were transitioned to comfort care within 24 hours of BCID result. The primary endpoint is duration of antimicrobial use. Duration, in hours, will be calculated as the time difference between the start order and stop order for the antimicrobial. Secondary endpoints include; time to first active antibiotic, time to first appropriate antimicrobial adjustment, time to definitive antimicrobial therapy, proportion of contaminants not treated, time to BCID and culture results, and total cost associated with implementing the BCID panel. **Results and Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the advantages that rapid blood culture identification panels can have over standard blood culture susceptibility methods. Recognize the importance of utilizing the rapid blood culture identification results to provide recommendations to improve the speed at which appropriate antimicrobial therapy is provided.

### Self Assessment Questions:

The BCID panel is expected to:

- A: Increase the overall antimicrobial use
- B: Result in a larger improvement in antimicrobial de-escalation than
- C: Increase the time to appropriate antimicrobial therapy
- D: Reduce the overall antimicrobial use

At what point during the antimicrobial identification process is the BCID panel performed?

- A: Directly following the gram-stain procedure
- B: At the time blood cultures are drawn
- C: Performed directly from the plate growth, prior to gram staining
- D: Following the final culture and susceptibility results

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-935L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PROVIDER PRESCRIBING PRACTICES RELATED TO PATIENT-CONTROLLED ANALGESIA IN ADULT SURGICAL/TRAUMA PATIENTS AT A LARGE ACADEMIC MEDICAL CENTER

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**Purpose:** This study aims to characterize prescribing practices related to patient-controlled analgesia (PCA) in adult patients at OSF Saint Francis Medical Center (SFMC) with the goal of identifying areas of opportunity for improving PCA pain management in surgery/trauma patients. The specific objectives are to determine (1) if patient-specific factors are associated with initial PCA drug choice (morphine, fentanyl, or hydromorphone) and initial PCA dosing, (2) if there are differences in pain goal achievement and naloxone use between patients receiving each of the three opioids, and (3) if prescribers adjust PCA dosing prior to switching to a different opioid to meet pain management goals. **Methods:** This retrospective chart review includes adult, hospitalized surgical/trauma patients who received PCA at OSF SFMC between January 1, 2015 and June 30, 2015. Patients admitted for medical diagnoses were excluded from this study. The following data were collected from the electronic medical records of the 1,213 patients who met inclusion/exclusion criteria: age, gender, weight, creatinine clearance, PCA-ordering service line, opioid use prior to admission, initial PCA opioid received, initial PCA settings, pain score goal attainment within 4 hours or 8 hours after PCA initiation, and administration of other analgesics or naloxone while receiving PCA. PCA dose changes, time to opioid switch, and the opioid to which the PCA was changed were also documented in the 150 patients who experienced a PCA opioid change. Statistical analyses will be performed to determine if significant associations exist between patient-specific factors and initial choice of PCA opioid and dose settings. Safety and efficacy parameters will be compared between PCA opioids. In addition, the practice of switching PCA opioids, adjusting dose settings, and prescribing of adjunctive analgesics will be quantitatively described. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify patient-specific factors that should be considered in choosing the appropriate opioid and dose settings for PCA therapy.  
Discuss possible outcomes of improving PCA prescribing practices.

### Self Assessment Questions:

Which of the following patients is likely receiving appropriate PCA therapy?

- A: Opioid-naïve surgical patient initiated on a fentanyl PCA with a cor
- B: Patient with end stage renal disease initiated on a fentanyl PCA
- C: Elderly female patient initiated on a morphine PCA with a shortene
- D: Confused patient with end stage renal disease initiated on a morpl

Which of the following is a potential outcome of improving PCA prescribing practices?

- A: Increased healing time
- B: Decreased patient safety
- C: Increased length of stay
- D: Improved HCAHPS scores

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-515L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## DEVELOPMENT OF AN AMBULATORY CARE PHARMACIST-MANAGED TRANSITIONS OF CARE SERVICE WITHIN A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** Transitions of care clinics provide follow-up after hospital discharge to address issues related to patients disease state management, medication adherence, and access to care. The purpose of this study is to pilot a care transitions service involving pharmacist-to-pharmacist referral between the acute and ambulatory care settings and track interventions made by the ambulatory care pharmacist under a scope of practice. **Methods:** Patients were referred for ambulatory care pharmacist transitions of care services based on patient need as indicated by significant changes to medication regimens or diagnosis of new disease states needing close follow-up. Patients were contacted by a pharmacist for a visit occurring within 14 days of hospital discharge. Patients received disease state management, medication counseling, laboratory follow-up, and/or referral to other providers based on individual patient need. Data assessed included number and type of interventions made during transitions of care encounters, length of encounters, follow-up referrals, and assessment of 30-day readmission. Data will be collected on all participants referred for services from September 1, 2015 through March 31, 2016. **Preliminary Results:** The preliminary results include a study period of September 1, 2015 through January 31, 2016. In the five-month sample, 20 patients were referred to receive services. Of the 20 patients, 45% met exclusion criteria, 15% could not receive services, and 40% received services. Most patients who received services were referred due to significant changes to their medication regimen. Interventions were made on all patients who received services, with 62.5% receiving a medication-related intervention. Most patients were referred to a pharmacist for additional follow-up. **Conclusion:** All patients who received services benefitted from pharmacy interventions, including medication changes or referral for additional follow-up. These results support continuation of a care transitions program within current pharmacy services to target specific needs of patients transitioning from the inpatient to outpatient setting.

### Learning Objectives:

Define the role of an ambulatory care pharmacist in providing transitions of care to patients being discharged from a Veterans Affairs medical center.

Describe the outcomes of pharmacist-managed transitions of care services related to clinical interventions, care referrals, time dedicated to providing services, and hospital readmissions.

### Self Assessment Questions:

Which of the following was the primary service provided to patients referred to the transitions of care service at the Indianapolis VA Medical Center?

- A: Prescription filling
- B: Adherence counseling
- C: Medication reconciliation
- D: Disease state management

Which of the following is true regarding the outcomes of the pharmacist-managed transitions of care service at the Indianapolis VA Medical Center?

- A: All patients received a medication intervention by a pharmacist
- B: Most patients were referred to a pharmacist for additional follow-up
- C: Most patients were referred to the service for follow-up of hyperter
- D: The mean recommended time to next follow-up was greater than 6

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-813L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## USE OF MATHEMATICAL MODELING TO REDUCE WASTE OF COMPOUNDED STERILE PRODUCTS IN A CHILDRENS HOSPITAL

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**Purpose:** Due to their short stability, compounded sterile products (CSPs) are a source of waste in hospital and health-system pharmacies. Generally, CSP waste can be attributed to order discontinuation after production and/or misdirected doses. Because of the potential for large amounts of waste, in addition to the high cost of materials and labor to prepare CSPs, it is prudent to determine the amount of CSP waste and identify strategies to minimize waste. **Methods:** This is a single-center, retrospective, observational study that aims to determine the optimal timing and frequency of patient-specific CSP batches. A 7-day physical audit of pediatric CSPs that are returned and wasted and associated data will be collected. Data will be collected for CSPs that print on pediatric batches (eliminating first dose data) that include order number, entry time, discontinuation/associated time and credits, batch print time, and medication name, volume and administration time. Hourly cancellation probabilities will be calculated, peak times when CSPs are ordered, peak medication administration times and number of CSPs that are dispensed but not administered will be determined, and CSP credit data will be analyzed as a surrogate marker for CSPs that are returned. Cost savings will be estimated by identifying CSP medications that are most commonly wasted and those that are wasted in the largest volumes. Cost savings will then be calculated by utilizing hospital medication acquisition pricing and applying it to the volumes of medications that are wasted. **Results and Conclusions:** Data collection and analysis are currently underway. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify CSP order and production workflow factors that influence optimal CSP batch times to minimize CSP waste.

Describe methodology to minimize CSP waste that can be adapted and implemented at other health-system institutions.

### Self Assessment Questions:

Which of the following are factors that contribute to compounded sterile product waste?

- A: Misdirected doses
- B: Medication order changes
- C: Patient discharge
- D: All of the above

What is a central reason pediatric compounded sterile products are an ideal marker for determining compounded sterile product waste workflow efficiencies?

- A: Physicians discontinue fewer pediatric medication orders in comparison to adult patients
- B: Smaller variety of medications are used in pediatric patients
- C: Patient-specific, weight-based dosing that limits reusability of compounded sterile products
- D: Pediatric patients are on fewer chronic medications in comparison to adult patients

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-814L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## QUALITY IMPROVEMENT PROJECT: DEVELOPMENT AND PILOT OF A CLINICAL PHARMACY PRODUCTIVITY MODEL

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**Purpose:** Pharmacy practice has transitioned from being primarily a distribution-based industry to providing clinical services. Capturing this service-based clinical productivity can be difficult due to the lack of well-defined and standardized metrics. External benchmarking is useful for comparing clinical staffing against other similar organizations, however it lacks ongoing utility for daily internal pharmacy clinical productivity monitoring. At OhioHealth there is a need to establish internal clinical productivity metrics in order to capture and quantify pharmacy clinical services. This project aimed to: 1) Develop internal pharmacy metrics to evaluate clinical productivity per productive pharmacist full time equivalents (FTEs) and 2) implement a pilot study at OhioHealth Riverside Methodist Hospital to evaluate a clinical productivity model utilizing internal pharmacy metrics per productive pharmacist FTEs in support of a health-system clinical productivity project. **Methods:** This is an IRB exempt pilot study. Clinical productivity will be calculated via weighted active orders within the electronic medical record (EMR). Weighted active orders will be defined as medication orders and pharmacy consults that are active on the EMR at the time of data capture. Orders will be categorized and weighted based on clinical acuity supported by literature, time studies, hospital policy and procedure, and expert opinion. There will be a daily extraction of all active orders to be captured at noon via an EMR snapshot. In order to calculate clinical productivity, weighted active orders and productive pharmacist FTEs will be measured in aggregate per pay period(s), and divided to yield a productivity factor. This will be a single-site pilot with the plan to apply the clinical productivity methods and calculation to the health-system. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the importance of quantifying pharmacy clinical productivity  
Outline methods for calculating clinical productivity

### Self Assessment Questions:

Which of the following is true regarding pharmacist clinical productivity?

- A: External benchmarks can be used daily to measure and track internal clinical productivity
- B: Clinical productivity metrics are needed due to the transition from distribution-based to service-based pharmacy
- C: There are well-defined and standardized metrics for measuring clinical productivity
- D: Clinical productivity metrics are needed due to the transition from distribution-based to service-based pharmacy

Which of the following are components of weighted active orders that are included in pharmacy clinical productivity?

- A: Active orders not reviewed by a pharmacist
- B: Completed medication orders
- C: Number of medication dispenses
- D: Active medication orders and pharmacy consults

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-815L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## AN EVALUATION OF HIGHER VANCOMYCIN DOSES ON TARGET TROUGH CONCENTRATIONS AND RENAL FUNCTION IN NEONATE

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**Purpose:** Despite the widespread use of vancomycin in neonates, optimal dosing remains controversial and prospective validation of published dosing guidelines is lacking. The impact of weight, renal function, and age on vancomycin concentrations in neonates has led to the adoption of different dosing regimens in clinical practice. Many of these regimens, including those currently used by several tertiary resources, targeted trough concentrations of 5-10 mg/L. In 2009, national guidelines recommended trough concentrations exceed 10 mg/L to avoid the development of resistance in methicillin resistant *Staphylococcus aureus* infections. In addition, troughs of 15-20 mg/L were deemed necessary to obtain a target AUC/MIC of  $\geq 400$  in adults with MICs  $\leq 1$  mg/L. In response to the guidelines, Lurie Children's Hospital implemented revised dosing recommendations for neonates with normal renal function in 2011. The higher end of the dosing range from a well-established tertiary reference was selected to increase the likelihood of attaining higher trough concentrations. The purpose of this study is to assess target trough concentrations (TTC) and evaluate the incidence of acute kidney injury (AKI) among neonates receiving the new dosing regimen. **Methods:** In this single-center retrospective review, all neonates without anatomical kidney abnormalities treated with vancomycin according to the revised dosing with appropriately drawn troughs from September 2011 to December 2015 were included. TTC were defined as 10-20 mg/L. AKI was defined according to the 2013 neonatal Kidney Diseases Improving Global Outcomes (KDIGO) classification utilizing changes in serum creatinine and urine output. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Review vancomycin dosing and therapeutic drug monitoring recommendations in neonates.

Describe the incidence of AKI in neonates receiving vancomycin.

### Self Assessment Questions:

What range of therapeutic trough concentrations are vancomycin dosing regimens in neonates currently based upon in most tertiary references?

- A: 5-15 mg/L
- B: 5-10 mg/mL
- C: 10-15 mg/mL
- D: 15-20 mg/mL

Which of the following parameters are used to assess for the incidence of acute kidney injury in neonates based on the 2013 KDIGO guidelines?

- A: Serum creatinine
- B: Cystatin-C
- C: Urine output
- D: Both A and C

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-516L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## ASSESSMENT OF DIFFERENT DOSING REGIMENS FOR PHARMACOLOGIC VENOUS THROMBOEMBOLISM PROPHYLAXIS IN OBESE INPATIENTS

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**Purpose:** Various authors have studied the pharmacokinetics and pharmacodynamics of heparin and enoxaparin dosing in obese patients for VTE prophylaxis. Some studies looking at anti-Xa levels show that obese patients may need higher prophylactic doses to reach a pre-specified anti-Xa target range. These studies are small, heterogeneous, and most importantly they do not correlate with clinical outcomes. A study by Wang and colleagues looked at the clinical correlation between both standard and high dose enoxaparin and heparin. They found a lower clotting incidence in obese patients with high dose prophylaxis. The results from both treatment groups were combined; therefore, it is unknown whether increased dosing for obese patients is beneficial for enoxaparin or heparin. This project will differentiate between heparin and enoxaparin to determine if a particular medication or dose is associated with fewer bleeding or clotting outcomes in obese patients for VTE prophylaxis. **Methods:** This is a multi-center, retrospective cohort of obese patients that received either enoxaparin or heparin for VTE prophylaxis while inpatient within the Aurora Healthcare Network. This project is modeled off a previous study by Wang and colleagues. Inclusion criteria, modified from Wang, consist of patients weighing  $>100$ kg or having a body mass index of  $\geq 30$ kg/m<sup>2</sup> receiving enoxaparin or heparin for VTE prophylaxis for at least 48 hours. Exclusion criteria include patients admitted with a VTE event, a bleeding event, total knee replacement, pregnancy, less than eighteen years old, or creatinine clearance  $<30$  mL/min. A set of variables was used to create two reports and access information from the electronic medical record in order to analyze data for specific bleeding or clotting outcomes. The report data was then verified by patient chart review if needed.

**Results and Conclusions:** Data collection and analysis ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe 3 reasons obese patients may require higher doses of anticoagulation.

Indicate a reason that more studies are needed to evaluate the clinical outcomes for prophylactic enoxaparin and heparin dosing in obese patients.

### Self Assessment Questions:

Which of the following could explain why obese patients might need a higher dose of enoxaparin or heparin?

- A: Enoxaparin has a higher distribution rate into adipose tissue, meaning it has a higher volume of distribution.
- B: Renal blood flow decreases in obesity which could cause a decrease in enoxaparin clearance.
- C: High blood flow rates in adipose tissue suggest a larger volume of distribution.
- D: There is increased protein binding with heparin which would mean a higher free concentration is needed.

Which of the following is true?

- A: Optimal dosing of VTE prophylaxis is not clearly defined in the pre-existence of obesity.
- B: One study looked at clinical outcomes in obese patients using high dose enoxaparin.
- C: The ACCP guidelines recommend an enoxaparin dose of 40 mg every 12 hours for obese patients.
- D: All of the studies looking at high dose enoxaparin or heparin for VTE prophylaxis in obese patients have shown similar outcomes.

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-517L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## PROTHROMBIN COMPLEX CONCENTRATE REDUCES BLOOD PRODUCT UTILIZATION IN HEART TRANSPLANTATION

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**Purpose:** Current practices for the reversal of warfarin prior to cardiac surgery include the use of vitamin K and fresh frozen plasma (FFP) to reduce the risk of bleeding. While the 2010 International Society of Heart and Lung Transplantation (ISHLT) Guidelines acknowledge the use of Prothrombin Complex Concentrate (PCC), there is no clear consensus on its efficacy. The primary endpoint was to assess the efficacy of 4-factor PCC administration in patients requiring warfarin reversal prior to heart transplantation by determining blood product utilization perioperatively. **Methods:** Thirteen Patients who received PCC for warfarin reversal prior to heart transplantation were matched to a similar cohort of 39 patients from January 2011 to July 2015. Blood product utilization was collected retrospectively for the 24-hour preoperative, intraoperative, and 48-hour postoperative periods.

**Results:** Patients receiving PCC required fewer blood products in all three categories: 24 hours preoperatively, intraoperatively, and 48 hours postoperatively. Differences in blood product administration within the 24 hours prior to surgery were significant ( $p=0.002$ ) with 22 patients (56%) and 1 patient (8%) in the control and PCC groups, respectively. No patients in the PCC group required FFP preoperatively. Intraoperatively, all patients received blood products. Of those who did receive them, the PCC group required fewer units of packed RBCs (median 3 units vs. 7 units  $p=0.034$ ). In the 48 hours postop period, 20 patients (51%) in the control group and 2 patients (15%) in PCC group ( $p=0.023$ ) received blood products. **Conclusion:** Prothrombin Complex Concentrate reduces blood product utilization 24 hours preoperatively, intraoperatively, and 48 hours postoperatively after cardiac transplantation. Historically the majority of patients have required FFP for warfarin reversal, yet in this single-center experience this need has

### Learning Objectives:

Describe the use of prothrombin complex concentrate (PCC) for warfarin reversal prior to heart transplantation

Identify current practices of reversing warfarin prior to heart transplantation

### Self Assessment Questions:

1. Per the 2010 International Society of Heart and Lung Transplantation (ISHLT) Guidelines, is prothrombin complex concentrate (PCC) recommended for anticoagulation reversal prior to heart transplant?

- A: The 2010 ISHLT Guidelines acknowledge the use of PCC and pro
- B: The 2010 ISHLT Guidelines acknowledge the use of PCC, but the
- C: The 2010 ISHLT Guidelines acknowledge the use and efficacy of P
- D: The 2010 ISHLT Guidelines acknowledge the use and safety of P

What are the current practices for warfarin reversal prior to heart transplantation?

- A: vitamin K and fresh frozen plasma (FFP)
- B: vitamin K and prothrombin complex concentrate (PCC)
- C: vitamin K, fresh frozen plasma (FFP), and prothrombin complex c
- D: fresh frozen plasma (FFP) and prothrombin complex concentrate (

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-518L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING THE IMPACT OF TRANSITIONING RITUXIMAB CONTAINING CHEMOTHERAPY PROTOCOLS OUTPATIENT

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**Purpose:** Outpatient administration of anticancer regimens provides benefit to patients and institutions alike. By reducing the number of beds occupied for routine infusions, nursing time spent with patients, and overall cost of treatment, outpatient infusion of anticancer medications is more cost effective for institutions. In particular, rituximab is a high cost drug commonly combined with other anticancer agents for the treatment of CD-20+ hematologic malignancies. R-EPOCH and R-ICE have successfully been given in the outpatient setting. The toxicity profiles largely remain unchanged depending on the location of administration, and regimens are efficacious and well tolerated in the outpatient setting. The purpose of this retrospective, non-randomized, pre/post analysis is to analyze the influence of a novel medication use guideline on the administration location of rituximab-containing regimens and the associated financial implication of administration location. **Methods:** A retrospective analysis of rituximab-containing regimens given in the inpatient setting from January 2013 to December 2015 was initially performed. This helped guide the creation of a medication utilization protocol for the R-EPOCH and R-ICE regimens to be administered in the outpatient setting. Collaboration between pharmacists, nurses, and physicians enabled this guideline to be a comprehensive approach to outpatient chemotherapy administration. Upon protocol implementation, a post-implementation analysis will be performed to assess the impact of medication use guidelines on bed days saved, drug acquisition cost savings, and reduction in charges. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List two benefits of administering chemotherapy in the outpatient setting

Identify three key stakeholders that need to collaborate for the development and implementation of a medication use guideline.

### Self Assessment Questions:

Outpatient administration of chemotherapy is desired for which of the following reasons?

- A: Outpatient administration of chemotherapy increases the number of
- B: Outpatient administration of chemotherapy is more expensive for t
- C: Toxicity profiles are comparable for inpatient and outpatient chem
- D: A & c

Which of the following healthcare professions needed to collaborate to create the medication use guideline for R-EPOCH?

- A: Pharmacy
- B: Nursing
- C: Physicians
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-816L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSMENT OF CISATRACURIUM INFUSION DOSING REQUIREMENTS IN PATIENTS RECEIVING CONTINUOUS RENAL REPLACEMENT THERAPY

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**Purpose:** Continuous renal replacement therapy (CRRT) is a therapeutic option for multiple disease states in the intensive care unit (ICU), including acute renal failure complications, drug overdose, and electrolyte abnormalities. While individual CRRT modalities affect drug elimination to differing degrees, certain drug characteristics universally promote increased elimination. Cisatracurium is a neuromuscular blocking agent with several uses in critically ill patients, and is traditionally regarded as a drug that does not require dosing adjustment for concomitant diseases such as renal or hepatic dysfunction due to its pharmacokinetic properties, including non-enzymatic Hofmann elimination. However, recent studies report that cisatracurium dosing requirements are not consistent across ICU patients, especially in septic shock, hypothermia, and prolonged infusion duration. While not previously documented in the literature, our investigators' clinical experiences have observed potential trends that patients receiving CRRT may also require higher doses of cisatracurium infusion. The primary objective of this study was to measure effective paralytic doses of cisatracurium in CRRT patients compared to non-CRRT patients via doses required to achieve goal train-of-four (TOF) scores  $\leq 2:4$ . This multi-center, retrospective cohort study evaluated dosing requirements in patients receiving cisatracurium infusions with or without concomitant CRRT at University of Cincinnati Medical Center and West Chester Hospital from October 2012 to April 2016. Major exclusion criteria included fixed-dose cisatracurium infusions, infusions only for surgical procedures, concomitant extracorporeal membranous oxygenation (ECMO), and lack of TOF monitoring. Secondary endpoints included comparisons of intra-patient dosing variability during infusion, time to first effective paralysis measurement, and overall percent efficacy. A multivariate analysis was also performed to assess predictors of increased dosing requirements in all patients, including CRRT, septic shock, hypothermia, severity of illness, residual renal function, and total days of cisatracurium therapy. **Results/Conclusion:** Results will be analyzed and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain continuous renal replacement therapy (CRRT) modalities and impact on drug elimination

Describe pharmacology of the neuromuscular blocking agent cisatracurium

### Self Assessment Questions:

Which of the following drug characteristics is ideal for elimination in CRRT?

- A: >25% innate renal elimination
- B: Volume of distribution <1 L/kg
- C: Protein binding <80%
- D: All of the above

Which of the following statements is true regarding cisatracurium?

- A: Cisatracurium is primarily eliminated through the renal pathway
- B: Cisatracurium is a depolarizing neuromuscular blocking agent
- C: Cisatracurium competitively antagonizes postsynaptic acetylcholin
- D: Cisatracurium is highly bound to serum proteins

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-519L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PATHOLOGICAL COMPLETE RESPONSE RATES WITH PERTUZUMAB-BASED NEOADJUVANT CHEMOTHERAPY IN BREAST CANCER

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**Purpose:** Neoadjuvant chemotherapy (NAC) allows for assessment of tumor response while eradicating micrometastatic disease and is standard-of-care for locally advanced, operable, HER2-overexpressing breast cancer. Pathological complete response (pCR) at time of surgery is pathological evidence of invasive cancer eradication following NAC and may act as a surrogate of long-term efficacy. Anthracycline and taxane-based chemotherapy combined with the anti-HER2 monoclonal antibody, trastuzumab, are standard NAC regimens. Pertuzumab, a humanized monoclonal antibody directed at the dimerization domain of HER2, received FDA approval for use in the neoadjuvant setting after the NeoSphere trial demonstrated improved pCR rates in patients who received NAC with pertuzumab and trastuzumab plus docetaxel compared to trastuzumab plus docetaxel. Anthracyclines were not administered neoadjuvantly in this trial. The 2015 National Comprehensive Cancer Center Network (NCCN) Breast Cancer guidelines recommend using an anthracycline-containing regimen followed by a trastuzumab/pertuzumab/taxane-containing regimen, or vice versa, in patients with operable, HER2-overexpressing breast cancer. However, the optimal sequencing of these regimens is unknown. The guidelines also support the use of a non-anthracycline option, pertuzumab/docetaxel/carboplatin/trastuzumab (PTCH). Current NCCN recommendations for utilization and sequencing of anthracycline and taxane-based regimens in combination with dual targeted therapy have yet to be validated with published pCR results. The purpose of our study was to identify the surgical pCR rate in patients who received combination pertuzumab-trastuzumab with various neoadjuvant chemotherapy regimens. Safety and efficacy of chemotherapy sequencing on pCR rates, dose intensity, and toxicities were also assessed. **Methods:** Patients with HER2-overexpressing breast cancer who received NAC between September 2013 and July 2015, followed by definitive surgery were included. Five regimens were evaluated: pertuzumab/trastuzumab/taxane (docetaxel or paclitaxel) followed by doxorubicin/cyclophosphamide (AC), AC followed by pertuzumab/trastuzumab/taxane, and PTCH. Descriptive statistics will be used for data analysis. **Results:** The results of this study will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review current literature supporting neoadjuvant chemotherapy in the treatment of HER2-overexpressing breast cancer.

Report pathologic complete response (pCR) rates of patient who received pertuzumab-trastuzumab in combination with other chemotherapy agents in the neoadjuvant setting to compare effects of chemotherapy regimen and sequencing on pCR rate and toxicity.

### Self Assessment Questions:

The goal of neoadjuvant chemotherapy for breast cancer patients is to provide which of the following outcomes:

- A: Eradication of micrometastatic disease
- B: Assessment of tumor response to chemotherapy
- C: Shrink tumor burden to allow for breast-sparing surgery
- D: All of the above

Improved pCR rates with the addition of pertuzumab to trastuzumab-containing regimens is thought to act as a surrogate for which outcome measure:

- A: Long-term efficacy
- B: Chemotherapy dose intensity
- C: Febrile neutropenia rates
- D: Trastuzumab-associated cardiotoxicity

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-520L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **BEDSIDE MEDICATION DELIVERY: REFINING TRANSITIONS OF CARE BY UTILIZING MOBILE TECHNOLOGY**

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**Purpose:** On average, one in five adults is readmitted to a hospital within thirty days of discharge. Readmissions are multifactorial including medication-related concerns owing to not obtaining discharge prescriptions. Pharmacists are exceptionally positioned to enhance the discharge process by ensuring patients leave the hospital with prescriptions in hand and are provided detailed education at discharge. The purpose of this project is to expand the current pharmacy practice model at Ministry Saint Josephs Hospital (MSJH) outpatient pharmacy to include bedside medication delivery and education to patients by employing mobile technology.  
**Methods:** This quality improvement project has been exempt from review by the Institutional Review Board. Baseline data collection includes retrospective discharge prescription capture rate and corresponding revenue, thirty day all-cause readmission rate, and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores related to medications from January 1, 2014 to February 28, 2014. The intervention phase includes the offer of prescription delivery with education to discharging patients in the same time frame of the subsequent year. Patients are excluded if they are being discharged to a skilled nursing or assisted living facility. The post-implementation phase data collection includes: number of discharge prescriptions captured and corresponding revenue at MSJHs outpatient pharmacy, number and rate of all-cause readmissions within thirty days of discharge, HCAHPS scores related to medications, and patient satisfaction regarding the service. The primary objective of this project is to increase prescription volume at MSJHs outpatient pharmacy by utilizing mobile technology to deliver medications to the patients bedside. Secondary objectives include evaluation of financial impact on MSJHs outpatient pharmacy, readmission rate, and patient satisfaction.

**Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe the role and potential benefits of bedside medication delivery utilizing mobile technology.

Explain how increased prescription capture correlates with improved patient outcomes.

### **Self Assessment Questions:**

Which of the following is the largest benefit of implementing a bedside discharge medication delivery service?

- A Increased readmissions
- B: Decreased patient understanding of their medications
- C: Increased prescription fill at discharge
- D: Decreased primary adherence

Which of the following is associated with ensuring patients have prescriptions at discharge?

- A Reduced readmissions
- B Increased patient complaints
- C Disgruntled caregivers
- D Increased length of stay

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-817L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **EVALUATION OF THREE AMBULATORY PHARMACY CLINICS SIX MONTHS AFTER IMPLEMENTATION**

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**Background:** With the landscape of health care changing, ambulatory pharmacy practice sites in primary care have expanded in recent years. Several researchers have described best practices for implementation of a new ambulatory pharmacy practice. A common theme among these authors is to assess the specific needs of each institution. Mercy Health Muskegon has recently implemented ambulatory pharmacy services co-located in three patient-centered medical homes (PCMHs). In order to best serve the patients and providers of these sites, assessment of the progress of these practices is warranted.  
**Purpose:** The purpose of this project is to quantitatively and qualitatively assess the implementation of pharmacy services in three recently established ambulatory care pharmacy practices.  
**Methods:** Quantitatively, retrospective analysis was performed on the initial 6-months of various patient visit statistics, including number of patients seen per day, number of cancellations and no-shows, referral reasons, among others. Qualitatively, surveys were administered to providers at 6-months post-implementation, assessing provider perceptions, comments and feedback regarding the new services.  
**Results:** To be presented  
**Conclusions:** To be presented

### **Learning Objectives:**

List strategies to prepare for implementation of a pharmacist in an ambulatory care setting.

Identify potential barriers to successful implementation of an ambulatory care pharmacy practice.

### **Self Assessment Questions:**

What is the best approach to implementing pharmacists in ambulatory clinics?

- A Slowly empirically develop the model
- B: Focus on what the pharmacist likes to do
- C: Evaluate where organization is at risk financially and/or publically
- D: Pharmacist sees every referral regardless of scope

Which of the following barriers were experienced during implementation to a new ambulatory care practice?

- A Clear role and job description for the pharmacist and understanding
- B Lack of understanding of clerical staff of pharmacist schedule and
- C Referral process to pharmacist for patients that are not meeting quality
- D Deliberate and structured orientation to the site by management

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-818L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## FLUDARABINE AND CYTARABINE (FLA) VERSUS MITOXANTRONE ETOPOSIDE, AND CYTARABINE (MEC) REGIMENS IN RELAPSED OR REFRACTORY ACUTE MYELOID LEUKEMIA (AML)

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**Purpose:** Approximately 60-80% of patients who receive standard induction therapy for AML achieve a complete remission (CR), however most patients relapse within 2 to 3 years. Patients with relapsed or refractory disease have a poor prognosis and response to salvage regimens. There is currently no standard salvage chemotherapy regimen, and comparative studies amongst these regimens are limited. The ultimate goal of salvage chemotherapy in relapsed or refractory AML is to obtain a CR and eventually proceed to hematopoietic stem cell transplant (HSCT), which is the only potentially curative option. At the James Cancer Hospital, FLA +/- granulocyte colony stimulating factor (G-CSF) or MEC are the salvage regimens of choice for treatment of relapsed or refractory AML. To date, there have been no direct comparisons between these regimens to assess for differences in efficacy and long-term outcomes, and individual studies have shown mixed results. Therefore, this study will evaluate the efficacy of FLA +/- G-CSF versus MEC chemotherapy in relapsed or refractory AML. The primary objective is to estimate and compare the CR and complete remission with incomplete count recovery (CRi) rates for FLA +/- G-CSF and MEC. Secondary objectives include overall survival (OS), relapse free survival (RFS), and the number of patients who proceeded to HSCT after treatment with FLA +/- G-CSF or MEC. **Methods:** A single-center, retrospective cohort study was conducted to evaluate the rates of CR and CRi. Adult patients with relapsed or refractory AML who received FLA +/- G-CSF or MEC regimens between December 1, 2009 and December 31st, 2014 were included. Data collected includes demographics, hematologic malignancy history, number of previous salvage regimens (including HSCT), bone marrow biopsy results after treatment, and number of patients proceeding to HSCT.

**Results/Conclusions:** Data evaluation is currently being conducted. Final results will be presented.

### Learning Objectives:

Describe commonly used salvage chemotherapy regimens for treatment of relapsed or refractory AML and ultimate goals of treatment  
Identify differences in clinical outcomes between FLA and MEC regimen

### Self Assessment Questions:

What is the ultimate treatment goal for patients with relapsed or refractory AML?

- A: Achieve complete remission
- B: Achieve complete remission then proceed to hematopoietic stem cell transplant
- C: Achieve partial remission then proceed to hematopoietic stem cell transplant
- D: Achieve complete remission then continue with maintenance chemotherapy

Which chemotherapy agent is a key component in many salvage regimens for relapsed or refractory AML?

- A: Fludarabine
- B: Mitoxantrone
- C: Cytarabine
- D: Etoposide

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-521L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## ANALYSIS OF CLINICAL PHARMACY SPECIALIST INTEGRATION WITHIN PATIENT-ALIGNED CARE TEAMS TO PROVIDE DIABETES MANAGEMENT SERVICES TO VETERANS

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**Purpose:** The Veterans Affairs (VA) system has developed interdisciplinary teams known as Patient-Aligned Care Teams (PACT) for chronic disease state management in the outpatient clinic setting. At the Robley Rex VA Medical Center, Clinical Pharmacy Specialists (CPSs) began serving as providers on PACT teams in July 2015. The goal of this quality improvement study is to analyze the contribution of CPSs to the PACT teams in the management of Veterans with diabetes mellitus. **Methods:** This is an observational analysis that is being conducted in four of the outpatient VA clinics affiliated with the Robley Rex VA Medical Center from July 6, 2015 through February 28, 2016. The Computerized Patient Record System (CPRS) and The Primary Care Almanac are being used for data collection. Patient follow-up visits are being conducted either in-person (60.28%) or by telephone (39.72%). The primary objective is to evaluate the change in each patient's HbA1c from baseline to a minimum of three months after the initial CPS appointment. **Preliminary Results:** On average, HbA1c values have decreased by 1.43% over a period of 133 days after CPS involvement. Overall improvements have also been seen in the following secondary outcomes: percentage of patients with Hb1c >9% (-41.23%); on-time diabetic retinopathy exams (+10.23%), and percentage of patients on appropriate statin (+8.85%), antiplatelet (+11.5%), and antihypertensive (+1.84%) therapy at the follow-up appointment compared to the initial visit. The percentage of patients with on-time diabetic foot exams (-3.02%) was also evaluated, but has not shown improvement after CPS intervention. **Conclusions:** CPS management of diabetes mellitus is associated with an overall improvement in diabetes-related outcomes. The results from this project will contribute to the ongoing quality improvement process within our health system and improve care for Veterans in our facility.

### Learning Objectives:

Explain the concept of PACT teams within the VA system and the consultation process required for diabetes management by the clinical pharmacy specialists.

List two advantages of pharmacist-led diabetes clinics and identify examples of performance measures that could improve after pharmacist involvement.

### Self Assessment Questions:

Which of the following performance measures were the CPSs at our facility able to improve within the PACT clinics?

- A: Decreased inpatient admission rate
- B: Decreased average wait time to see provider
- C: Decreased urgent care utilization rate
- D: Decreased percentage of patients with HbA1c >9%

What is the ideal ratio of clinical pharmacy specialists to primary care providers within the PACT system?

- A: 1:1
- B: 1:3
- C: 1:5
- D: 1:10

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-522L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## ADULT HIGH-DOSE METHOTREXATE OPTIMIZATION THROUGH PRIOR-TO-ADMISSION URINE ALKALINIZATION AND STANDARDIZED SUPPORTIVE CARE

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**Background:** High-dose methotrexate (HDMTX), defined as any dose of methotrexate  $\geq 500$  mg/m<sup>2</sup>, is frequently used for the treatment of osteosarcoma, acute lymphoblastic leukemia, and lymphoma. Literature reports up to 10% of patients receiving HDMTX experience nephrotoxicity with a resultant mortality rate of 4%. Urine alkalization, leucovorin rescue therapy, and aggressive hyperhydration are the cornerstones of supportive care measures to prevent HDMTX toxicity. Errors in the execution of supportive care, such as insufficient urine alkalization, can lead to catastrophic patient outcomes. The purpose of this project is to enhance overall safety, increase efficiency, and decrease incidence of toxicity for adults receiving HDMTX at UW Health. **Methods:** An email survey was sent to query peer institutions regarding their practices. We conducted a literature search to assess past and current urine alkalization and leucovorin dosing strategies. We performed a retrospective chart review of patients from June 2011-June 2015 to delineate areas for improved safety, efficiency, and process standardization in HDMTX treatment protocols. A prior-to-admission enteral urine alkalization regimen and leucovorin dosing algorithm were developed with the assistance of a multidisciplinary project team. Existing electronic order sets were standardized and an institutional clinical practice guideline was written to implement treatment process enhancements. **Results:** Twenty-eight percent of patients receiving HDMTX from April-October 2013 did not start treatment until day two of hospitalization due to process inefficiencies and failure to achieve appropriate urine pH. Mean time from admission to HDMTX administration was 12.5 hours. Prospective data collection is underway to determine the impact of supportive care standardization on urine pH on admission, time to HDMTX administration, hospital length of stay, and incidence of HDMTX toxicity. Deviations from the treatment protocol are expected to increase length of stay, risk of infection, overall cost of treatment, and patient morbidity and mortality. **Conclusions:** To be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Describe risk factors that may contribute to increased toxicity in patients receiving high-dose methotrexate

Identify supportive care strategies that may be utilized to prevent high-dose methotrexate toxicity

### Self Assessment Questions:

Which of the following factors may contribute to an increased risk for toxicity in patients receiving high-dose methotrexate

- A: Young age
- B: Urine pH 6.5
- C: Receiving ceftriaxone at the same time as high-dose methotrexate
- D: Past medical history including hypothyroidism

Which supportive care medication is a reduced form of folic acid that competes with methotrexate at intracellular binding sites to restore and "rescue" DNA synthesis?

- A: Sodium bicarbonate
- B: Leucovorin
- C: Glucarpidase
- D: Filgrastim

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-523L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF DEMOGRAPHIC FACTORS IMPACTING HEMORRHAGE RATES IN TISSUE PLASMINOGEN ACTIVATOR FOR ACUTE ISCHEMIC STROKE

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**Purpose:** Recombinant tissue plasminogen activator (tPA) is a thrombolytic agent used for the treatment of acute ischemic stroke (AIS). Multiple studies have correlated early administration of tPA with improved neurological outcomes following AIS. Previous randomized controlled trials have demonstrated increased functional outcomes in patients, but concerning bleed rates have been reported. Uncertainties remain regarding the risks and benefits in severity of stroke, onset of symptoms, and in certain populations. In particular, data are lacking for subgroups such as: advanced age, diabetics, females, delayed administration of tPA, elevated national institute of health stroke scale, past medical history, extreme weights, and uncontrolled blood pressure per-infusion. The primary objective of this study is to evaluate the demographic and clinical factors associated with increased hemorrhage rates after receiving tPA for acute ischemic stroke. **Methods:** This IRB-approved, retrospective, cohort study was conducted using the Cerner electronic medical records database. Data were collected from patients who received tPA between July 1, 2012 and December 31, 2015 with a preliminary diagnosis of AIS. Patients were excluded if they received tPA at another institution, were not administered tPA, or received tPA for another indication. Patient demographics, modified Rankin Scale scores, last known normal time, time to infusion, mortality and bleeding outcomes, initial vitals, and Hemorrhage After Thrombolysis scores will be collected by two separate researchers. A 10% sample of the collected data will be reevaluated by two additional researchers for accuracy. **Results:** Research is currently in the data collection phase. **Results will be presented at the Great Lakes Conference.** **Conclusion:** Conclusions of the study will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List benefits and risks with tPA therapy for treatment of acute ischemic stroke

Describe appropriate dosing and preparation for tPA for ischemic stroke

### Self Assessment Questions:

Which of the following has been demonstrated to be true with early administration of tPA?

- A: Increased survival rates
- B: Decreased mortality
- C: Increased Modified Ranking Scale Score
- D: Improvement of National Institute of Health Stroke Scale

What is the maximum total dose of tPA that can be administered for acute ischemic stroke

- A: 90 mg
- B: 100 mg
- C: 0.9 mg
- D: 81 mg

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-524L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF A PHARMACIST-MANAGED VENOUS THROMBOEMBOLISM PREVENTION SERVICE ON PATIENT SAFETY PARAMETERS

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Purpose: Venous thromboembolism (VTE), a complication which can occur during and after hospitalization, carries up to a 30% mortality risk.

Anticoagulation with pharmacologic agents is necessary for prevention in patients with moderate and severe risk. As a class however,

anticoagulants are one of the top five medication classes associated with patient safety incidents. In 2015, St. Elizabeths Hospital initiated a pharmacist-managed VTE prevention protocol. The protocol guides the pharmacists in VTE risk stratification and implementation of pharmacotherapy selection. As the medication experts, with intimate knowledge of high-risk medications, the assumption is that there will be less patient safety incidents involving anticoagulants when pharmacists are responsible for management of VTE prophylaxis. The goal of this study is to compare time from admission to first order of pharmacologic VTE prophylaxis, as well as number of anticoagulation medication events, between physician-managed and pharmacist-managed. Methods: This study is a pre- and post-implementation, retrospective study. The primary outcome will compare time from admission to first order of pharmacologic prophylaxis between the physician-managed, pre-implementation group with the pharmacist-managed, post-implementation group. The second outcome will determine the number of anticoagulation medication events between the

physician-managed and pharmacist-managed groups. After IRB submission, pre-implementation group will consist of all admissions

April 14, 2015 through September 14, 2015. Post-implementation group will consist of all admissions September 15, 2015 - February 15, 2016. For Outcomes 1 and 2, Data Repository (DR) reports will identify the time of patient admission and the time of first order of pharmacologic VTE prophylaxis in patients risk-stratified as moderate or high VTE risk. A medication error reporting system will identify anticoagulation adverse events. Results and Conclusions: Data collection and analysis is pending. Results and conclusions to be presented.

### Learning Objectives:

Describe a patients risk level for venous thromboembolism  
Identify precautions and contraindications to pharmacologic VTE prophylaxis

### Self Assessment Questions:

An 89-year-old female presents from a nursing home to the ED with pneumonia and UTI. Previous medical history includes breast cancer (12 years ago), MI (4 years ago) and HTN. Patient is hemodynamically

- A: No risk
- B: Low risk
- C: Moderate risk
- D: High risk

Which of the following are all contraindications to pharmacologic VTE prophylaxis?

- A: Prior GI bleed, HIT, current use of NSAIDs
- B: Child-Pugh class B, epidural 36 hours previously, acute DVT
- C: Thrombocytopenia, coffee-ground emesis, Child-Pugh class C
- D: Proliferative retinopathy, CNS neoplasm, leukocytosis

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-936L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION AND EVALUATION OF A PHARMACIST-LED IMMUNOSUPPRESSIVE DOSING DELEGATION PROTOCOL IN AN ACADEMIC CANCER CENTER

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The number of hematopoietic stem cell transplants (HSCTs) performed annually in the United States is increasing due to expanded indications, increased efficacy, and improved safety of HSCT. Pharmacists have the unique ability to increase capacity to care for this growing number of patients by serving as physician extenders under delegation protocols. As a result of collaboration with HSCT providers at UW Health, an institutional protocol has been developed to delegate authority to pharmacists to manage post-HSCT immunosuppression with tacrolimus, cyclosporine, and/or sirolimus. The purpose of this project is to implement and evaluate the pharmacist-led immunosuppressive dosing delegation protocol to improve patient management and efficiency in the hematology/oncology clinics. The first step of this project involved describing the current state of immunosuppressive medication management in the hematology/oncology clinics. This was accomplished through meeting with providers and performing direct observations in clinic. Developing the new workflow involved collaborating with information technology personnel to create an electronic consult order, a process for tracking patients, and a standard progress note for pharmacist documentation. Once the delegation protocol was implemented, physicians used the electronic consult order to indicate the immunosuppressive medication(s) to be managed, the desired trough, and the anticipated length of therapy. Pharmacists then ordered labs, adjusted medication doses, and educated patients on therapy changes. These activities were all documented and sent to the patients physicians. The outcomes of this project will include a comparison of the percentage of drug levels in therapeutic range and percentage of patients who develop acute graft-versus-host disease before and after protocol implementation. The findings will be used to help further develop the pharmacists roles in the hematology/oncology clinics at UW Health.

### Learning Objectives:

Describe the key steps required to implement a pharmacist-led immunosuppressive dosing delegation protocol.  
Identify outcome measures that can be used to evaluate the impact of a pharmacist-led immunosuppressive dosing delegation protocol.

### Self Assessment Questions:

Which of the following steps must be taken before implementing a pharmacist-led immunosuppressive dosing delegation protocol?

- A: Call local outpatient pharmacies to educate them on the new delegation protocol
- B: Develop a process for tracking patients being managed under the protocol
- C: Determine the baseline percentage of immunosuppressive drug levels in therapeutic range
- D: Determine the baseline percentage of acute graft-versus-host disease

Which of the following outcome measures can be used to evaluate the impact of pharmacists managing immunosuppressive therapy?

- A: Percentage of patients on appropriate anti-infectives following HSCT
- B: HCAHPS scores for the hospital's hematology/oncology unit
- C: Time to engraftment following HSCT
- D: Percentage of immunosuppressive drug levels in therapeutic range

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-525L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**CORRELATION OF PHARMACOKINETIC/PHARMACODYNAMIC PREDICTIONS OF EFFICACY WITH CLINICAL AND MICROBIOLOGICAL OUTCOMES IN PATIENTS WITH PSEUDOMONAS AERUGINOSA PNEUMONIA USING MINIMUM INHIBITORY CONCENTRATIONS (MIC)**

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**Background/Purpose:** Pseudomonas aeruginosa pneumonia constitutes a tremendous burden on hospitals in the United States in terms of morbidity, mortality, and healthcare costs. Antimicrobial therapy for P. aeruginosa infections is limited because of the organisms multiple resistance mechanisms, often resulting in higher minimum inhibitory concentrations (MICs). Optimization of antimicrobial therapy through the application of pharmacokinetic (PK)/pharmacodynamic (PD) principles has the potential to significantly improve clinical and microbiological outcomes. However, few studies have used real-world application of PK/PD modeling and the use of targeted indices with Etest MICs at the individual patient level. The purpose of this study is to evaluate the correlation of PK/PD predictions using Etest MICs with clinical and microbiological outcomes in patients with P. aeruginosa pneumonia. **Methods:** This is a retrospective study of all hospitalized adult patients who received a broad-spectrum -lactam (cefepime or piperacillin/tazobactam) for a positive respiratory culture with P. aeruginosa admitted from 1 January 2013 through 30 September 2014 at The Ohio State University Wexner Medical Center. The primary outcome is the correlation between predicted PK/PD modeling and clinical cure in patients with P. aeruginosa pneumonia. Secondary outcomes include hospital length of stay (LOS), infection-related LOS, intensive care unit (ICU) LOS, duration of mechanical ventilation, time to resolution of clinical signs and symptoms, microbiological outcomes (rate of documented or presumed organism eradication and recurrence) 30-day all-cause mortality, and infection-related mortality. Patient demographics and baseline clinical characteristics will be compared via Student's t-test, Wilcoxon rank-sum test, Chi-square test, or Fisher's exact test as appropriate. Variables associated with the outcome of interest on univariate analyses with a p-value < 0.20 will be considered in the multivariable model. Logistic regression will be used to identify independent factors for the primary outcome of clinical cure. **Results and Conclusions:** Data collection is currently underway and results will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Review current literature on PK/PD outcomes in the treatment of Pseudomonas aeruginosa pneumonia.

Discuss the correlation of PK/PD predictions using exact MICs with clinical and microbiological outcomes.

**Self Assessment Questions:**

Which of the following statements is correct?

- A: There is no concern for rising minimum inhibitory concentrations (I
- B: Pseudomonas aeruginosa pneumonia has no effect on morbidity &
- C: Successful treatment of Pseudomonas aeruginosa has no correlat
- D: Pseudomonas aeruginosa has multiple resistance mechanisms, o

Extended infusion -lactam regimens \_\_\_\_\_ PK/PD profiles and patient outcomes.

- A: Improve
- B: Negatively impact
- C: Do not effect
- D: Worsen

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-526L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**CLINICAL PHARMACIST IMPACT ON SEPSIS CORE MEASURE BUNDLE COMPLIANCE AND CLINICAL OUTCOMES IN THE EMERGENCY DEPARTMENT**

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The Centers for Medicare and Medicaid Services (CMS) will implement a new core measure in 2016 for Severe Sepsis and Septic Shock (SEP). The new core measure implements specific three and six hour goals which are consistent with the Surviving Sepsis Campaign (SSC) bundles revised in April 2015. The impact of clinical pharmacist interventions on sepsis core measure goals and bundle compliance remains unclear. The purpose of this study is to evaluate the impact of clinical pharmacy services in the emergency department on sepsis goals and patient outcomes. This is a quality improvement initiative in a 35-bed emergency department at a tertiary care facility in Lexington, KY. Baseline data were collected for 152 patients with sepsis diagnosis-related group coding assignments from April 2015 to June 2015 who were admitted through the emergency department with severe sepsis or septic shock present on admission. The quality improvement initiative will include patients admitted from September 2015 to November 2015 after implementation of clinical pharmacy services in the emergency department. Patient demographics, vital signs, lab results, culture results, physical exam findings, and medications will be recorded and analyzed. Appropriate statistics will be used to evaluate each outcome. The primary outcomes will be overall sepsis goal compliance and in-hospital mortality. Secondary outcomes will include three and six hour goal compliance, intensive care unit (ICU) length of stay (LOS), overall LOS, 30-day readmission rate, and cost per case. Data collection is currently being conducted. Results and conclusion to be determined.

**Learning Objectives:**

Discuss early goal-directed therapy and the early management bundle for severe sepsis and septic shock.

Relate the early management bundle requirements for severe sepsis and septic shock to clinical practice.

**Self Assessment Questions:**

Which of the following is included in the 6 hour goals for septic shock?

- A: Initial lactate level measurement
- B: Vasopressors
- C: Blood cultures drawn prior to antibiotics
- D: Administration of broad spectrum antibiotics

In order to meet the fluid resuscitation goal for septic shock, what volume of crystalloid fluid should be administered for a 100 kg patient?

- A: 1 Liter
- B: 2 Liters
- C: 3 Liters
- D: 4 Liters

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-527L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PROTON PUMP INHIBITOR PRESCRIBING TRENDS IN A VA PRIMARY CARE CLINIC.

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Up to 20% of Americans are affected by gastroesophageal reflux disease (GERD), which is most often treated in a primary care setting. Most of these patients are given proton pump inhibitors (PPIs), making them the second most-prescribed class of medications in the United States. However, PPIs are not first line therapy for mild to moderate GERD symptoms and are not meant to be used chronically in most patients. Many studies have linked chronic PPI use to calcium and magnesium deficiencies, as well as increased risks of bone fracture and infections. The purpose of this project was to ascertain the prescribing trends of PPIs in a primary care setting in order to increase awareness of and align care more closely with best practices. Chart reviews were performed on patients who refilled a PPI within a two month period of time. Information gathered included the appropriateness of PPI dosing, duration of treatment and place in therapy while also evaluating step therapy use, labs obtained and whether lifestyle modifications for symptom control were discussed. The data obtained from chart reviews was used to help shape future guidance for prescribers in relation to proper GERD management.

### Learning Objectives:

Identify the place in therapy of PPI use for GERD.

Recognize appropriate step up therapy for patients with GERD.

### Self Assessment Questions:

In patients with mild to moderate GERD without erosive esophagitis, an appropriate first line therapy would be:

- A ranitidine 75mg BID
- B: omeprazole 40mg BID
- C: calcium carbonate 500mg PRN
- D: cimetidine 200mg daily

Order the following therapies in correct "step up" sequence:

- A omeprazole 40mg daily
- B famotidine 10mg BID
- C lansoprazole 15mg daily
- D ranitidine 150mg BID

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-528L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLICATIONS OF STATIN USE ON VASOPRESSOR THERAPY IN THE SETTING OF SEPTIC SHOCK

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Purpose: Pleiotropic anti-inflammatory and immunomodulatory effects of statins have been associated with improved outcomes in the critically ill population. The purpose of this study was to evaluate the implications of statin use on duration of vasopressor therapy in the setting of septic shock in patients with exposure to statin therapy prior to admission. The primary outcome was to compare the duration of vasopressor therapy in patients with septic shock with and without previous statin exposure. The effects of statin continuation on admission will also be evaluated. Methods: This study was approved by the Institutional Review Board. Adult patients diagnosed with septic shock based on inpatient International Classification of Diseases, Ninth revision coding were evaluated utilizing retrospective chart review. The patient population was obtained from two affiliated hospitals over 5 years. Data collection included duration and choice of vasopressor therapy, choice and dose of statin therapy, demographic data, pertinent laboratory values, and antibiotic use. Patients were included if they were on any vasopressor for greater than six hours from the time of admission. Exclusion criteria included pregnancy, age less than 18 years, and incarceration. Continuous and categorical variables will be analyzed for significance using Students t tests and chi-square analyses respectively. Results/Conclusions: Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the proposed mechanisms of the anti-inflammatory actions of statins

Explain the impact of statin exposure on mortality outcomes in critically ill patients

### Self Assessment Questions:

Which of the following is not a proposed mechanism of the anti-inflammatory effects of statins?

- A Inhibition of the effects of tumor necrosis factor  $\alpha$  (TNF- $\alpha$ )
- B: Inhibition of the effects of reactive oxygen species (ROS)
- C: Inhibition of the effects of nuclear factor  $\kappa$  B (NF- $\kappa$ B)
- D: Inhibition of the effects of immunoglobulin G (IgG)

Which of the following is true regarding mortality outcomes in critically ill patients exposed to statins?

- A There have been no studies evaluating critically ill patients exposed to statins
- B Studies have shown conflicting results regarding mortality outcomes
- C Studies have shown decreased mortality in critically ill patients who were exposed to statins
- D Studies have shown increased mortality in critically ill patients who were exposed to statins

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-529L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE INCIDENCE OF ACUTE KIDNEY INJURY WITH EXTENDED-INFUSION PIPERACILLIN-TAZOBACTAM AND VANCOMYCIN COMPARED TO STANDARD-INFUSION PIPERACILLIN-TAZOBACTAM AND VANCOMYCIN

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**Purpose** Current evidence demonstrates decreased mortality, length of hospitalization, total dose requirements, and cost, along with improved cure rates with extended-infusion piperacillin-tazobactam compared to standard-infusion piperacillin-tazobactam. However, data is limited on adverse events associated with extended-infusion piperacillin-tazobactam. Persistent higher concentrations could result in increased incidence of toxicity. Adverse effects of piperacillin-tazobactam include renal failure, seizures, and clostridium difficile colitis. The risk of acute kidney injury (AKI) is greater with concomitant piperacillin-tazobactam and vancomycin than with either medication alone. The study objective is to assess the incidence of AKI in patients treated with extended-infusion piperacillin-tazobactam and vancomycin compared to standard-infusion piperacillin-tazobactam and vancomycin. **Methods** Prior to data collection, approval was obtained from the Institutional Review Board for a retrospective chart review. Gundersen Health Systems electronic health record was used to identify patients treated with piperacillin-tazobactam and vancomycin. Patients were categorized into two groups: those treated with extended-infusion piperacillin-tazobactam and vancomycin and those treated with standard-infusion piperacillin-tazobactam and vancomycin. Patients were included if they were 18 years or older, treated with a minimum of 48 hours with piperacillin-tazobactam and vancomycin for any indication, and had at least two serum creatinine measurements. Patients receiving outpatient antibiotic infusions or previously receiving renal replacement therapy were excluded. The primary endpoint was incidence of AKI, defined as an increase in serum creatinine of at least 0.5 mg/dL or 1.5 times baseline within 48 hours of antibiotic initiation. Secondary endpoints included the incidence of severe AKI, initiation of renal replacement therapy, 30-day clostridium difficile infection rate, seizure occurrence, length of hospitalization, and 30-day mortality. **Results** Data collection is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the benefits of extended-infusion piperacillin-tazobactam infusions

Describe possible adverse effects of piperacillin-tazobactam

### Self Assessment Questions:

Which of the following is a likely outcome of extended-infusion piperacillin-tazobactam infusions?

- A Increased total dose requirements
- B Improved cure rates
- C Increased total cost
- D Increased mortality

Other than nephrotoxicity, which of the following is a possible adverse effect of piperacillin-tazobactam?

- A Hyperkalemia
- B Stroke
- C Peripheral neuropathy
- D Seizure

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-937L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RISK FACTORS FOR PSEUDOMONAS AERUGINOSA TO GUIDE EMPIRIC THERAPY FOR GRAM-NEGATIVE INFECTIONS

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**Purpose:** Pseudomonas aeruginosa (PSA) is a leading nosocomial pathogen associated with high rates of morbidity and mortality. Current literature highlights several risk factors for PSA infections, including previous antibiotic exposure, prior hospitalization, and severity of illness. Appropriate empiric therapy leads to better patient outcomes and less antibiotic resistance. Therefore, understanding risk factors that may predispose patients to pseudomonal infections is paramount. The primary endpoint of this study was to identify risk factors for PSA infections in order to guide empiric therapy. **Methods:** This was an IRB-approved, retrospective, observational, case-control study including patients from a single institution from January 1, 2010 through December 31, 2014. Cases were defined as adult patients with a PSA infection, while controls were adults infected with Enterobacteriaceae (ENT). Exclusion criteria included cystic fibrosis patients and polymicrobial infections. Demographics, prior hospitalizations, admitting diagnosis by ICD9 codes, discharge disposition, comorbidities, severity of illness based on the Charlson Comorbidity Index, pertinent vital signs lab values, microbiological data, and antimicrobial utilization were collected from our institutions Center for Clinical and Translational Science Enterprise Data Trust. All analyses were performed using R statistical software (3.12). **Results/Conclusions:** In all, 2183 patients were evaluated (1787 in the ENT group vs. 396 in the PSA group). Female gender was more common in the ENT group (61% vs. 41%,  $p < 0.0001$ ). E. coli (54%) and K. pneumoniae (19%) were the most common Enterobacteriaceae isolated. All comorbidities tested, except diabetes and CAD, were significantly more prevalent in the PSA group. There was a greater incidence of bacteremias and mechanical ventilation in the PSA group. (12% vs 7%,  $p < 0.0001$  and 19% vs 11%,  $p < 0.0001$ , respectively). Mean Charlson Comorbidity Index score and the frequency of hospital-acquired infections were higher in PSA group (3.05 vs. 2.67,  $p = 0.003$  and 67% vs 58%,  $p = 0.0004$ , respectively). Additional results and conclusions will be presented.

### Learning Objectives:

Identify the key risk factors associated with Pseudomonas aeruginosa infections and scoring tools in current literature

Discuss the utility of a risk-factor-score analysis to guide empiric therapy in patients with risk factors for Pseudomonas aeruginosa infections

### Self Assessment Questions:

Which of the following are common risk factors for Pseudomonas infections?

- A ICU admission
- B Nursing home residence
- C Viral illness
- D A & b

In the published Gram-negative bacteremia score, which of these risk factors has the highest score associated with it?

- A Pitt bacteremia score  $\geq 4$
- B Liver cirrhosis
- C Malignancy
- D Non urinary/CVC source of BSI

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-530L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**DEVELOPMENT AND IMPLEMENTATION OF AN ELECTRONIC MEDICAL RECORD DOCUMENTATION PLATFORM FOR COMMUNITY PHARMACIST OPTIMIZATION OF CHRONIC HEART FAILURE MEDICATIONS**

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**Purpose:** With an increased emphasis on improving patient outcomes, health systems are identifying methods to target and enhance the care of patients with chronic disease states. Evidence-based guidelines for appropriate, target range medication therapy in patients with chronic heart failure (CHF) have proven to positively impact patient outcomes. As a result, the National Quality Forum (NQF) and Centers for Medicare and Medicaid Services (CMS) adopted specific quality measures related to CHF contained in the guidelines, including dose titration and patient follow-up. Through implementation of a standardized electronic medical record (EMR) documentation platform, community pharmacists can better optimize medication use, perform medication monitoring, increase patient follow-up, and improve patient health outcomes. **Methods:** Collaboration with CHF clinic cardiologists and nurses resulted in defining key interventions and roles for community pharmacists in the management of chronic heart failure. A computer-based training module focused on evidence-based CHF treatment guidelines was developed for community pharmacists. Pre and post-surveys were developed and administered to pharmacists to assess baseline knowledge and retention of CHF treatment guidelines. Development of an electronic platform for documentation of telephone-based, community pharmacist led interventions was designed and built within the EMR. A pilot program will be implemented in a community pharmacist-run population health clinic. Inclusion criteria for patient enrollment in the program includes: 18 years of age or older; current diagnosis of systolic heart failure; current UW Health primary care provider; and current prescription fills at UW Health pharmacies. Outcomes tracked will include pre and post implementation rates on patient-specific goals related to heart failure, rates of achievement of specific CMS and NQF measures, and rates of patients on evidence-based therapy within target dosing ranges. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify key assessments community pharmacists can perform and document to support medication therapy changes suggested to physicians for patients with CHF.

Describe how community pharmacists can improve CMS and NQF quality measures for CHF.

**Self Assessment Questions:**

Which of the following can be used to streamline communication between pharmacists and providers for symptom documentation and decision support in titrating CHF medications?

- A: Faxes
- B: Paper charts
- C: Electronic medical records
- D: Mailed letters

Which of the following is a NQF/CMS quality measure for CHF?

- A: Percentage of patients on diuretics
- B: Percentage of patients on beta-blockers
- C: Percentage of patients seen by cardiologists
- D: Percentage of patients in stage C heart failure

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-531L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**ESTABLISHING AND EVALUATING THE ROLE OF A PHARMACIST IN A COMMUNITY HOSPITAL CARDIOLOGY CLINIC**

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**Purpose:** The role of pharmacists continues to expand. Pharmacist involvement in ambulatory care clinics allow for a collaborative, multidisciplinary team approach to patient care in the ambulatory setting. In cardiovascular healthcare, the pharmacist and cardiologist can work directly with one another to optimize patient medication therapy. At Community Memorial Hospital Cardiology Clinic, physician appointment times are limited and patients are scheduled consecutively, which leave no additional time for medication questions or education. A pharmacist in the cardiology clinic would allow patients direct access to a medication expert to answer their medication questions, provide high quality counseling, and reinforce the importance of medication adherence. The primary objective of this project is to evaluate the impact of pharmacist services in a community hospital cardiology clinic as measured by the number and type of medication interventions. Secondary objectives include: developing and implementing a pharmacist workflow in the clinic, quantifying the number of patients seen, evaluating the number of 30-day hospital readmissions pre and post implementation of the clinic pharmacist, estimating cost savings based on the interventions made, and reviewing Avatar patient satisfaction survey results pre and post implementation of the clinic pharmacist. **Methods:** During the initial phase of this project a pharmacist was in the clinic two days per week to develop a workflow and build relationships with the cardiology nurses and cardiologists. Once a workflow was established, data collection began on medication interventions. Medication interventions include: medication changes, providing patient education, and answering drug information questions for the clinic staff and patients. All recommendations are made based on the most recent published guidelines. **Results:** This study is currently ongoing and results will be reported at the conference. **Conclusions:** Will be presented at the conference.

**Learning Objectives:**

Describe the need for pharmacist involvement in ambulatory cardiology clinics.

Report the impact of adding a pharmacist to an ambulatory cardiology clinic through the number and type of medication interventions made.

**Self Assessment Questions:**

What is the leading cause of death in the United States?

- A: Diabetes
- B: Stroke
- C: Heart Disease
- D: Cancer

Pharmacists can contribute to the cardiology clinic team in which way?

- A: Identification of drug-drug interactions and adverse drug effects
- B: Individualized medication recommendations
- C: Patient education
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-532L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **THERAPEUTIC DRUG MONITORING AND DOSE ADJUSTMENTS OF CALCINEURIN INHIBITORS IN PEDIATRIC PATIENTS UNDERGOING HEMATOPOIETIC STEM CELL TRANSPLANT**

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**Purpose:** Calcineurin inhibitors, tacrolimus and cyclosporine, are immunosuppressant medications utilized for prevention of graft rejection and graft versus host disease (GVHD) in hematopoietic stem cell transplant (HSCT). These medications have a narrow therapeutic index with high inter- and inpatient variability requiring monitoring of serum drug levels. If checked prior to steady state, the level may represent an inaccurate value and lead to preemptive dose changes that could ultimately lead to toxicity or subtherapeutic levels. In the absence of indications requiring closer monitoring, levels can be safely checked starting 48 hours after the first dose and then two to three times per week and even less frequently in patients who are further out from transplant and have not required dose adjustments. The current standard of practice at the Children's Hospital of Wisconsin (CHW) for patients undergoing HSCT is to draw calcineurin inhibitor levels as often as daily. The purpose of this study is to determine if the current therapeutic drug monitoring and dose modification strategy at CHW for pediatric HSCT patients receiving calcineurin inhibitors is the most effective. **Methods:** This study was approved by the Institutional Review Board. The electronic medical record system was used to retrospectively identify patients admitted to CHW during an eight month period who received calcineurin inhibitors for a hematopoietic stem cell transplant. This study will evaluate the timing and frequency of dose adjustments in relationship to serum calcineurin inhibitor drug levels. Concurrently, a literature search will evaluate available recommendations for therapeutic drug monitoring and subsequent dose modifications of calcineurin inhibitors in this population. Data collected may include patient demographics and information regarding the transplant, calcineurin inhibitor, and therapeutic drug monitoring.

**Results & Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lake Pharmacy Residency Conference.

### **Learning Objectives:**

Review the pharmacokinetics of calcineurin inhibitors and need for therapeutic drug monitoring.

Identify indications that may require increased monitoring of calcineurin inhibitor drug levels.

### **Self Assessment Questions:**

Which of the following statements regarding the pharmacokinetics of calcineurin inhibitors is correct?

- A Due to predictable pharmacokinetics and a wide therapeutic index
- B: Based on the elimination half-life of tacrolimus, steady state is achieved
- C: Toxicity or subtherapeutic levels may be the result of dose change
- D: Therapeutic drug levels for cyclosporine typically reflect a peak level

Which situation would require more vigilant monitoring of tacrolimus levels?

- A Acute onset of hand tremor and new onset seizure
- B Continuation of home prophylactic fluconazole dose
- C A tacrolimus trough of 10 ng/mL
- D Initiation of hydroxyzine for nausea

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-533L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **ASSESSING AND OPTIMIZING MEDICATION WARNINGS AT AURORA HEALTH CARE**

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**Purpose:** The Clinical Decision Support (CDS) systems which accompany modern Electronic Health Record (EHR) systems are intended to reduce medication errors and improve patient safety. In theory, CDS features such as medication warnings would prompt clinicians to intervene on potentially unsafe medication orders. In practice, medication warnings instead create disruption in clinician workflows due to the excessive volume with which they fire. Additionally, providers often find these warnings clinically irrelevant. As a result, clinicians may become conditioned to ignore all medication warnings, including those of high clinical importance. The objective of this project is to evaluate and optimize medication warnings at Aurora Health Care (AHC) in order to maximize the utility of the institutions CDS system. **Methods and Procedures:** A medication warnings statistics report was generated from AHCs EHR system to identify warnings which occurred with greatest frequency as well as those with the highest override rates. A clinical evaluation of these warnings was then performed to determine their appropriateness. Two formal strategies for filtering drug warnings were designed around warnings deemed inappropriate based on this evaluation. The first strategy focused on medications ordered from within order sets firing high-dose warnings. Given that the content of these order sets is reviewed by clinicians, the default medication dosing on these order sets is presumably appropriate. As such, a process to formally evaluate high-dose warnings was integrated into the order set revision process. The second strategy involved enabling the user-filtering feature, which allows end-users to prevent the appearance of a subset of low-risk warnings which they deem to be inappropriate. **Post-implementation data collection includes an assessment of warning override rates and the number of warnings averted. Results:** Data collection and analysis are in progress. The results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe barriers to implementing changes to Clinical Decision Support (CDS) functionality within an Electronic Health Record (EHR)

Discuss methods for identifying inappropriate medication warnings

### **Self Assessment Questions:**

Which of the following must be considered when attempting to modify existing medication warning functionality within an EHR system?

- A End-user training
- B: Technical limitations imposed by EHR or CDS systems
- C: Technical limitations imposed by network infrastructure
- D: Both A and B

Which of the following characteristics may help identify inappropriate medication warnings?

- A Warnings which are frequently overridden
- B Warnings which users frequently mark as "Not Clinically Significant"
- C Warnings with unassigned importance levels
- D Both A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-819L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE IMPACT OF IN-HOUSE RESPIRATORY VIRUS PANELS: MUDDYING THE WATERS OR IMPROVING THERAPY?

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**Purpose:** Immunocompromised persons have greater risk of morbidity and mortality due to respiratory viruses. Polymerase chain reaction (PCR) testing is a valuable, yet costly, diagnostic tool in this population. The purpose of this study was to evaluate antimicrobial stewardship (AMS) outcomes associated with the addition of rapid in-house respiratory panel (RIHRP) PCR testing in immunocompromised patients. We hypothesize that RIHRP will improve test turn-around time (TAT) and facilitate AMS intervention. **Methods:** This was a single center, quasi-experimental study which compared AMS outcomes before and after implementation of RIHRP testing. Standard testing in observation 1 (October 1, 2014 - March 30, 2015) included influenza A/B PCR and multiplex respiratory virus panel PCR testing, and observation 2 (Oct 1, 2015 - March 30, 2016) included RIHRP (in-house multiplex PCR and influenza A/B PCR) testing. Prior to RIHRP implementation, education on the use of newly available PCR testing was provided infectious diseases, solid organ transplant (SOT), and pharmacy committees. The study included all SOT and hematopoietic-stem cell transplant patients, and with immunocompromised patients in the intensive care unit. Pregnant females, patients less than 18 years of age, and any death prior to test result were excluded. The primary endpoint was TAT compared between observation periods. Secondary outcomes included days of empiric antibiotics, length of stay in the intensive care unit, and time to a therapeutic intervention (defined as de-escalation or discontinuation of empiric antimicrobials, addition of appropriate antimicrobials, or modification of immunosuppressants). To detect a 50% reduction in TAT with 80% power and  $\alpha = 0.05$ , a sample size of 176 patients was determined. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize patient populations which may benefit from rapid in-house respiratory virus panels.

Identify antimicrobial stewardship interventions proceeding results from rapid in-house respiratory virus panels.

### Self Assessment Questions:

MV is a 34 YOM with a history of a kidney transplant in May 2013, on day 3 of empiric therapy for CAP and influenza (oseltamivir, ceftriaxone, and azithromycin) after an onset of cough, shortness of b

- A Start inhaled ribavirin for high suspicion of RSV.
- B: Request the rapid-in-house multiplex PCR for respiratory viruses.
- C: Discontinue all antimicrobials, as this is likely a viral infection.
- D: Consult the transplant team to discontinue the immunosuppressive

The multiplex PCR resulted positive for rhinovirus and the patient remains stable. The most appropriate intervention is to:

- A Escalate therapy to cover organisms associated with healthcare a:
- B Discontinue CAP therapy and continue oseltamivir because the int
- C Encourage supportive care, discontinue antimicrobials, and facilita
- D Continue the current regimen.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-820L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPROVING PHARMACIST-TO-PHARMACIST COMMUNICATION IN ONCOLOGY TRANSITIONS OF CARE

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The treatment of cancer in the modern medical landscape involves patients receiving pharmacy services in several settings within the health care system. These settings include specialty pharmacies, inpatient oncology units, outpatient infusion clinics and retail pharmacies. The purpose of this project was to develop an electronic platform for pharmacists to communicate with one another and share oncology-related information for a patient throughout the patient's transitions of care in multiple pharmacy settings. Frontline pharmacists were surveyed to determine what information would be most useful to efficiently provide pharmacy services for a patient who had transitioned from receiving pharmacy services in another pharmacy setting. Using this feedback, a platform was designed which exists in the current electronic medical record. In order to make this a platform for communication, a standardized set of pharmacist-to-pharmacist notes was created specifically for use on this platform. These notes are automatically populated into a section of the platform and are visible to pharmacists using the platform. These notes were made to be visible to pharmacists regardless of when the note was created or when the platform is accessed. In order to minimize the time needed to document information in these notes, templates were created to communicate common events including: hospital admission, approved prior authorization, delay in therapy, change in therapy and completed medication education. In addition to this messaging functionality, various pieces of patient-specific oncology information are automatically populated into this platform including pertinent laboratory values, imaging results, physician notes, and current oncologic treatment schedule. Results will be collected after implementation of EMR functionality and staff education. Metrics will include: number of distinct communications opened via the developed functionality and a time study. Conclusions will be drawn after the implementation of this new functionality and analysis of the results.

### Learning Objectives:

Identify four distinct health care settings where oncology patients will receive pharmacy services.

Describe two ways in which an electronic medical record can be used to improve pharmacists' access to information during transitions of care.

### Self Assessment Questions:

In which of the following settings do oncology patients receive pharmacy services?

- A Inpatient Oncology Units
- B: Outpatient Infusion Clinics
- C: Specialty Pharmacies
- D: All of the Above

Which of the following functions of the electronic medical record was developed to improve pharmacist-to-pharmacist communication?

- A Automated generation of pertinent oncology laboratory values into
- B Standardized set of notes to document important events in a patie
- C Automated generation of physician communications into "Oncolog
- D Creation of a "Oncology Pharmacy Visit" electronic encounter

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-821L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST LED ANTIMICROBIAL STEWARDSHIP OF THE TREATMENT OF URINARY TRACT INFECTIONS AND PYELONEPHRITIS IN THE EMERGENCY DEPARTMENT

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**Purpose:** Antibiotic prescribing patterns for the treatment of urinary tract infections (UTI) in the Emergency Department (ED) have historically been suboptimal. Unnecessary antibiotic use for asymptomatic bacteriuria as well as the overuse of fluoroquinolones are two contributing factors. Appropriate selection and necessity of empiric antibiotics for the treatment of UTI and pyelonephritis is an area where pharmacist-led antimicrobial stewardship programs (ASP) can have an impact on mitigating the downstream effects of suboptimal antibiotic prescribing. Previous studies have shown implementation of best-practice guidelines for the treatment of UTI for patients in the ED increased overall prescribing appropriateness from 2.3% to 20%. At Mercy Health Saint Mary's (MHSM) empiric therapy guidelines and clinical pharmacy services have been implemented within the ED with the aim of increasing appropriate antimicrobial prescribing. The primary purpose of this study is to evaluate the impact of a pharmacist-led ASP on prescribing practices within the ED for the treatment of UTI, pyelonephritis, and asymptomatic bacteriuria. **Methods:** This retrospective, quasi-experimental study compares patients discharged from the MHSM ED following collection of a urine sample before (January to June 2011) and after implementation of ED pharmacy services and empiric therapy guidelines (January to June 2015). Study outcomes include proportion of guideline concordance (i.e., correct antibiotic based on institutional guidelines, dose, and duration), urinary pathogens resistant to the antibiotic prescribed or first-line antibiotic, and patients with asymptomatic bacteriuria prescribed antibiotic therapy. Statistical analysis will be performed using the Chi-square or Fisher's exact test for nominal data, and Mann-Whitney U or Student's t-test for continuous data as appropriate. **Results:** Data collection and analysis are currently in progress. **Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define the first-line treatment options for urinary tract infections according to the IDSA guidelines.

Discuss how an emergency department pharmacist can be involved in antimicrobial stewardship programs.

### Self Assessment Questions:

Which of the following is/are the first line treatment option(s) for uncomplicated cystitis?

- A Nitrofurantoin 100 mg BID x 5 days
- B: Sulfamethoxazole/trimethoprim 1 DS tablet BID x 7 days
- C: Ciprofloxacin 500 mg BID x 5 days
- D: Amoxicillin 500 mg TID x 14 days

Which of the following are areas an ED pharmacist can have an impact on ASP?

- A Implement a discharge culture follow-up program
- B Increasing duration of antibiotic therapy
- C Aid in empiric antibiotic selection
- D Answers A and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-534L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING THE IMPACT OF PROPOFOL DURATION, RATE, AND CUMULATIVE DOSE ON THE INCIDENCE OF HYPERTRIGLYCERIDEMIA IN INTENSIVE CARE UNIT PATIENTS

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**PURPOSE:** Propofol is a potent sedative agent used frequently in the intensive care unit (ICU). The benefit of propofol is in its ultra-short half-life, allowing for more frequent awakening attempts. Despite this agent's customary use, it has been associated with the development of hypertriglyceridemia in the ICU setting. Therefore, the primary objective of this study is to evaluate for significant differences in durations, rates, and cumulative doses of propofol between patients with and without hypertriglyceridemia. The secondary objective is to examine the impact hypertriglyceridemia has on patient length of stay and development of acute pancreatitis. We hope that this data enables us to develop an optimal triglyceride monitoring protocol for ICU patients on propofol. **METHODS:** The study is a retrospective chart review of patients admitted to the ICU at Kettering Medical Center from August 1, 2013 to August 1, 2015. The electronic medical record was utilized to identify patients on propofol for at least 24 hours with at least one reported triglyceride value during propofol therapy. Hypertriglyceridemia is defined as having at least one triglyceride value greater than 400 mg/dL. Notable exclusion criteria include those with a history of hypertriglyceridemia, use of other lipid emulsion products, or concomitant use of a triglyceride-lowering agent. An interim analysis was planned when 60 patients were enrolled in each group, or if one group was filling up more rapidly than the other, a pre-screening protocol would be utilized. Patients meeting inclusion criteria were divided into two groups; hypertriglyceridemia and non-hypertriglyceridemia. These two groups were compared for differences in the duration, rate, cumulative dose of propofol, and length of stay. Secondary analyses in the hypertriglyceridemia group included incidence of acute pancreatitis and propofol-related infusion syndrome. **RESULTS/CONCLUSIONS:** Results and conclusions are pending and will be presented at the 2016 Great Lakes Pharmacy Resident Conference from April 27-29.

### Learning Objectives:

Express the relationship propofol duration, rate, and cumulative dose has on the development of hypertriglyceridemia in the critically ill patient  
Recognize the importance of efficiently monitoring triglycerides in patients that may be at a higher risk of developing propofol-induced hypertriglyceridemia.

### Self Assessment Questions:

Which of the following is a characteristic of propofol-related infusion syndrome (PRIS)?

- A Hyperkalemia
- B: Hypertriglyceridemia
- C: Orange-colored urine
- D: A and B

What is the recommended maximum titratable rate for maintenance infusions of propofol?

- A 40 mcg/kg/min
- B 45 mcg/kg/min
- C 50 mcg/kg/min
- D 55 mcg/kg/min

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-535L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEFINING ISOMETRIC HUMANIZED DOSING STRATEGIES OF CEFEPIME

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**Purpose:** The purpose of this project is to develop a novel dose exposure methodology that produces isometric humanized pharmacokinetic profiles of cefepime in rats without inducing physiologic alterations (e.g., urinary nitrite or invasive surgical techniques) commonly utilized in animal research. This will be accomplished by use of a continuous infusion pump to correct for faster drug removal that will more closely mimic maximum drug concentrations in humans. Ultimately, this method will allow for construction of more translatable animal models that can be applied to discern maximally effective cefepime exposures between species. **Methods:** Cefepime clearance in rats will mimic human clearance via use of a continuous infusion pump to replace the cleared amount of drug. Infusion rates will be calculated using the equation  $CL(\text{man}) = \text{Infusion Rate} - CL(\text{rat})$ ; clearance values will be obtained using median values from man and rat population data. Blood samples from each rat will be drawn at indicated times relative to cefepime doses and concentrations will be quantified using an HPLC assay developed and validated by our research group for cefepime in rat plasma. Cefepime clearance in rats will then be calculated using a two compartment flow model to fit the rat PK data using a nonparametric adaptive grid algorithm and Bayesian estimation techniques will be employed to determine the individualized PK parameters and exposure variables of interest for each animal under study ( $C_{\text{max}}$ , AUC,  $C_{\text{min}}$ , and  $T > \text{threshold}$ ). Results and conclusions will be presented at the 2016 Great Lakes Residency Conference.

### Learning Objectives:

Discuss clinical challenges associated with increasing cefepime use in the era of rising antimicrobial resistance.

Outline the benefits of using continuous infusions schemes to study the pharmacokinetic profile of cefepime in rats.

### Self Assessment Questions:

Which toxicity has been associated with cefepime?

- A: nephrotoxicity
- B: neurotoxicity
- C: peripheral neuropathy
- D: thrombocytopenia

Which of the following is true regarding the use of continuous infusion dosing schemes in rat research?

- A: Continuous infusions should be avoided as they are often imprecise
- B: Continuous infusions are not as accurate as current methods to simulate
- C: Continuous infusion more closely mimics human pharmacokinetics
- D: Continuous infusions are equally as accurate as implementation of

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-536L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF MOBILE MEDICATION REMINDER APPLICATIONS FOR MEDICATION ADHERENCE ON 30-DAY HOSPITAL READMISSION RATES

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**Purpose:** Approximately 33% to 69% of medication-related hospitalizations are a result of poor medication adherence and account for \$100 billion in annual health care costs. Although multifactorial, poor adherence is often unintentional and influenced by patient-specific characteristics such as forgetfulness or carelessness. Mobile technologies, such as smartphones, are a widely recognized and rapidly growing communication method, offering many features that can be designed to help patients and health care providers improve medication-taking behavior. Current literature indicates that the use of mobile technologies, such as reminder applications, can improve medication adherence, thus representing a novel approach to reducing medication-related hospitalizations. Therefore, the primary objective of this study is to determine the impact of a mobile medication reminder application for medication adherence on 30-day hospital readmission rates. **Methods:** This study was conducted in Fairview Hospital, a Cleveland Clinic hospital, from November 2015 through January 2016. A retrospective chart review was completed to determine the top readmission diagnoses and serve as a historical control group. Eligible patients admitted with one of the identified diagnoses were provided the opportunity to download the medication reminder application, Medisafe, to their smartphone. All patients who successfully downloaded the application were contacted via phone after discharge to complete a patient experience survey, consisting of questions to assess medication adherence and overall satisfaction with the application. The primary outcome of interest was 30-day readmission rates of those patients who downloaded the application and completed the survey. The 30-day readmission rates of the study participants were compared to those of the historical control group. Secondary outcomes include descriptive results of the patient experience survey. **Results and Conclusions:** Data analysis is in progress. Results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify potential barriers to medication adherence and how mobile technologies may be used to improve patients medication adherence at home.

Explain how improved medication adherence by the use of a mobile reminder application may help to decrease hospital readmission rates.

### Self Assessment Questions:

Potential barriers to medication adherence include

- A: Forgetfulness
- B: Carelessness
- C: Complex medication regimens
- D: All of the above

Mobile medication reminder applications can be incorporated into pharmacy practice for the purpose of

- A: Providing patient education
- B: Reducing missed doses, improving medication adherence and therapy
- C: Determining the appropriate dose and duration of therapy
- D: Improving patient safety outcomes

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-822L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **PNEUMONIA READMISSION RISK FACTORS AND IMPLICATIONS IN A CMS POPULATION AT A COMMUNITY TEACHING HOSPITAL**

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**Purpose:** Pneumonia related hospital admissions continue to rise as these infections remain one of the leading causes of death in the United States. The National Observed Readmission Rate according to CMS for pneumonia readmission is 17.0%. At Saint Joseph Mercy Oakland, a 443 bed community hospital, the 30-day readmission rate expected on the basis of average hospital performance and hospital case mix is 19.7%. Studies have identified the need for additional research related to readmission including sociodemographic factors and comorbid risks. Our study looks to identify factors that may contribute to an increased risk of readmission related to the diagnosis of pneumonia. The goal of this study is to assess patients at increased risk of re-hospitalization that may benefit from implementation of a transitional care model. **Methods:** This study is an observational, retrospective, descriptive, single center design. The primary outcome is to identify risk factors for hospital readmission. The secondary outcomes include Core Measure compliance and pathogen isolation or identification. In this study, we utilized the data provided by CMS in the Hospital-Specific Report and a local hospital database to identify patients for inclusion and exclusion based on a diagnosis of pneumonia at discharge. CMS patients must have had a subsequent readmission within 30 days after discharge and were compared to a control group of patients who did not have a 30-day readmission between January and December, 2013.

**Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference at Purdue University, West Lafayette, IN.

### **Learning Objectives:**

Recognize the need for identification of social factors and comorbid conditions that may increase risk of hospital readmission related to pneumonia.

Translate those risks to admitted patients that may benefit from a focused implementation of a transition of care program to prevent readmission.

### **Self Assessment Questions:**

Sociodemographic risk factors to identify patients at increased risk of re-hospitalization include:

- A: Marital status
- B: Employment status
- C: Pathogen isolation
- D: A & b

Pneumonia related hospital admissions and readmissions continue to rise as a result of:

- A: Decreased antibiotic resistance
- B: An aging population
- C: Decreased prevalence of comorbidities
- D: Patients diagnosed with pneumonia rarely being hospitalized

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-823L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **IMPACT OF HYPOPHOSPHATEMIA IN MECHANICALLY VENTILATED PATIENTS WITH SEVERE SEPSIS AND SEPTIC SHOCK**

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**Purpose:** In mechanically ventilated patients, phosphate supplementation has been shown to increase diaphragmatic contractility by a mean of 70%. Other studies have shown hypophosphatemia to have a deleterious effect on outcomes in patients on mechanical ventilation, continuous renal replacement therapy, and intensive care unit (ICU) patients as a whole. However, these studies had varying definitions of hypophosphatemia and none focused solely on septic patients. The purpose of our study is to determine the impact of hypophosphatemia on clinical outcomes in mechanically ventilated ICU patients with sepsis. **Methods:** This is a single-center retrospective cohort study comparing mechanically ventilated patients with severe sepsis or septic shock with and without hypophosphatemia during ICU admission. Patients 18 to 89 years old admitted to an ICU between August 2013 and July 2015 will be included for evaluation. Exclusion criteria include admission to the burn service, past medical history of hyperparathyroidism or chronic kidney disease, admission from a different hospital, chronic tracheostomy, incarceration, and pregnancy.

The primary outcome measure is duration of mechanical ventilation. Secondary outcomes include all-cause 28-day mortality, time to tracheostomy, and ICU and hospital length of stay. Serum phosphate categorization will be determined by time-weighted serum phosphate based on all of the patients serum phosphates values while in the ICU. Hypophosphatemia is defined as a time-weighted serum phosphate of < 2.5 mg/dL. Linear regression analysis will be used to estimate adjusted mean duration of mechanical ventilation and hospital and ICU length of stay, as well as controlling for patient demographics and baseline characteristics. Logistic regression will be used to find the relationship between 28-day mortality and hypophosphatemia status.

**Results:** Data collection and analysis are currently being conducted. Final results and conclusions will be presented.

### **Learning Objectives:**

Describe the theorized deleterious effect hypophosphatemia has on patients that are mechanically ventilated

Explain the benefit of avoiding hypophosphatemia in mechanically ventilated patients with severe sepsis or septic shock

### **Self Assessment Questions:**

What is the principal proposed beneficial mechanism of avoiding hypophosphatemia in mechanically ventilated patients?

- A: Adequately supplying phosphate to white blood cells prevents ven
- B: Normal adenosine triphosphate production improves diaphragm
- C: Phosphate uptake into the CNS is integral to maintaining normal n
- D: Normal phosphate levels prevent clinically significant bleeding fro

To which of these patients could you most likely apply the results of this study?

- A: 55 y/o male being treated for an ST-elevated myocardial infarction
- B: 38 y/o female with alcohol withdrawal admitted to the floor for CIW
- C: 73 y/o female admitted to the medical ICU for mechanical ventilati
- D: 62 y/o male admitted for nausea, vomiting, and abdominal second

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-537L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PERIOPERATIVE AMIODARONE IN CARDIOVASCULAR SURGERY: PHARMACIST DOSING SERVICE

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**Purpose:** After cardiovascular surgery, post-operative atrial fibrillation occurs frequently leading to increased length of stay and hospital costs. A Cochrane review indicated that use of amiodarone in heart surgery reduced the incidence of post-operative atrial fibrillation or supraventricular tachycardia by 57%. Amiodarone can cause QT prolongation and has numerous drug-drug interactions and long term adverse effects. Based on these characteristics, pharmacist evaluation of appropriateness and dosing of amiodarone in the perioperative setting may be beneficial. **Methods:** A protocol for amiodarone evaluation and dosing by pharmacists will be created in collaboration with cardiovascular surgery and electrophysiology providers. Patients will be identified for inclusion in the protocol by cardiovascular surgeons and extenders at the time of consult for surgery. After provider consult, patients undergoing coronary artery bypass grafts and/or valvular surgery during their current inpatient stay will be evaluated by pharmacists based on the protocol established for dosing of perioperative amiodarone. If patient meets established criteria, weight-based dosing will be entered pre-operatively and ordered through transitions of care post-operatively. Documentation of meeting established criteria and counseling on short-term use of amiodarone will be provided by pharmacists. Post-operative atrial fibrillation incidence stay will be compared to a retrospective cohort at Aurora St. Lukes Medical Center. **Results/Conclusion:** Data collection and analysis are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss two benefits for reducing the incidence of post-operative atrial fibrillation after cardiovascular surgery

Identify two challenges with prescribing prophylactic amiodarone in the perioperative period for cardiovascular surgery

### Self Assessment Questions:

Developing post-operative atrial fibrillation after cardiovascular surgery can contribute to which of the following?

- A: Decreased hospital cost
- B: Increased bleeding after surgery
- C: Increased length of stay
- D: No adverse outcomes for developing post-operative atrial fibrillation

Which of the following is a barrier to prescribing amiodarone prophylactically in cardiovascular surgery patients?

- A: Drug-drug interactions and QT prolongation
- B: Required registration in REMS program
- C: Limited to inpatient use
- D: Cost

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-538L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CLINICAL OUTCOMES OF SWITCHING FROM TICAGRELOR TO CLOPIDOGREL IN ACUTE CORONARY SYNDROME AFTER PERCUTANEOUS CORONARY INTERVENTION AND CORONARY STENTING

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Although many institutions switch acute coronary syndrome patients from ticagrelor to clopidogrel, an optimal dosing strategy and its clinical implications are unknown. The purpose of this study is to determine composite endpoints for patients who are switched from ticagrelor to clopidogrel using an institution-specific protocol. In this single center, retrospective database review, patients who were switched from ticagrelor to clopidogrel and patients who were maintained on clopidogrel therapy were analyzed using the National Cardiovascular Data Registry CathPCI database from April 6th, 2012 to August 21st, 2015. The composite endpoint included in-hospital mortality, myocardial infarction, cerebrovascular accidents, and bleeding. Patients were excluded if they were not either initiated and continued on clopidogrel or initiated on ticagrelor therapy and switched to clopidogrel. The study population consisted of 3,815 patients. There was no difference in the primary composite endpoint (74 [2.09%] in the group maintained on clopidogrel versus 7 [2.49%] in the ticagrelor to clopidogrel group,  $p=0.6644$ ). When each endpoint was analyzed separately, there were no significant differences between the two groups for myocardial infarction ( $p=0.1906$ ), in-hospital mortality ( $p=0.9999$ ), cerebrovascular events ( $p=0.9999$ ), and bleeding events within 72 hours ( $p=0.7660$ ). There was no difference in clinical outcomes between clopidogrel-maintained patients and ticagrelor switched to clopidogrel patients utilizing an institution dosing strategy. This dosing strategy may be both efficacious and safe in percutaneous coronary intervention patients. These results provide rationale for future investigations involving various switching regimens in a larger patient sample size.

### Learning Objectives:

Recall current literature describing outcomes when switching between P2Y12 inhibitors

Define a potential dosing strategy when switching a patient from ticagrelor to clopidogrel therapy

### Self Assessment Questions:

Which of the following describes ticagrelors mechanism of action on the P2Y12 receptor?

- A: Competitive inhibition
- B: Uncompetitive inhibition
- C: Non-competitive inhibition
- D: Irreversible inhibition

According to the ONSET/OFFSET study, at what time does clopidogrel reach maximum platelet inhibition?

- A: 2 hours
- B: 8 hours
- C: 24 hours
- D: 72 hours

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-539L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CUSTOMIZED VERSUS STANDARDIZED COMMERCIAL PARENTERAL NUTRITION: A COMMUNITY HOSPITAL PERSPECTIVE

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**Purpose:** Limited data exist demonstrating improved safety outcomes, cost savings and improved workload with standardized commercial parenteral nutrition (PN). The primary outcome of this study is to determine the frequency of electrolyte abnormalities, specifically sodium, potassium, magnesium and phosphorus, in patients receiving customized PN compared to standardized commercial PN. Secondary outcomes include: frequency of nursing administration errors, duration of PN and a cost analysis comparing customized to standardized commercial PN. **Methods:** This study was approved by the Sullivan University International Review Board. This was a single-center, retrospective chart review of patients 18 years of age and older who received at least 72 hours of PN from July 2014 to July 2015. Seventeen subjects who received fully customized PN, 19 subjects who received standardized commercial PN with standardized electrolytes and 25 subjects who received standardized commercial PN with customized electrolytes were included in this study. When patients were switched from one PN formulation to a different PN formulation, only data points from days of administration of the original PN formulation were collected. Subjects were excluded if they received peripheral PN or were admitted on a home PN regimen. Data collected included days out of range for specified electrolytes, number of nursing administration errors and a cost analysis utilizing product acquisition cost and work-sampling method. **Results:** Preliminary results show a significant difference in hyponatremia in the standardized commercial PN with standardized electrolytes group compared to the standardized PN with customized electrolytes and fully customized PN (59.2% vs. 29.6% vs. 20.1%,  $p = 0.01$ ). Hyperphosphatemia and hypermagnesaemia were also statistically significant in the customized group (2.6% vs. 2% vs. 15.3%,  $p = 0.01$ ; 0% vs. 0% vs. 6.8%,  $p = 0.03$ ). The difference in nursing administration errors was not statistically significant. **Conclusions:** To be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize complications associated with PN

Identify appropriateness for initiation of parenteral nutrition

### Self Assessment Questions:

Which of the following is a metabolic complication associated with PN?

- A Bacteremia
- B: Refeeding syndrome
- C: Pneumothorax
- D: Fungemia

It is reasonable to initiate parenteral nutrition when inadequate oral intake is expected to last for \_\_\_ days.

- A 1
- B 3
- C 5
- D 7

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-540L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECTS OF INTRAVENOUS CHLOROTHIAZIDE OR ENTERAL METOLAZONE ON URINE OUTPUT WHEN ADDED TO INTRAVENOUS FUROSEMIDE MONOTHERAPY

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**Purpose:** Loop diuretics are first line agents for management of volume overload. Development of loop diuretic resistance is not uncommon and aside from suggested strategies supported by guidelines, specific recommendations to overcome this adverse response do not exist. Two retrospective cohort studies have explored the effects of intravenous chlorothiazide versus enteral metolazone as add-on therapy to loop diuretics in heart failure populations. However, many critically ill patients require diuretic polypharmacy to maintain appropriate fluid balance. The purpose of this research was to analyze the effects of intravenous chlorothiazide or enteral metolazone on urine output when added to intravenous furosemide monotherapy in a broader cohort of critically ill adults. **Methods:** A retrospective chart review was conducted on medical and cardiothoracic intensive care patients receiving intravenous furosemide monotherapy at baseline who also received at least one dose of either chlorothiazide or metolazone. The primary objective was to assess the change in urine output at 24 hours induced by the addition of either intravenous chlorothiazide or enteral metolazone compared to furosemide alone. Secondary objectives include length of stay (intensive care unit and hospital), need for renal replacement therapy, and survival to discharge. A total of 128 patients (64 patients from each intervention arm) would provide a power of 80% to detect a 500mL difference between groups. **Results:** To date, 120 patients (chlorothiazide: 60, metolazone: 60) were evaluated on interim analysis. Intravenous chlorothiazide induced a greater change in urine output at 24 hours compared to enteral metolazone (2491mL vs. 1837mL,  $p=0.022$ , respectively). However, furosemide doses pre and post intervention were not equal within both groups (chlorothiazide: 209mg vs. 293mg,  $p<0.01$ ; metolazone: 181mg vs. 311mg,  $p<0.01$ ).

**Conclusions:** Further statistical analysis is necessary before conclusions can be made. Data collection and statistical analysis is ongoing with final results to be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize disease states in which diuretic resistance is common and which patients may benefit from combination diuretic therapy.

Describe the pathophysiology behind the use of combination diuretic therapy with thiazides in patients experiencing diuretic resistance.

### Self Assessment Questions:

Diuretic resistance is commonly seen in which disease state?

- A Hypertension
- B: Heart failure
- C: Diabetes
- D: Copd

Which agent(s) are commonly used in combination diuretic therapy to overcome loop diuretic resistance?

- A Ethacrynic acid
- B Chlorothiazide
- C Metolazone
- D Both B and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-541L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PREFERENCES FOR PATIENT MEDICATION LIST STRUCTURE TO OPTIMIZE UTILIZATION

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Purpose To date, significant focus and importance has been placed on transitions of care and medication reconciliation, however little attention has been paid to understanding what constitutes the most useful medication list from either a providers or patients perspective. An accurate patient medication list is assumed to reduce medication errors and facilitate communication among patients, physicians and other healthcare professionals. Literature is lacking in regard to how medication lists are utilized and the optimal contents as no recommended standards exist for medication lists. The purpose of the study is to generate evidence to support the optimal content of a standardized medication list. Specific objectives include determining how physicians are currently utilizing medication lists generated from the electronic health record and to identify physicians desired content and formatting of an optimal medication list in order to assist in defining a standard. Methods This cross-sectional survey will explore current utilization of medication lists generated through the electronic health record. Randomly selected Illinois physicians will be invited to complete the survey via email with a link to an electronic survey (N=5000 invitations sent with estimated response rate of 24% for an estimated n=1200 completed surveys). Email addresses will be obtained via a third party vendor of the American Medical Association. Reminder emails will be sent to physicians approximately 7 days after initial distribution of the survey. If response to the survey is lower than anticipated (<14%), an alternative approach will be employed. Results Data collection has not yet begun, but is anticipated to be completed March - April 2016.

Conclusions Conclusions are pending results.

### Learning Objectives:

Identify barriers to medication list utilization for physicians and other healthcare professionals

Describe preliminary pilot data on understanding patient utilization of their medication list

### Self Assessment Questions:

Which of the following is a barrier for provider utilization of medication lists?

- A Lack of time to verify accuracy of the medications on the patient's
- B: Providers are confident patients will use the medication list to improve
- C: Understanding of what components should be included in a patient
- D: Patients often have an abundance of medication self-management

Which of the following statements is correct?

- A Pilot data to date shows not improvements are necessary for patient
- B Patient focus group data demonstrates areas for improvement include
- C An initial pharmacist survey demonstrated that pharmacist most patients
- D There is an abundance of literature assessing how patients and providers

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-938L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF TIME TO FIRST DOSE OF ORAL MORPHINE IN THE TREATMENT OF NEONATAL ABSTINENCE SYNDROME (NAS)

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Purpose: The purpose of this study was to compare the time to first dose of oral morphine used in the treatment of NAS in a neonatal intensive care unit (NICU) versus a special care nursery (SCN) setting within the same hospital system. Methods: A retrospective chart review was conducted at two community hospitals within Community Health Network in Indianapolis, Indiana. Infants born between January 1, 2013 and August 31, 2015 who received at least one dose of oral morphine were included in the study. Infants were excluded if they received oral morphine for an indication other than NAS, the first dose was not administered during the initial delivery admission, or the infant was born with major congenital anomalies. The primary objective was to compare the time to first dose of oral morphine for the treatment of NAS in a NICU versus SCN setting. The secondary objectives were to evaluate the influence of other factors that may affect the initiation of morphine and to determine the effects of initiation timing on treatment outcomes. Secondary outcomes include maternal and fetal drug screen results, substances used during pregnancy and reason for their use, maternal history of substance abuse or dependence, maternal psychotropic drug use, maternal history of smoking, time to first Finnegan score and peak score, Finnegan score prior to first dose, overall peak Finnegan score, time to transfer to the NICU or SCN, starting dose of morphine, maximum dose, cumulative dose, duration of treatment, length of stay, need for an additional agent, receipt of breast milk, and incidence of seizures, feeding difficulties, and respiratory difficulties. Results and Conclusions: Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the pathophysiology, signs and symptoms, and treatment of neonatal abstinence syndrome.

Identify factors that put neonates at higher risk for NAS.

### Self Assessment Questions:

At what point is pharmacotherapy indicated in the treatment of NAS?

- A Duration of symptoms greater than 3 days
- B: Two Finnegan scores greater than 8 or a single score greater than
- C: When the infant starts showing any signs or symptoms of withdrawal
- D: Within 24 hours of birth if mother's daily opiate dose is greater than

Which of the following factors can put infants at a higher risk of neonatal abstinence syndrome?

- A Avoidance of other psychotropic medications in the third trimester
- B Pharmacotherapy management of substance abuse disorders
- C Short-term use of opiates during pregnancy for acute pain management
- D Smoking cessation prior to conception

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-542L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF CLINICAL PHARMACIST SERVICES WITHIN A HEART FAILURE CLINIC

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**Purpose:** To determine if the implementation of clinical pharmacist services in a heart failure (HF) clinic will help improve outcomes for HF patients. **Methods:** Currently at NorthShore University HealthSystem, HF patients are seen in an ambulatory care-based HF clinic to follow up with their NorthShore cardiologist on a regular basis. During these clinic visits, cardiologists and nurse practitioners perform diagnostic cardiac tests, evaluate patients, make adjustments to patients medication regimens, and provide basic patient education on HF management and HF medications. However, physicians have limited time to spend with patients and do not have the same background in medication management and patient counseling that clinical pharmacists have. Therefore, it is hypothesized that the implementation of clinical pharmacist services in a HF clinic will help improve patient outcomes by enhancing the medication management and education of HF patients. To accomplish this, the HF clinic pharmacist will see patients independently for medication reconciliation, disease state and medication education, and HF medication titrations for patients with HF with reduced ejection fraction (HFrEF). HF medications will be titrated every two to four weeks via titration protocol and collaborative practice agreement, and patients will be monitored by the clinic pharmacist through in-person clinic visits and phone follow-up. The clinic pharmacist will also be responsible for collecting patients vitals, ordering and interpreting labs, and documenting any patient encounters in the electronic medical record. To evaluate and quantify the impact of the HF clinic pharmacist interventions, the following metrics will be used: 30-day HF-related hospital readmissions, HF clinic pharmacist patient capture rate, and number of patients on all guideline-recommended HF medications before and after pharmacist intervention. **Results/Conclusion:** Data collection and analysis are currently underway. The results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the guideline recommended target doses of medications recommended for patients with HFrEF.

Memorize the medications that have been shown to reduce morbidity and mortality in patients with HFrEF.

### Self Assessment Questions:

According to the 2013 ACCF/AHA Heart Failure Guidelines, what is the target dose of metoprolol succinate for patients with HF?

- A 50 mg daily
- B: 100 mg daily
- C: 150 mg daily
- D: 200 mg daily

Which of the following medication classes has been shown to reduce morbidity and mortality in patients with HFrEF?

- A Loop diuretics
- B ACE inhibitors
- C Digoxin
- D Thiazide diuretics

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-543L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PREOPERATIVE ANEMIA AND TRANSFUSION REQUIREMENTS IN ADULT LIVER TRANSPLANT RECIPIENTS

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**Background:** Liver transplantation (LT) is often associated with massive blood loss due to surgical complexity and the hemostatic abnormalities of end-stage liver disease. Blood transfusions have been associated with increased risk of infection, multi-organ dysfunction, graft loss, and mortality. **Objective:** We sought to determine whether a correlation exists between preoperative anemia and transfusion requirements, length of stay (LOS), and incidence of postoperative infection in LT. **Methods:** A retrospective review of LTs between 1/1/12 and 6/30/15 was conducted. Packed red blood cell (PRBC), fresh frozen plasma (FFP), platelet, and cryoprecipitate units were collected preoperatively, intraoperatively, and in the first 48 hours postoperatively. Cox Proportional Hazard model was used to model the outcome of infection. Linear regression was used to model the outcomes of postoperative LOS and blood use. **Results:** Of the 112 patients, mean age was 56 years, mean Model for End-stage Liver Disease score was 27, and mean preoperative hemoglobin was 10.5 g/dL. Lower preoperative hemoglobin was significantly associated with increased preoperative PRBC, platelet, and cryoprecipitate use ( $p < 0.04$ ) as well as increased intraoperative PRBC, FFP, platelet, and cryoprecipitate use ( $p < 0.0001$ ). Preoperative PRBC, FFP, and platelets and intraoperative PRBCs were associated with longer LOS ( $p < 0.045$ ). Each g/dL decrease in preoperative hemoglobin was associated with a 26% increased risk of infection in univariate models ( $HR = 1.26$ ,  $p = 0.01$ ). Longer LOS and higher preoperative cryoprecipitate, intraoperative FFP, and postoperative FFP were also associated with increased risk of infection. More units of preoperative cryoprecipitate ( $HR = 1.07$ ,  $p < 0.01$ ), fewer units of postoperative cryoprecipitate ( $HR = 0.19$ ,  $p < 0.01$ ), and more units of postoperative FFP ( $HR = 1.75$ ,  $p < 0.01$ ) were associated with infection in multivariable stepwise selection. **Conclusion:** Lower preoperative hemoglobin was associated with increased preoperative and intraoperative transfusion requirements as well as increased postoperative infection. More preoperative cryoprecipitate units, fewer postoperative cryoprecipitate units, and more FFP units were independent predictors of infection.

### Learning Objectives:

Recognize risks associated with blood transfusion.

Identify risk factors for increased transfusion requirement in orthotopic liver transplant recipients.

### Self Assessment Questions:

Which of the following is not a risk associated with blood transfusion?

- A Infection
- B: End-stage renal disease
- C: Increased length of stay
- D: Decreased cost

Which of the following was found to be associated with significantly increased incidence of postoperative infection?

- A End-stage renal disease
- B Preoperative anemia
- C Age > 65 years
- D Female gender

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-824L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**EVALUATION OF A VENOUS THROMBOEMBOLISM (VTE) TRANSITIONS OF CARE PROCESS INVOLVING THE DIRECT ORAL ANTICOAGULANTS (DOACS) IN THE EMERGENCY DEPARTMENT AND OBSERVATION UNIT: EVACUATE**

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**Purpose:** The cost of care and length of stay rendered by hospitalizations for the treatment of acute VTE continues to contribute to the economic burden on our health care system. The standard of care for acute VTE has historically been an oral vitamin K antagonist with low molecular weight heparin bridging. Discharge on DOAC therapy from the site of diagnosis, which is often the emergency department or observation unit, can decrease hospital length of stay and reduce health care costs. A transitions of care process has been implemented at a large academic institution to ensure safe transition to the outpatient setting for this patient population. Pharmacists have the opportunity to provide dosing recommendations, patient education, and care coordination during this process to ensure safe and efficacious therapy.

**Methods:** This study is a retrospective review of a transitions of care process implemented in the emergency department and observation unit for patients presenting with acute VTE being discharged directly to the outpatient setting on DOACs. The implementation of this transitions of care process will be described. Patients presenting with acute VTE during the study period will be identified, and the characteristics of the patients discharged directly to the outpatient setting on DOACs will be compared to those patients proceeding to inpatient admission. Patient baseline demographics, diagnosis, VTE treatment agent(s), and details regarding post-discharge follow-up will be collected. The impact of this process on length of stay and cost of care versus inpatient admission will be assessed. Descriptive statistics will be used to describe findings. **Results/Conclusions:** To be presented at the Great Lakes Pharmacy Residency Conference

**Learning Objectives:**

Describe the process for transitioning patients admitted to the emergency department or observation unit with acute venous thromboembolism directly to the outpatient setting on direct oral anticoagulants.

Describe patient characteristics, length of stay, and cost of care of patients presenting with acute VTE who are discharged directly to the outpatient setting on direct oral anticoagulants.

**Self Assessment Questions:**

What is the goal of implementing a transitions of care process for directly discharging patients with acute VTE to the outpatient setting on DOACs?

- A: Increase hospital length of stay
- B: Decrease unnecessary hospitalizations
- C: Reduce bleeding risk in the hospital
- D: Reduce mortality risk in the hospital

Which patient population is most appropriate for direct discharge on DOAC to the outpatient setting?

- A: Patients with pulmonary embolism
- B: Patients who have failed previous DOAC therapy
- C: Patients with DVT who are hemodynamically stable
- D: Patients with a history of medication non-adherence

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-544L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**EXACERBATION RATES OF VETERANS DIAGNOSED WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) IN THE PRIMARY CARE SETTING**

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**Purpose:** The primary objective of the study was to assess and evaluate exacerbation rates of veterans diagnosed with COPD in primary care at the Indianapolis VAMC, which was evaluated through emergency department visits. Secondary objectives included evaluating smoking cessation, PFTs, CAT/mMRC documentation, GOLD Classification, initial COPD regimen, therapy appropriateness, and medication possession ratio. The ultimate goal of this research was to assess prescribing patterns of physicians in primary care at the Indianapolis VAMC with the future intent of incorporating pharmacist scope of practice for COPD. **Methods:** This quality improvement initiative was exempt from IRB approval. A retrospective cohort design was used to meet study objectives. Patients at the Indianapolis VAMC who were diagnosed with COPD from January 1, 2013 through December 31, 2014 were studied for one year from time of diagnosis. International Classification of Diseases (ICD-9) diagnosis codes were used to identify eligible Veterans. Additional information was collected including age, sex, race, refill history, and exacerbations. Data was collected from the VA electronic health record. Exclusion criteria included the following: Veterans with concomitant asthma, managed by a pulmonologist, seen at outside community-based outpatient clinics (CBOCs), Veterans who stopped being seen before the study time was over or those who died before the study time was over, and co-managed Veterans seen by VA and outside providers. Descriptive statistical analyses were used to evaluate the data collected. **Results:** Final results to be presented at Great Lakes Residency Conference **Conclusions:** Pharmacists can play a crucial role in COPD management in the primary care setting. Providers often offered smoking cessation and documented treatment regimens for Veterans, but did not always order a rescue inhaler or PFT tests. Final conclusions and statistics to be presented at Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Discuss prescribing patterns of primary care providers at the Indianapolis VAMC.

Identify how pharmacists can help manage COPD in a primary care setting.

**Self Assessment Questions:**

What was the most frequent long-acting inhaler prescribed in primary care at the Indianapolis VAMC?

- A: Budesonide/formoterol
- B: Tiotropium
- C: Mometasone
- D: Formoterol

2. If scope of practice for pharmacist COPD management is implemented in a primary care clinic, what metrics would be impacted?

- A: Inhaler technique counseling
- B: Smoking cessation management
- C: Medication refill assessment
- D: All of the above

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-545L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPROVING INHALER PATIENT EDUCATIONAL TOOLS TO ADDRESS HEALTH LITERACY NEEDS IN AN UNDERSERVED POPULATION

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**Purpose:** Improper inhaler technique is associated with an increase in acute exacerbations and hospitalizations in patients with asthma and chronic obstructive pulmonary disease (COPD). A recent evaluation at Mount Sinai Hospital demonstrated that patients unable to learn adequate inhaler technique were twice as likely to be readmitted for an exacerbation within six months post-inhaler education. One factor contributing to patients ability to adequately retain inhaler technique is health literacy. Levels of health literacy vary among patients and can significantly impact disease trajectory. Although handouts are not substitutes for direct patient instruction, they are a useful supplement that can reinforce important concepts and empower patients to become better custodians of their own health. The objective of this study is to evaluate inhaler technique scores pre- and post-implementation of new educational tools. **Methods:** This is a single center quality improvement project. Educational tools were revised to increase ease of readability and distributed to patients receiving inhaler education. A script was developed to highlight key communication and educational points; this will be utilized by pharmacy students going forward to ensure standardization of future inhaler teaching sessions. Inhaler education was provided to patients admitted to general medicine floors and using MDIs or the tiotropium handihaler. The teach-to-goal method was utilized and patients not achieving a score of 75% or greater were retested after 24-72 hours. Inhaler technique scores will be compared to previously documented scores prior to implementation of new education strategy. **Results and conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe patient characteristics that can influence a patients ability to adequately learn inhaler technique

Discuss importance of proper inhaler technique

### Self Assessment Questions:

Which of the following characteristics influence a patients ability to adequately learn inhaler technique?

- A age
- B: vision
- C: arthritis
- D: All of the above can influence a patient's ability to adequately learn

Which of the following statements is true?

- A COPD and asthma are associated with 100,000 hospitalizations a
- B Estimated 25% of patients incorrectly use their inhalers
- C C.U.S. Centers for Medicare and Medicaid Services expanded its
- D Inhaler technique should only be assessed and corrected at initial

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-546L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## HIV GENOTYPIC MUTATION CHARACTERIZATION IN KENTUCKY

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In 2012, the number of individuals living with HIV in the Southern United States was five times higher compared to the rest of the nation. We sought to determine whether Kentucky patients genotypic resistance patterns were associated with Kentuckys increasing incidence of HIV/AIDS. Our objective was to characterize therapeutic drug resistance (TDR) of newly diagnosed individuals between 2004 and 2014, and determine the yearly incidence of antiretroviral class (ARV) resistance for the protease (PI), non-nucleoside reverse transcriptase (NNRTI), and nucleos(t)ide reverse transcriptase (NRTI) inhibitors. This is the first study to characterize HIV in Kentucky. Data was retrieved for newly HIV diagnosed patients from January 1, 2004 to December 31, 2014 from the University of Kentucky HealthCare database. Data collected included age, race/ethnicity, mode of exposure, date of HIV diagnosis and genotyping, and TDRs. Patients with an initial genotyping completed within six months of HIV diagnosis were included. The percent of patients with baseline mutations was calculated per year for each ARV class and analyzed using a linear regression. Overall, 988 individuals were included with 35% having genotypes performed, resulting in 356 TDRs. Demographics included a median age of 40 years old, 35% non-white, 93% sexually transmitted, and 30% diagnosed with AIDS within six months of HIV diagnosis. The percentage of patients with NNRTI mutations increased from 14% to 31% over the ten-year period ( $p=0.35$ ). Significant trends were not identified for either NRTI ( $p=0.57$ ) or PI ( $p=0.61$ ) classes. Although reports have indicated an increasing incidence of HIV/AIDS in Kentucky, the incidence of patients with baseline mutations did not increase significantly over the ten-year period. This suggests that drug resistance is not associated with the increasing incidence. More research is required to determine whether social factors are linked to the increasing incidence, such as health education, medication adherence, or modes of transmission.

### Learning Objectives:

Describe the incidence of HIV genotypic mutations in Kentucky

Discuss reasons for having a baseline NNRTI, NRTI, and PI mutation in newly diagnosed individuals

### Self Assessment Questions:

Which medication class was found to have no association with the increasing incidence of HIV in Kentucky?

- A Nucleos(t)ide reverse transcriptase inhibitor
- B: Integrase inhibitor
- C: Fusion protein inhibitor
- D: C-C chemokine receptor type 5 antagonist

Which of the following is a potential reason for an individual to have a wild type HIV strain when initially genotyped?

- A Homozygous C-C chemokine receptor type 5-delta 32 mutation
- B Medication adherence to treatment therapy in the newly diagnosee
- C Genotype Reversion
- D Used HIV pre-exposure prophylaxis

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-547L02-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION AND EVALUATION OF A PHARMACIST-MANAGED TRANSITIONS OF CARE SERVICE WITHIN A VETERANS AFFAIRS HEALTHCARE SYSTEM

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**Purpose** In the United States, nearly one in five hospital discharges results in a readmission, which frequently reflects the quality of care provided throughout patients transitions of care. Pharmacists fulfill a unique role within transitions of care that promotes positive health outcomes by: ensuring medication regimens are appropriate, effective, and safe; empowering patients with education to become their own best health advocates and remain healthy in the community; and improving patient safety by decreasing risk factors associated with medication errors. The goal of this pharmacist-managed transition of care service within an outpatient, primary care setting is to make proactive changes to improve patient care post-discharge, prevent over-utilization of our healthcare system, and promote healthier long-term outcomes. **Methods** This is a prospective project to design, implement, and evaluate a pharmacist-managed transitions of care service integrated into the current workflow of an interdisciplinary primary care team at the VA Ann Arbor Healthcare System. The design phase included: evaluating clinic utilization; identifying the high risk target population, inclusion and exclusion criteria; and creating electronic documentation tools. The implementation phase has included disseminating communication to team members; patient recruitment; and documentation. Nurse care managers make routine post-discharge phone calls, refer, and schedule patients who meet inclusion criteria to participate in the service in real time. The pharmacist completes a comprehensive appointment focusing on: reconciling medications; mitigating adherence barriers; educating and ensuring patient understanding; and confirming follow up care. The primary endpoint is 30-day readmission or emergency department utilization. The secondary endpoints include the number and type of pharmacist interventions and patient satisfaction throughout the transitional process. Data is continuously collected and evaluated upon patient enrollment.

**Results** The pharmacist-managed transitions of care service was successfully implemented on November 10, 2016: evaluation and results are pending further patient enrollment. **Conclusions** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the components of developing of a pharmacist-managed transitions of care service.

Describe the risk factors associated with transitions of care and the role of a primary care pharmacist in mitigating risk, resolving barriers, and ensuring successful patient transitions of care.

### Self Assessment Questions:

Which of the following actions must be taken in order to achieve successful implementation of a new clinical service?

- A Identify the need for the service and create an action plan
- B: Create the necessary documentation templates and identify the ta
- C: Identify the need for the service and gain the support of key stake
- D: Create a scope of practice agreement and a budget plan

Which of the following are risk factors associated with a patients transition of care?

- A Involvement of more than one care team and medication reconcili
- B Multiple medication changes and inadequate medication reconcili
- C Prescribing of high risk medications and a post-discharge follow up
- D Inadequate discharge counseling and a closed-system healthcare

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-825L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE CHART REVIEW OF THE EFFECT OF AMANTADINE ON COGNITIVE OUTCOMES IN THE ACUTE TREATMENT OF TRAUMATIC BRAIN INJURY PATIENTS

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**Purpose:** Traumatic brain injury is a devastating cause of death and disability in young individuals. Amantadine is commonly prescribed in these patients to promote functional recovery. It is hypothesized that the drug exerts its effects through N-methyl-D-aspartate receptor antagonism and indirect dopamine agonist. Recently published literature suggests that the use of amantadine between four and sixteen weeks after traumatic brain injury improves the rate of cognitive improvement. The purpose of this study is to determine if traumatic brain injury patients treated with amantadine in an acute setting experience accelerated cognitive recovery. **Methods:** This is a retrospective chart analysis of patients with traumatic brain injury who were treated with amantadine in the acute setting at a single institution from January 1, 2012 and August 31, 2015. Patient will be retrieved via electronic search of our institutions computerized medical records. Data collection began December 2015 following approval by the Institutional Review Board. Data collected include: patient age, gender, ethnicity; cause of traumatic brain injury; time from injury to treatment; amantadine dose and duration; reason for therapy discontinuation; Glasgow coma scores; ability to follow commands; time to extubation; Ranchos Los Amigos Scores at initiation of therapy, during therapy, and discharge; discharge disposition; level of function prior to injury; and level of function at discharge. Descriptive analysis expressed as mean standard deviation will be used to characterize the study population and groups with cognitive improvement and no improvement. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

State the hypothesized mechanism of action of amantadine on neurologic recovery following traumatic brain injury.

Describe the effect of amantadine on neurologic recovery following traumatic brain injury, as evidenced by currently available literature.

### Self Assessment Questions:

What is the hypothesized mechanism of action of amantadine for neurologic recovery following traumatic brain injury?

- A Increases dopaminergic action in the brain by increasing dopamin
- B: GABA analogue that acts as GABA-B agonist
- C: Inhibits influenza A virus replication, assembly, and release of nuc
- D: Enhances inhibitory activity of GABA via allosteric modification of

According to currently available literature reviewed in this presentation, what effect does amantadine have on neurologic outcomes following traumatic brain injury?

- A Definitely found to slow neurologic recovery
- B Studies are lacking and effect on neurologic recovery remains larg
- C May improve the rate and/or magnitude of neurologic recovery, bu
- D Definitely found to improve rate and magnitude of neurologic rec

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-548L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE HAM TRIAL: RETROSPECTIVE STUDY ON HOME HEALTH ANTIBIOTICS MONITORING AND INFECTION RESOLUTION AT THE HUNTINGTON VETERANS AFFAIRS MEDICAL CENTER

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**Scientific or Scholarly Rationale:** According to the National Association for Home Care and Hospice, in 2008, approximately 12 million individuals were currently receiving home care. Approximately 0.6% of these patients were diagnosed with infectious and parasitic diseases, 1.9% with pneumonia, and 6.2% with skin and soft tissue diseases.<sup>1</sup> These patients with infectious disease origins are often treated with long term antibiotic therapy but data regarding outcomes of treatment are limited. They are frequently followed by healthcare professionals such as pharmacists to monitor lab values and medication serum levels. The purpose of this project is to determine the rate of antibiotic tolerability and medication adverse effects as well as ensuring appropriate adherence to national Outpatient Parenteral Antibiotic Therapy (OPAT) guidelines. **Methods:** This retrospective study will compare lab values (such as complete blood count with differential (CBC), serum creatinine (SCr), blood urea nitrogen (BUN), potassium, liver function tests (LFTs), creatinine phosphokinase (CPK), antibiotic medications (dosages, number of antibiotic switches, and drug monitoring levels). Baseline lab values will be defined as the last set of labs collected prior to discharge. Demographic data collected will include age, gender, condition treated, and type and duration of antibiotic utilized. Data will be collected from July 1, 2009 to July 1, 2014 in patients who were treated for greater than 2 weeks of antibiotic therapy monitored by clinical pharmacy specialists at the Huntington VA Medical Center. These comparisons will be used to determine rate of long term antibiotic tolerability and medication adverse effects as well as ensuring appropriate adherence to OPAT guidelines in order to better educate patients and staff. **Results:** Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss suggestions for laboratory monitoring parameters that should be monitored during outpatient parenteral antimicrobial therapy

Describe common adverse events that result in discontinuation of initial antimicrobial therapy

### Self Assessment Questions:

What are adverse reactions should be monitored when initiating Daptomycin in outpatient antibiotic therapy?

- A Vomiting, Diarrhea
- B: Rhabdomyolysis
- C: Allergic reaction
- D: All of the above

According to the 2004 Practice Guidelines for OPAT, what parameters should be monitored with Ceftriaxone?

- A CBC with differential, SCr/BUN, Potassium
- B CBC with differential, SCr/BUN
- C CBC with differential, Potassium
- D CBC with differential, SCr/BUN, Magnesium

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-549L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACIST DISCHARGE PRESCRIPTION DELIVERY AND MEDICATION COUNSELING ON 30-DAY HOSPITAL READMISSION RATE

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**Purpose:** In 2012, the Affordable Care Act established the Hospital Readmissions Reduction Program which requires Centers for Medicare and Medicaid Services (CMS) to reduce payments to hospitals if all-cause 30-day readmissions are higher than the national average, which is currently 15.2% as of December 2015. Data suggests several interventions can impact hospital readmissions, such as medication reconciliation and transitions of care programs. The purpose of this study is to assess the impact of pharmacist-delivered discharge prescriptions and medication counseling on 30-day hospital readmission rate. **Methods:** The primary outcome is percentage of 30-day all-cause hospital readmissions for patients receiving medication delivery and discharge counseling by a pharmacist. The secondary outcome is percentage of 30-day all-cause hospital readmissions for patients receiving medication delivery and discharge counseling by a nurse. Additionally, subgroup analyses on readmission rate include number of discharge prescriptions, number of comorbid conditions, and utilization of a charity care medication program. Discharge prescriptions are filled by an outpatient community pharmacy attached to the hospital. A pharmacist delivers patients discharge prescriptions to the patients hospital room and provides counseling if patients are > 18 years old and can be counseled between 8AM-3:30PM. Patients are excluded if a patient declines counseling, a pharmacist is unable to complete a counseling checklist, or the patient is a nursing home resident.

**Preliminary Results:** Currently, seven patients have received medication delivery and counseling by a pharmacist. Of the three patients that are past 30-days post-discharge, zero percent have been readmitted. Eight patients have received medication delivery and counseling by a nurse. On average, patients received four discharge prescriptions and had four comorbid conditions. All patients utilized charity care. **Conclusions:** While data collection is ongoing, early data suggests pharmacist medication delivery and counseling can have an impact on hospital readmission rate.

### Learning Objectives:

Recognize the national average for 30-day all-cause hospital readmission rate and the significance of reducing readmissions

Identify pertinent points to include in a discharge medication counseling checklist

### Self Assessment Questions:

What is the national average for 30-day all-cause hospital readmissions in the United States as of December 2015?

- A 14.6%
- B: 15.2%
- C: 16.4%
- D: 17.8%

Which of the following are important points to include in a medication counseling checklist?

- A Missed dose instructions
- B Administration instructions
- C Medication cost
- D A and B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-826L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A PHARMACIST INTO A COMPREHENSIVE STROKE CLINIC

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**Purpose:** Literature shows that preventative medications play a role in secondary prevention of stroke, and utilizing pharmacists expertise on medications to identify, prevent, and resolve drug-related problems is optimal. Currently, at our practice site, a role for a pharmacist in the stroke clinic had not yet been established. The purpose of this project was to integrate pharmacists into an ambulatory stroke clinic to evaluate the role and assess the potential for optimization of patients drug therapy. **Methods:** The pharmacists saw patients in the stroke clinic after they were discharged from Aurora St. Lukes Medical Center with a stroke diagnosis. Patients were evaluated for medication compliance, current medication therapy, and possible interventions. Pharmacists utilized a template which focused on potential areas for recommendations such as current home medication list, medication allergies, medication compliance, current statin therapy, missing preventative medication, drug-interactions, medication timing, and current blood pressure. Interventions were tracked and categorized. **Results/Conclusions:** Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the potential role of pharmacists in an ambulatory stroke clinic  
Identify barriers to implementing a new pharmacy service in a clinic setting

### Self Assessment Questions:

Which of the following areas are included on the pharmacists template when talking with patients in the stroke clinic?

- A: Statin therapy
- B: Drug-drug interactions
- C: Medication compliance
- D: All of the above

Which of the following are barriers to implementing a new pharmacy service in a clinic setting?

- A: Manual data collection
- B: Availability of pharmacists to staff in clinic
- C: Limited amount of patients captured
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-827L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION AND EVALUATION OF AN ANTIEMETIC ALGORITHM FOR THE TREATMENT OF CHEMOTHERAPY-INDUCED BREAKTHROUGH NAUSEA AND VOMITING

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**Purpose:** The prescribing of antiemetics in the setting of chemotherapy-induced breakthrough nausea and vomiting is not standardized and is often at the discretion and professional judgment of the provider. Patients receiving chemotherapy continually rate nausea and vomiting as one of their main concerns prior to beginning treatment. Our project provided a standardized treatment algorithm for antiemetics to be used in the setting of chemotherapy-induced breakthrough nausea and vomiting for patients admitted to our institutions oncology units in an attempt to improve symptom control. **Methods:** The study was a single-center prospective cohort pilot study. Before and after the algorithm was implemented, the number of antiemetics used during each patients stay, the number of vomiting episodes the patient experienced and/or the presence or absence of nausea, and the patient length of stay, along with demographic information were collected and compared. The algorithm was developed using national guideline recommendations; our institutions current antiemetic algorithm for use in patients receiving bone marrow transplants; and an understanding of neurotransmitter activity, timing, and mechanism of chemotherapy-induced nausea and vomiting. Education was provided to medical oncologists, their physicians assistants and nurse practitioners, oncology pharmacists, and oncology nurses about the responsibilities of each discipline. During the pilot study, antiemetics from the standardized algorithm were ordered for every patient admitted to the oncology units who anticipated chemotherapy administration during their inpatient stay. If antiemetics were not ordered from the algorithm, a reason was documented in the medical record. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify current management strategies for chemotherapy-induced breakthrough nausea and vomiting and potential methods to standardize antiemetic ordering and administration in this setting.

Describe the benefits and drawbacks of a standard antiemetic order set for the treatment of chemotherapy-induced breakthrough nausea and vomiting.

### Self Assessment Questions:

Which of the following strategies do the National Comprehensive Cancer Network (NCCN) guidelines for antiemesis recommend for breakthrough treatment for chemotherapy-induced nausea/vomiting?

- A: Utilize a combination of antiemetics on a scheduled/around the clock
- B: Increase the doses of the oral antiemetics in the patient's current regimen
- C: Administer serotonin receptor-3 antagonists as first line agents during breakthrough
- D: Add at least two antiemetics from the same drug class to the patient's regimen

A drawback of an algorithm for antiemetics in this setting includes

- A: Expediting patient care by reducing calls to prescribers for order clarification
- B: Following evidence-based care
- C: Reducing medication errors
- D: Only standardized antiemetic doses can be ordered

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-828L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**PREVALENCE OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS NASAL CARRIAGE AMONG LONG-TERM CARE FACILITY RESIDENTS DIRECTLY ADMITTED TO THE INTENSIVE CARE UNIT AT AN URBAN, NON-TEACHING COMMUNITY HOSPITAL**

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**Purpose:** Methicillin-resistant Staphylococcus aureus (MRSA) carriage is a strong predictor of subsequent nosocomial MRSA infection, particularly for patients admitted to the intensive care unit (ICU). Long-term care facility (LTCF) residents have high rates of MRSA colonization; however, the prevalence of MRSA nasal carriage among LTCF admitted to urban, non-teaching hospitals is unknown. The objectives of this study are i) to determine the prevalence of MRSA nasal carriage among LTCF patients directly admitted to the ICU at an urban, non-teaching hospital and ii) to identify predictors of MRSA nasal carriage and the incidence of new MRSA infection in this population.

**Methods:** This is a single-center, retrospective, observational study looking at all patients admitted to Wheaton Franciscan Healthcare-St. Francis Hospital ICU from surrounding LTCFs between January 1, 2010 and July 31, 2015. The following patient-level characteristics will be collected: age, gender, co-morbid medical conditions, history of MRSA, type of LTCF from which the patients was admitted, initial MRSA nasal PCR results upon admission to the ICU, primary admission diagnosis, presence of open wound or ulcers, ulcer location, previous admission(s) within one year prior to admission, and antibiotic use within the last 30 days - including which antibiotics if known. If the primary admission diagnosis was infection-related then the type(s) of infection will also be documented. Severity of co-morbid conditions and severity of illness will be collected as well. Finally, development of a MRSA infection after hospital admission and the site(s) of MRSA infection will be recorded as will each patient's discharge disposition. Descriptive statistics will be used to quantify the prevalence of nasal MRSA carriage and incidence of new MRSA infection. Univariable and multivariable regression analyses will be used to determine potential predictors of nasal MRSA carriage in this population. **Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Recognize predictors of MRSA nasal carriage and the incidence of new MRSA infection in this population.

Define the prevalence of MRSA nasal carriage among LTCF patients directly admitted to the ICU at an urban, non-teaching hospital.

**Self Assessment Questions:**

What factors are thought to increase risk of MRSA infections?

- A: Antibiotic use within the last 30 days
- B: Extended length of stay in a hospital or long term care facility
- C: Previous admission to a hospital or long term care facility within the last 30 days
- D: All of the above

What is the most common way of screening for MRSA at admission?

- A: Blood culture
- B: Nasal swab
- C: Axilla swab
- D: Sputum culture

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-550L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**COST EFFECTIVENESS OF NOVEL NASAL NEBULIZER-DELIVERED MEDICATION AS AN ALTERNATE TO SURGERY FOR THE TREATMENT OF NASAL POLYPS - A PILOT STUDY**

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**Purpose:** The purpose of this pilot study is to do a preliminary analysis on the cost effectiveness of treating nasal polyp surgery candidates with topical medications via a novel nasal nebulizer as an alternate to surgery.

**Methods:** A literature review was performed to determine: cost of surgery, efficacy of surgery, incidence of revision and 2nd revision surgeries, cost of NasoNeb treatment, efficacy of topical corticosteroids in treatment of CRSwNP, and need for follow-up or maintenance treatment. To the authors' knowledge, no research has been done to examine the need, drug regimen, or cost associated with long-term use of NasoNeb to treat or cure nasal polyps. The investigators in this study established a business associate agreement and data use agreement with a local Ear, Nose and Throat (ENT) medical specialty office in order to perform a chart review. Under the terms of these agreements, a limited data set will be gathered to identify how patients and ENTs are using NasoNeb to manage nasal polyps. This project was submitted as IRB Exempt Category 4 and is awaiting approval from Purdue University's IRB. Upon IRB approval, the chart review will be conducted, limited data set created, and calculations will be made to determine the long-term cost of using NasoNeb to manage nasal polyps. The investigators will develop a cost-effectiveness analysis (CEA) model of surgery vs NasoNeb treatment, accounting for time, incremental cost-effectiveness quadrants, and other pertinent pharmacoeconomic principles.

**Learning Objectives:**

Discuss the NasoNeb device and its potential for treating chronic rhinosinusitis with nasal polyps

Outline the cost-effectiveness of medical management vs surgery in patients with CRSwNP

**Self Assessment Questions:**

The nasal cavity typically filters out particles larger than \_\_\_\_\_ to prevent them from entering the lungs.

- A: 1 micrometer
- B: 10 micrometers
- C: 50 micrometers
- D: 100 micrometers

This percentage of CRSwNP patients undergoing surgery will require revision surgery within 3 years

- A: 45%
- B: 20%
- C: 10%
- D: 5%

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-974L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EFFECT OF IMPLEMENTING A STRESS ULCER PROPHYLAXIS CLINICAL TOOL ON PRESCRIBING HABITS AND ASSOCIATED INSTITUTIONAL DRUG ACQUISITION COST

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**Purpose:** Several studies have shown benefit of acid suppressive therapy in the intensive care unit (ICU) population and risks of inappropriate overuse of acid suppressive therapy in the non-ICU population. The objective of this study is to evaluate if a pharmacist lead intervention for the appropriate use and duration of acid suppressive therapy in the ICU can lead to decreased health system spending. **Methods:** This study has been submitted to the Institutional Review Board and approved. Pharmacy records will identify patients on stress ulcer prophylaxis (SUP) in the ICU. The following data will be collected: patient age, sex, agent used for stress ulcer prophylaxis, total doses of agent administered, appropriateness of SUP at transitions of care (based on the following criteria: mechanical ventilation, coagulopathy, medical history of GI bleed, diagnosis of sepsis, ICU stay greater than one week, occult bleed greater than 6 days, current high dose steroid therapy, current chronic non-steroidal anti-inflammatory drug use), home proton pump inhibitor or histamine-2 receptor antagonist therapy, issuance of new discharge prescription for acid suppressive therapy. A clinical tool will be developed and distributed to medical residents in the ICU during an educational review, defining appropriate indication of SUP therapy. Pharmacists who round with the intensive care team will evaluate patients on SUP therapy and recommend discontinuation of therapy as appropriate with a focus on patients transferring out of the ICU. Total doses of therapy that are deemed not indicated on review by authors will be multiplied by medication acquisition cost to determine cost of inappropriate therapy to the institution. **Results:** N/A **Conclusions:** N/A

### Learning Objectives:

Review recommendations for Stress Ulcer Prophylaxis  
Recognize importance of assessing continued therapy particularly at transitions of care

### Self Assessment Questions:

Who recommends use of proton pump inhibitors for stress ulcer prophylaxis?

- A The Society of Critical Care Medicine
- B: The Surviving Sepsis Campaign
- C: The Dutch Critical Care Guidelines
- D: The American Society of Health-Systems Pharmacists Stress Ulcer

The use of proton pump inhibitors has been associated with potential adverse events such as:

- A Cholelithiasis
- B Hypokalemia
- C Bone Fractures
- D Increase risk of skin and soft tissue infections

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-551L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## STANDARDIZATION OF COUNSELING AND MATERIALS FOR OUTPATIENT ANTIBIOTIC THERAPY PROGRAM

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**Purpose:** The objective of this study is to measure patient comfortability on taking outpatient antibiotics (both oral and intravenous) before and after patient friendly discharge counseling. **Methods:** This prospective trial will collect patients identified through the already implemented St. Francis Pharmacist Coordinated Antimicrobial Therapy Program. These particular patients have been requested for pharmacy follow up due to outpatient antibiotic therapy upon discharge. Surveys will be collected from patients before any discharge education about their current knowledge of their antibiotic, experience with other medications, and warning signs of reinfection. Five to seven days after the patient is discharged, they will be contacted and asked the same standard questions, to see if their overall understanding of their antibiotic improved. The primary outcome will be overall change in patient comfortability on taking outpatient antibiotics. **Preliminary Results:** Collection of information is currently in progress. Preliminary results and conclusions will be presented at the Great Lakes Residency Conference. **Conclusions:** Research is in progress and therefore conclusions are pending.

### Learning Objectives:

Explain the importance of using patient-friendly words and illustrations for proper discharge counseling.

Identify the role of a pharmacist as a patient is being discharged from the hospital.

### Self Assessment Questions:

Which of the following is an appropriate method to assure patient understanding when counseling on a medication?

- A Teach-back method
- B: Quiz them and repeat questions they miss
- C: Assume they understand and finish the conversation
- D: Hand them supplemental information and tell them to read it when

A patient is being discharged on an IV antibiotic to be administered every eight hours. A way to help the patient maintain this schedule would be:

- A To make sure the nurse in the hospital explains it to them
- B Give them a medication guide of the product
- C Insist they go to an infusion clinic for every dose of medication
- D Provide them with a calendar or form of reminder to ensure they d

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-552L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF AN ANTIMICROBIAL STEWARDSHIP PROGRAM AT A COMMUNITY HOSPITAL

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**Purpose:** By reducing the inappropriate use of antimicrobials, Antimicrobial Stewardship Programs (ASPs) improve patient outcomes as well as reduce antimicrobial resistance, adverse drug reactions, and healthcare costs. The purpose of this study is to analyze the current ASP practices at Franciscan St. Margaret Health (FSMH) and identify potential areas of improvement. **Methods:** Patients included are ≥ 18 years old admitted to FSMH from January 1, 2015 through June 30, 2015 who received antimicrobial therapy for at least 24 hours during their hospital stay. The study analyzes utilization of the following antimicrobial agents: daptomycin, vancomycin, piperacillin/tazobactam, cefepime, ceftriaxone, levofloxacin, meropenem, and ertapenem. Medication Utilization Evaluations (MUEs) were performed via retrospective chart review using a standardized data collection sheet. Data collected includes patient demographics, diagnoses, antimicrobial agents used, culture and sensitivity results, pharmacist interventions, and antimicrobial purchasing costs. **Preliminary Results:** A total of 400 charts were reviewed for inclusion in the study and 283 patients were included in final data analysis. The study population was 47% male, had a mean age of 67 years, and a mean length of stay of 11.1 days. Overall, antimicrobials were used inappropriately in 9% of the cases. Another 4% of cases were identified where antimicrobial choice, while still appropriately covering the targeted organism, was not optimal and presented opportunities for de-escalation based on available culture and sensitivity data. Only 14% of the cases had documented pharmacist interventions. A total of 81 cases of MDROs were identified, of which the biggest culprits were ESBL (30%) and MRSA (28%). **Conclusion:** The preliminary results of this study demonstrate that MDRO rates in the patient population at FSMH remain a concern. This highlights the importance of and justifies the need for having a strong ASP and for continued pharmacy involvement in ASP in order to help to slow or minimize resistance trends.

### Learning Objectives:

Describe the importance of having a strong ASP program in place in a health system

Identify areas of opportunity for pharmacists to participate in and improve ASP

### Self Assessment Questions:

Which of the following are expected outcomes associated with an ASP with multidisciplinary involvement?

- A: Decreased rates of Multi Drug Resistant Organisms (MDROs)
- B: Improved patient outcomes
- C: Reduced healthcare costs
- D: All of the above

All of the following are interventions a pharmacist can make through an ASP except:

- A: IV:PO Conversion where appropriate
- B: Dose optimization based on renal function
- C: Price bargaining with drug representatives
- D: Prompt de-escalation based on cultures

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-553L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## POTENTIAL RISK FACTORS FOR THE DEVELOPMENT OF CLOSTRIDIUM DIFFICILE INFECTION AT A COMMUNITY HOSPITAL

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**Purpose:** Clostridium difficile infection (CDI) is associated with higher morbidity and mortality and increased healthcare costs. The nationwide increase in rates of CDI poses a significant problem to healthcare facilities and communities across the United States. Overall, this study aims to identify and provide insight on potential hospital-specific or community-acquired risk factors for CDI. The data provided by this study may be used to target areas of improvement, develop new strategies to prevent CDI, provide insight on community- or hospital-specific risk factors, or provide preliminary data to develop a hypothesis for future studies at this campus or other Wheaton Franciscan Healthcare facilities. **Methods:** A retrospective chart review was used to collect data on each occurrence of all adult hospitalized patients that test positive for C. difficile at Wheaton Franciscan Healthcare - All Saints Hospital from January 2015 through December 2015. Microbiology laboratory reports were used to generate a list of CDI-positive subjects. The following characteristics of the CDI were collected using a standardized data collection form: CDI classification (healthcare facility onset, community onset, community associated CDI, and indeterminate), CDI severity (mild-moderate, severe, severe complicated, first recurrence, or second recurrence), CDI pathogenicity (defined as the following: suspected toxigenic CDI with 3 or more unformed stools per 24 or fewer consecutive hours in addition to either abdominal pain or antibiotic use in the last 90 days), initial treatment and order set used, initial treatment ordering physician, various potential risk factors, and previous treatment for recurrent CDI cases. **Results:** Results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify modifiable risk factors for the development of healthcare-associated Clostridium difficile infection in hospitalized patients  
Discuss how antimicrobial stewardship programs may reduce the incidence of healthcare-associated Clostridium difficile infection.

### Self Assessment Questions:

Which of the following is a modifiable risk factor for the development of Clostridium difficile infection?

- A: overutilization of broad-spectrum antibiotics
- B: age
- C: prolonged C. difficile treatment
- D: chemotherapy exposure

Which of these antibiotics is considered to have the lowest risk for development of clodstridium difficle infection?

- A: clindamycin
- B: meropenem
- C: doxycycline
- D: levofloxacin

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-554L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ANALYSIS OF KNOWLEDGE, ATTITUDES, AND BELIEFS THAT IMPACT IMMUNIZATION STATUS IN PATIENTS 19-65 YEARS OF AGE

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**Purpose:** The rates of vaccination for U.S. adults remain low for most routine vaccines, and they fail to meet the Healthy People 2020 targets. Improvements in vaccine administration rates are needed to prevent these diseases and the resultant complications that can occur. The purpose of this study is to identify the knowledge, attitudes, and beliefs that prevent individuals ages 19-65 from receiving recommended vaccinations for their age and health status and to propose potential interventions that can be made by pharmacists to improve vaccine administration rates based on these findings. **Methods:** A cross-sectional survey was administered to employees, ages 19-65, of a regional supermarket chain headquartered in West Michigan. Surveys were distributed at three pre-specified locations during the 2015 employee influenza clinics. Eligible participants included employees receiving the influenza vaccine, as well as employees opting out of vaccination, on the dates of each influenza clinic. Surveys were color-coded based on vaccine receipt to allow for separate analysis comparing the responses between those who received the vaccination and those that did not. Consent was obtained from each participant prior to survey administration. The survey aimed to assess demographic characteristics, health status, knowledge of vaccines, and perceptions related to vaccination. No identifiable patient information was obtained. Data analysis is being performed using SPSS Statistical Software. A P-value of 0.05 will be used to determine statistical significance. **Results/Conclusions:** It is anticipated that the results of this survey may help to illuminate which factors impact immunization status in patients 19-65 years of age in order to develop targeted-interventions to increase vaccination rates in this population. Data analysis is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List the Healthy People 2020 objectives related to immunizations in the adult population.

Discuss the common barriers that exist which prevent patients from receiving recommended vaccines and the corresponding interventions that pharmacists can use to increase vaccine administration rates.

### Self Assessment Questions:

Which objective below is included in the Health People 2020 Immunization & Infectious Disease Objectives:

- A: Increase the vaccination coverage level of 3 doses of human papillomavirus vaccine
- B: Increase the percentage of adults age 18 and older who are vaccinated
- C: Increase the percentage of adults age 18 and older who are vaccinated
- D: Increase hepatitis B vaccine coverage among all adults age 18 and older

Which of the following options represents a barrier to vaccine acceptance paired with the appropriate pharmacist intervention?

- A Patient lacks knowledge on vaccine --> Pharmacist education to patient
- B Physician has not recommended the vaccine --> Use techniques to encourage physician to recommend vaccine
- C Patient has a fear of needles --> Patient Education about vaccines
- D Patient may forget the vaccine is due --> Send a reminder message

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-829L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RENAL RISK INDEX AND ACUTE KIDNEY INJURY IN LIVER TRANSPLANT PATIENTS

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**Purpose:** Acute kidney injury (AKI) is a common complication following liver transplantation (LT) and a strong predictor of end-stage renal disease (ESRD). Renal Risk Index (RRI) is a validated scoring tool used to predict post-LT ESRD using 14 pre-transplant recipient characteristics. The objective of this study is to evaluate the clinical utility of RRI as a prognostic tool for AKI within the first 7 days after LT.

**Methods:** This is a retrospective cohort study of approximately 350 transplant-naïve adult patients who received a deceased donor LT at the University of Michigan Health System (UMHS) between January 2010 and September 2015. Patients who required chronic dialysis for > 3 months pre-LT, died or required retransplantation within 7 days post-LT were excluded. All patients received tacrolimus-based immunosuppression. The following data were collected under institutional IRB approval: demographics, RRI variables, pre-/post-operative labs, transplant information, and renal function parameters. RRI was calculated using the publicly available online calculator (<https://rri.med.umich.edu>). The primary outcome was development of AKI, stratified into one of four renal outcome groups based on severity of kidney dysfunction according to RIFLE criteria: no AKI (Class N), risk (Class R), injury (Class I), or failure (Class F). The Kruskal-Wallis test will be used to compare RRI among Classes N-F, while post-hoc pairwise comparisons will be done using the Mann-Whitney U test. Receiver operator characteristic curves will be generated. Youden's Index and c-statistics will be used to determine optimal RRI cutoffs to best predict AKI outcome and severity. Secondary outcomes of interest include length of stay, renal function at 7 days, 6 months, and 1 year post-LT (renal replacement requirement, MDRD-4 eGFR, CKD stage), and death or graft failure at 1 year post-LT. **Results and Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe post-transplant renal complications in liver transplant recipients  
Identify the current application of renal risk index in the liver transplant population

### Self Assessment Questions:

1. Which of the following statements about post-transplant renal complications in liver transplant recipients is correct?

- A: Acute kidney injury is uncommon in the early post-operative phase
- B: Acute kidney injury has not been shown to predict progression to end-stage renal disease
- C: Majority of liver transplant patients have chronic kidney disease by 1 year post-LT
- D: Early post-operative acute kidney injury is not associated with an increased risk of end-stage renal disease

How can renal risk index be used in clinical practice today?

- A: To summarize the relative risk of post-transplant end stage renal disease
- B: To express the relative risk of post-transplant acute kidney injury
- C: To determine the predicted risk of renal transplantation five years post-LT
- D: To summarize the relative risk of post-transplant mortality in patients with AKI

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-555L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## APPOINTMENT BASED PHARMACY MODEL (ABPM) AND REFILL SYNCHRONIZATION EFFECTS ON PATIENT ADHERENCE AND WORKFLOW

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Purpose: Nonadherence is a serious public health concern that leads to a number of harmful effects including increased hospitalizations and morbidity and mortality. Patients are nonadherent to their drug regimen for a number of reasons including factors associated with the patients medical condition, health-care system flaws, complex therapeutic regimens or adverse effects, and socioeconomic causes. The most effective way to improve medication nonadherence involves an individualized approach to meet the needs of the patient. The appointment based pharmacy model (ABPM) is a patient care model which involves three basic components: 1) prescription synchronization, 2) a monthly patient phone call, and 3) a scheduled monthly appointment. This model allows for a reduction in excessive pharmacy visits, enhanced time for pharmacist-patient interaction, and improved pharmacy operational efficiency. A new appointment based pharmacy model was recently implemented at Stephanie Tubbs Jones Family Health Center (STJFHC). The STJFHC serves a patient population that demonstrates low adherence rates and health literacy. This project will determine if adherence and workflow are improved as a result of the new program. Methods: This study will be a retrospective, non-interventional, pre-post chart review in which both primary and secondary endpoint data will be retrieved through review of study subjects charts within the EPIC and Cerner database. Patients will be identified and enrolled at STJFHC. Patients will be reviewed from January 2015 through February 2016. The primary outcome will be change in adherence rates using proportion of days covered for medications before and after patients are enrolled in the ABPM. Secondary outcomes will include number of patients considered adherent, overall non-persistence rates, the impact on workflow, and number of patient visits to the pharmacy per month. Results & Conclusions: Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List the components of the appointment based pharmacy model (ABPM)  
Describe benefits of the appointment based pharmacy model (ABPM).

### Self Assessment Questions:

The appointment based pharmacy model (ABPM) is a patient care model which involves three basic components: 1) prescription synchronization, 2) \_\_\_\_\_, and 3) a scheduled monthly appointment.

- A Automated refills
- B: Prescription delivery
- C: Compliance packaging
- D: Monthly patient phone call

The appointment based pharmacy model (ABPM) has been shown to increase patient satisfaction, adherence, persistence, and \_\_\_\_\_

- A Prescriptions returned to stock
- B Pharmacy efficiency
- C Wait time in the pharmacy
- D Number of patient visits to the pharmacy

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-830L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PRESCRIBING PATTERNS OF ALLOPURINOL IN PATIENTS DIAGNOSED WITH GOUT AT THE VA ANN ARBOR HEALTHCARE SYSTEM

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Purpose: Hyperuricemia is directly associated with gout. Allopurinol lowers serum uric acid (SUA) and decreases the frequency of gout flares. In 2012, the American College of Rheumatology (ACR) updated its guidelines for gout management by creating a systematic pharmacologic therapeutic approach to prescribing and monitoring allopurinol. The primary objective of this analysis is to determine the frequency with which these guidelines have been followed with respect to allopurinol at the VA Ann Arbor Healthcare System. A secondary objective is to compare the frequency of gouty attacks of patients labeled "guideline users" to those who are labeled "non-guideline" users. Findings from this study may lead to educational opportunities to improve adherence to the 2012 ACR gout guidelines. Methods: This study is a retrospective, medication utilization review. Patients diagnosed with gout who initiated allopurinol between October 1, 2012 and April 10, 2015 and continued therapy for one year were identified. Patients are screened by manual chart review and placed into two cohorts: allopurinol managed in accordance with the 2012 ACR gout guidelines ("guideline users") and not managed by the guidelines ("non-guideline users"). To determine the primary objective, the percent of "guideline users" will be reported as defined by having a baseline SUA and follow-up SUA drawn within 5 weeks after a SUA > 6mg/dL and allopurinol is initiated at ≤ 100 mg/day. Additionally, reasons why patients are placed in the "non-guideline" user group will be documented. To assess the secondary objective, the frequency of gouty attacks of patients labeled "guideline users" to those labeled "non-guideline" users will be compared. Results/Conclusions: Data collection is currently in progress. Final results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Identify the common prescribing deviations from the 2012 ACR Guidelines for Gout Management

Discuss interventions to improve the prescribing patterns of allopurinol at the VA Ann Arbor Healthcare System

### Self Assessment Questions:

When should a serum uric acid level be checked after initiating allopurinol?

- A 1 month
- B: 6 months
- C: 8 months
- D: 12 months

At what dose should allopurinol be initiated in a patient with normal renal function?

- A 50 mg
- B 100 mg
- C 200 mg
- D 300 mg

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-556L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ANTICOAGULATION INDICES IN IMPELLA PATIENTS

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An Impella is a temporary percutaneous left-ventricular assist device that provides partial hemodynamic support. The Impella device requires a heparin based purge solution to maintain adequate pressure within the motor. The manufacturer also recommends using supplemental systemic anticoagulation with heparin. A goal activated clotting time of 160 to 180 seconds is recommended by the manufacturer but there are no standardized anticoagulation protocols on how to obtain this target. A standardized heparin protocol could potentially optimize the amount of time spent in goal range. This protocol needs to incorporate the systemic heparin and the heparin being provided by the purge solution. Identifying characteristics of heparin management in patients requiring Impellas may lead to a standardized protocol thus limiting adverse events. The primary objective is percentage of data points (ACT, PTT, or UFH anti-Xa) spent within goal range. Secondary objectives include number of dose titrations required to maintain ACTs, PTTs, or UFH anti-Xas within goal range, identification of initial systemic UFH infusion starting dose, number of times PTTs or UFH anti-Xas are used instead of ACTs, bleeding events (TIMI Non-CABG related bleeding scale), incidences of thromboembolic events, and goal ACT, PTT, or UFH anti-Xa range determined by the medical team. A retrospective cohort analysis is being conducted. All patients requiring an Impella for at least 24 hours at The University of Chicago Medicine between January 1, 2012 - August 31, 2015 and at least 18 years old were eligible for inclusion. Patients were excluded if the Impella was placed at an outside hospital, did not receive systemic heparin, or also required ECMO. Impact of variables on heparin doses will be analyzed using a multivariate analysis. Heparin dosing, monitoring, and secondary endpoints will be analyzed utilizing descriptive statistics. Impact of heparin dose on bleeding and clotting outcomes will be analyzed by linear regression analysis.

### Learning Objectives:

Explain why systemic heparin management is difficult in patients requiring Impella

Recognize the benefit of identifying anticoagulation indices in Impella patients

### Self Assessment Questions:

Which of the following describes why Impella patients are often difficult to appropriately anticoagulate?

- A: The Impella controller automatically adjusts the purge solution (wh
- B: There are no standardized anticoagulation protocols on how to obt
- C: A goal ACT of 160 to 180 seconds is recommended by the manuf
- D: All of the above

Identifying anticoagulation indices in Impella patients can potentially lead to which of the following?

- A: Identify an initial systemic UFH infusion starting dose
- B: Decrease bleeding events
- C: Decrease thromboembolic events
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-557L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PREGABALIN USAGE IN VETERANS WITH PAINFUL DIABETIC PERIPHERAL NEUROPATHY

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Purpose: Health care providers face significant challenges when treating patients with painful diabetic peripheral neuropathy (DPN) due to a lack of definitive data on the best treatment strategies. Currently, pregabalin is one of only two agents approved in the United States for DPN; however, it is not listed on the Veterans Affairs (VA) formulary. The objective of this study is to determine current utilization and associated patient outcomes of pregabalin for DPN within the Indianapolis VA Medical Center in order to provide data to assist in the prescribing and monitoring of pregabalin for veterans with DPN. Methods: Data collection and analysis was completed via retrospective chart review in the Computerized Patient Record System (CPRS). Inclusion criteria was comprised of age greater than or equal to 18 years, diagnosis of type I or type II diabetes mellitus, and the initiation of pregabalin therapy during the study period. Exclusion criteria included an indication for pregabalin other than DPN and the initiation of pregabalin therapy at another institution. Data collected included baseline characteristics, pregabalin dosing and length of therapy, and the utilization of other neuropathic pain agents before, during, and after pregabalin use. Data regarding the dosing strategies of patients transitioned from gabapentin to pregabalin was also collected. This study was approved by the Indiana University Institutional Review Board and the Indianapolis VA Research and Development Committee. (Preliminary) Results: Preliminary results reveal that patients who are titrated to a higher dose of pregabalin (400-600mg daily) were more likely to continue the medication and have a decreased number of concomitant neuropathic agents. Additionally, patients were most commonly transitioned from gabapentin to pregabalin using a conversion ratio of 12:1-18:1 mg, which was higher than the recommended conversion ratio for transitioning of 6:1 mg. Conclusion:

Conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the current pattern of usage of pregabalin at the Richard L. Roudebush VAMC, including the most common medications trialed prior to the initiation of pregabalin.

Identify two specific ways pregabalin prescribing for DPN could be improved at the Richard L. Roudebush VAMC.

### Self Assessment Questions:

1. Which of the following agents could be recommended for use prior to pregabalin therapy based on the VHA Criteria for non-formulary Use of pregabalin?

- A: Citalopram
- B: Acetaminophen
- C: Lidocaine Patch
- D: Amitriptyline

What is the recommended conversion ratio for gabapentin to pregabalin

- A: 3:1
- B: 6:1
- C: 12:1
- D: 18:1

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-558L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF TRANSITION OF CARE VISITS ON THIRTY-DAY HOSPITAL READMISSION RATES

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**Purpose:** Transitions of care between inpatient and community settings is vital to ensure quality of care and decrease readmission rates. Ineffective transitions of care contribute to inadequate patient education, incomplete or inaccurate medication reconciliation, and missed follow-up appointments. The purpose of this study is to determine how effective transition of care visits are at reducing thirty-day hospital readmissions in patients who are discharged from Memorial Hospital of South Bend with an expectation of following up at E. Blair Warner Family Medicine Center. **Methods:** A data query program will be utilized every Monday, Wednesday, and Friday to compile a report of patients who were recently discharged from Memorial Hospital of South Bend and have established care at E. Blair Warner Family Medicine Center. Within forty-eight hours of discharge, a pharmacist or nurse practitioner will contact the patient via telephone to validate understanding of discharge education, assess medication compliance, and schedule a follow-up appointment at the family medicine center within seven to fourteen days depending on complexity. During the follow-up office visit, the pharmacist or nurse practitioner will see the patient to conduct a medication reconciliation, perform medication education, identify any changes since the phone call, and provide recommendations to the physician, when applicable. The primary outcome will be readmission within thirty-days of hospital discharge. The secondary outcomes include increased revenue of billing, number and type of interventions made during phone calls and follow-up visits, and number of patients without a primary care physician who were seen and may not have received follow up otherwise. **Results and Conclusions:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Residency Conference.

### Learning Objectives:

Identify the role of the pharmacist in the development and implementation of the transitions of care program.

Describe the components that must be met in order to utilize CPT transitions of care billing codes.

### Self Assessment Questions:

What is the role of a transition of care pharmacist?

- A: Conduct a physical exam
- B: Room patients during follow-up visits
- C: Obtain patient vitals during follow-up visits
- D: Conduct a comprehensive medication reconciliation

Which of the following is not a requirement that must be met in order to bill transitions of care CPT codes?

- A: Follow-up clinic visit within 14 days
- B: Discharge counseling upon discharge
- C: Billing takes place 30 days from discharge
- D: Initial contact within 48 hours of discharge

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-831L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## DEVELOPMENT, IMPLEMENTATION AND EVALUATION OF A DISCHARGE BEDSIDE PRESCRIPTION DELIVERY PROGRAM AT A FOUR-HOSPITAL HEALTH SYSTEM: IMPACT ON PHYSICIAN SATISFACTION

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**Purpose:** It is estimated that 20% of patients admitted to the hospital do not fill their prescribed discharge medications. The delay or lack of outpatient treatment can lead to health complications, higher rates of readmission, and possibly mortality. Discharge interventions led by pharmacy staff have been shown to increase pharmacy prescription capture rates as well as patient satisfaction scores. The objective of this project was to implement a discharge bedside prescription delivery program to help patients obtain their medications prior to discharge from the hospital and to assist with discharge prescription complications and prior authorizations for physicians. **Methods:** A taskforce was created with inpatient and outpatient pharmacy managers, hospitalists, nurses, and case managers to assist with the design and implementation of the pilot program at a single hospital within a four hospital system. A partnership with the hospitalists was formed to target the general medicine floors of the hospital. A discharge prescription liaison (pharmacy resident, student, or technician) facilitated the filling of the discharge prescription. Upon admission, the liaison surveyed eligible patients on the general medicine floors to obtain permission to be enrolled in the program. This enrollment was logged in the electronic medical record and the preferred pharmacy in which electronic prescriptions were sent was changed to the current facility's outpatient pharmacy. If the patient was enrolled, the hospitalist would page the liaison once discharge prescription orders were completed. The liaison would then process these prescriptions in the outpatient pharmacy. Once filled, the prescriptions were delivered to the patients bedside and new medication counseling was coordinated. Measures of success include assessment of pre- and post-implementation of outpatient pharmacy prescription capture rates, pharmacy revenue generated from program, and hospitalist satisfaction surveys. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the potential benefits to patients and healthcare organizations implementing a discharge bedside prescription delivery program

Describe potential complications and barriers to implementing a discharge bedside prescription delivery program

### Self Assessment Questions:

What results may be achieved in a successful discharge prescription program?

- A: Decrease in prescription turnaround time
- B: Decrease in employee expenses
- C: Increases readmission rates
- D: Increase in discharge prescription volume

Which is a potential barrier to a discharge bedside prescription delivery program?

- A: Changes to physician workflow
- B: The need for dedicated personnel to deliver medications
- C: Patient prefers own pharmacy
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-832L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATING THE IMPACT OF BETA-AGONIST USE IN PATIENTS WITH HEART FAILURE WITH OR WITHOUT PULMONARY DYSFUNCTION

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**Purpose**The differential diagnosis for dyspnea is extensive, but frequently associated with pulmonary disease or heart failure exacerbations. Inhaled beta-agonist therapy is often initiated for symptom management prior to final diagnosis of cause. However, literature to support this practice is conflicting; while some data supports short-term use in heart failure exacerbation, chronic use may be harmful. This may result in clinical confusion and inappropriate use. By assessing the prescribing patterns, financial impact, adverse events, and re-hospitalization rates associated with beta-agonist prescribing in the setting of heart failure exacerbations at the Detroit Medical Center, this study will seek to identify educational opportunities for improving prescribing quality of this therapeutic class.  
**Methods**This retrospective study evaluates heart failure patients receiving short acting beta-agonists. Data is extract from the electronic medical record. Baseline demographics collected include age, gender, chief complaint, height, weight, medical history, renal function, race, left ventricular ejection fraction, smoking status, heart failure medication and beta-agonist use prior to admission. Inpatient data collected includes length of stay, admitting service, prescriber type, inpatient heart failure medication and beta-agonist use, number of administered beta-agonist doses, number of inhaler devices dispensed, and adverse reactions. Discharge data collected includes number of new and total prescriptions diagnosis, and ICD-9 code. Re-hospitalization data collected includes length of stay, admitting diagnosis, time since previous admission, admitting service, and chief complaint. Patients will be separated according to the status of pulmonary disease (stated diagnosis, definitive diagnosis, no diagnosis). Outcomes of the three groups will be evaluated separately. This study uses descriptive statistics for analysis. Inpatient and outpatient financial impact of beta-agonist prescribing will be described. Adverse events and 6-month re-hospitalization rates are evaluated using chi-squared tests.  
**Results/Conclusions**Results and data analysis will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the controversy and literature related to use of beta-agonists in heart failure

Describe prescribing patterns and patient impact of beta-agonist use for dyspnea in the presence of heart failure

### Self Assessment Questions:

According to current literature, which of the following statement is true?

- A Short term use of beta-agonist in heart failure may lead to worseni
- B: Short term use of beta-agonist in heart failure is associated with ur
- C: Long-term use of beta-agonist in heart failure may lead to worseni
- D: Long-term use of beta-agonist in heart failure may be beneficial in

Which of the following are potential reasons for confusion in beta-agonist prescribing?

- A Many patients with HF/rEF have comorbid COPD
- B Dyspnea is associated with heart failure exacerbation as well as p
- C No qualitative features of dyspnea are unique to heart failure
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-939L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ANALYSIS OF RISK FACTORS FOR 30-DAY HOSPITAL READMISSION IN MEDICINE PATIENTS

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**Background/Purpose:** Unplanned 30-day hospital readmissions may reflect low quality of care and lead to decrease reimbursement. There are patient characteristics that have been associated with higher incidences of readmission. Although risk factors have been identified, results are conflicting and generally applicable to only one comorbid condition. Furthermore, patient demographics vary from one institution to another; limiting the applicability of study results. The purpose of this study is to identify risk factors associated with 30-day readmission at a level I trauma center. The data will then be used to construct a risk score in order to identify high-risk patients at our institution. The secondary objective of this study is to evaluate the impact of pharmacist interventions on the risk of readmission. **Methods:** This prospective observational study will be conducted at Indiana University Health in Indianapolis, IN. Patients  $\geq 18$  years of age who are admitted for acute illness to medicine units from August 2015 to June 2016 are eligible for inclusion. Exclusion criteria include hospice and or palliative care patients, deceased patients, patients electively admitted, and or patients who are transferred to another hospital. Risk factors for readmission are identified via literature review and used to construct a data collection sheet. Patient characteristics, readmission within 30 days from the initial hospitalization, interventions by a pharmacist will be documented using the developed data collection form. Data will be assessed using multiple regression analysis, and Chi Square or Fishers Exact Test.

**Results/Conclusion:** To be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify risk factors associated with 30-day hospital readmission

Describe pharmacists role in decreasing 30-day hospital readmissions

### Self Assessment Questions:

Which of the following is a risk factor for 30-day hospital readmission documented in the literature?

- A Age greater than 60 years
- B: Three or more co-morbid conditions at baseline
- C: One hospitalization in the past year
- D: Polypharmacy

Which of the following pharmacist intervention has been shown to decrease 30-day hospital readmission?

- A Education on the disease state
- B Post-discharge follow-up 1 month after release
- C Medication reconciliation
- D A & c

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-833L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**EVALUATION OF SAFETY IN PATIENTS AGE 60 YEARS OR GREATER WHO RECEIVED CYTARABINE 3 G/M2 IN HYPER-CVAD MODULE B**

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**Purpose:** Hyper-CVAD is a chemotherapy regimen consisting of fractionated cyclophosphamide, vincristine, doxorubicin, and dexamethasone (Module A) alternating with high-dose methotrexate and high-dose cytarabine (Module B). The general practice with this regimen is to reduce the dose of cytarabine from 3 g/m<sup>2</sup> to 1 g/m<sup>2</sup> for patients age 60 years or greater. At Rush University Medical Center (RUMC), cytarabine 3 g/m<sup>2</sup> is administered to all age groups. There is currently insufficient evidence regarding the safety and tolerability of cytarabine 3 g/m<sup>2</sup> in the elderly patient population. Therefore, the primary purpose of this study is to evaluate the safety of cytarabine 3 g/m<sup>2</sup> in patients age 60 years or greater who received Hyper-CVAD. **Methods:** This is an Institutional Review Board approved, retrospective cohort study at RUMC comparing patients age 60 years or greater and patients age less than 60 years who received cytarabine 3 g/m<sup>2</sup> in Hyper-CVAD Module B between January 1, 2008 and October 31, 2015. Patients 18 years or older were eligible if they received Hyper-CVAD for the treatment of aggressive lymphoma or acute lymphoblastic leukemia. Patients were excluded if they received any initial dose reductions of cytarabine or if Hyper-CVAD was used to treat mantle-cell lymphoma. The primary end point is the incidence of suspected or documented neutropenic fevers or infections after receiving Hyper-CVAD Module B. Secondary end points include the number and duration of hospitalizations after Module B cycles for any reason other than chemotherapy, days until the next cycle (Module A) is given, complete response rate, incidence of cytarabine dose reductions or discontinuation of therapy, time to methotrexate clearance, and incidence of central nervous system (CNS) toxicities due to cytarabine. **Results and Conclusions:** Data collection and analysis are currently in process. Results will be presented at the Great Lakes Conference.

**Learning Objectives:**

Identify potential toxicities of high-dose cytarabine.  
Recognize the mechanism for CNS-related toxicities when administering high-dose cytarabine.

**Self Assessment Questions:**

Which of the following is/are potential toxicities seen with high-dose cytarabine?

- A Renal failure
- B: Conjunctivitis
- C: Myelosuppression-associated complications
- D: All of the above

Which of the following statements is true regarding the mechanism for high-dose cytarabine associated CNS-toxicities?

- A Cytidine deaminase concentrations are lower in the CNS, resulting
- B CNS toxicities associated with cytarabine is only seen with the cor
- C The risk for developing CNS toxicities is unrelated to the cytarabine
- D Cytarabine is metabolized by cytidine deaminase into a more pote

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-940L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

**CREATION AND UTILIZATION OF A RELATIVE VALUE UNIT SYSTEM IN AN OUTPATIENT INFUSION CENTER PHARMACY**

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**Purpose:** Advances in cancer treatment and the management of side effects has allowed chemotherapy administration to be done in outpatient clinics. The clinics can experience fluctuations in patient volume and treatment regimens. Simply evaluating the number of patients or items dispensed does not accurately measure the pharmacy workload due to the varying complexity of regimens. The purpose of this project is to develop a relative value unit (RVU) system to evaluate the efficiency and workload of an oncology clinic pharmacy and to optimize staff scheduling. **Methods:** A process map was created to illustrate the order review, preparation, and dispensing of both chemotherapy and non-chemotherapy items in an outpatient infusion center pharmacy. The steps that vary based on regimen were identified and evaluated with time studies. The time studies were conducted for the pharmacist review, order entry and compounding checks along with the technician preparation and compounding. An algorithm was developed based on the time data to calculate regimen-specific RVUs. Next, a retrospective review of the daily clinic schedule was completed over a two-month span to calculate total daily RVUs of products dispensed. The RVUs were calculated based on three regimen-specific variables: the average pharmacist time to complete evaluated tasks, the average technician time to complete evaluated tasks and a pre-medication complexity value. The staffing pharmacists and technicians during this period were asked to subjectively rank their daily workload on a 1-5 Likert scale, with 1 being slow and 5 being unmanageable. The daily RVU values were compared to the subjective evaluations to determine a maximum daily RVU value that the clinic can manage. The RVUs will be used to prospectively establish staffing requirements for certain clinic days.

**Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Define a relative value unit  
Explain how a relative value unit can be utilized to evaluate workload

**Self Assessment Questions:**

What is a relative value unit (RVU)?

- A The time to prepare and dispense a chemotherapy product
- B: A numerical representation of the pharmacy workload
- C: The number of products dispensed in a day
- D: A numerical measure of pharmacist work speed

Which of the following is a benefit of using a relative value unit (RVU) to measure workload?

- A It is evaluated quicker than counting the number of products dispensed
- B It is more specific in representing the pharmacy workload than counting
- C It will measure the safety of the clinic by evaluating how long pharmacist
- D It is easier to implement compared to counting the number of patients

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-834L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPING A STANDARDIZED PROTOCOL TO ASSIST PHARMACISTS DISPENSING OPIOID MEDICATIONS TO PATIENTS

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**Purpose:** The Wisconsin Prescription Drug Monitoring Program (WI PDMP) was implemented in January, 2013. However, little is known about how pharmacists access and use its information in patient care. The purpose of this study is to describe barriers to pharmacists accessing information on the WI PDMP, and provide education to facilitate better use of the information provided on the database. **Methods:** Two focus groups composed of Wisconsin community pharmacists were conducted. During the focus groups, contrived scenarios involving narcotic prescriptions were introduced to the participants. The goal of the focus groups was to spark conversation among the participants about how the scenarios can be handled including nuances that can result in changes in their decision-making process. Focus groups were audio-recorded and transcribed. A deductive qualitative analysis was conducted to create a consensus of how narcotic prescription orders are handled. **Results:** Triggers that pharmacists use to access the WI PDMP can be characterized into patient, physician, and prescription or medication characteristics. Similarly, barriers to pharmacists use of the WI PDMP can be characterized into patient, physician, and pharmacists characteristics, as well as technology and overall pharmacy work pressure.

**Conclusions:** Anecdotal evidence suggests that use of the information on the WI PDMP varies widely. Some pharmacists access it frequently, while others do not access it at all. Moreover, it is unclear how pharmacists act upon the information. This can lead to confusion and a misunderstanding between pharmacists, physicians, and patients. The information collected at the focus groups will be analyzed to create awareness and educate healthcare providers about accessing the WI PDMP. The hope is to make healthcare providers more conscious of its existence and how to use it effectively and efficiently so more consistent decisions are made with respect to narcotic prescriptions.

### Learning Objectives:

Discuss how local pharmacists are or are not using the WI PDMP database and how to overcome the barriers that may be preventing its use.

Express through education to healthcare professionals, including pharmacists, physicians, and nurses, better ways to use the information provided on the WI PDMP.

### Self Assessment Questions:

Which of the following is a possible trigger that a pharmacist might use when deciding to access the Prescription Drug Monitoring Program (PDMP)?

- A: The patient is unknown to the pharmacist or new to the pharmacy
- B: The database website is down
- C: The pharmacist has a trustworthy relationship with the patient
- D: The database takes too many clicks to get to the desired screen

Which of the following is a barrier that results in a pharmacist not accessing the Prescription Drug Monitoring Program (PDMP)?

- A: There are multiple pharmacists working in the current shift
- B: The pharmacist is not familiar with the prescribing physician
- C: The patient is inpatient and in a hurry to get his/her medication
- D: The prescription does not make sense

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-704L03-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF MULTIPLE SCLEROSIS CLINICAL AND SPECIALTY PHARMACY SERVICES

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**Background:** Multiple sclerosis (MS) is an immune-mediated, inflammatory condition with no cure. There are several disease-modifying therapies approved to treat relapsing-remitting MS, which accounts for about 85% of cases. These therapies are considered specialty medications and therefore involve high cost and limited distribution programs. Despite evidence suggesting early initiation of disease-modifying therapy may prevent subsequent development of disability, navigating the prior authorization and financial assistance process can be time-consuming and confusing for providers and patients alike. After a successful rollout of specialty pharmacy services for hepatitis C and oral oncology medications, the pharmacy began providing clinical and specialty pharmacy services for patients with MS. Having a designated pharmacist in this role allows for seamless communication between the clinic, dispensing pharmacy, and patient.

**Purpose:** The purpose of this study is to test the following hypothesis: Filling prescriptions for disease-modifying therapies for MS and receiving detailed education on the medication from a clinical pharmacist will lead to quicker time to drug in hand (from physician referral to medication delivery to patient). If our hypothesis is correct, this will help validate the need to continue our current service and support the expansion of specialty pharmacy services to other clinics and disease states.

**Methods:** This retrospective chart review of adult patients with MS seen at the IU Health neurology clinic included patients prescribed a new disease-modifying MS therapy between 1/1/2014 and 1/6/2016. Study endpoints included time to drug in hand (primary endpoint), self-reported missed doses, labs ordered, medication list accuracy, and interventions by the pharmacist. Demographic information included age, sex, disease-modifying medication, insurance type, medication filled at IU Health, and copay assistance provided. Comparisons were made between patients referred prior to and after the establishment of clinical and specialty pharmacy services. **Results:** Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify key characteristics of disease-modifying therapies for multiple sclerosis and important counseling points to convey to patients.

Describe the steps required in the process of initiating disease-modifying therapy in patients with multiple sclerosis.

### Self Assessment Questions:

Which of the following adverse reactions is commonly associated with interferon agents?

- A: Angioedema
- B: Flu-like symptoms
- C: Nephrotoxicity
- D: Hypotension

Which of the following typically occurs prior to the pharmacist educating a patient on a new disease-modifying therapy?

- A: First dose observation
- B: Injection technique training
- C: Submission of prior authorization request
- D: Ordering follow-up labs

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-559L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSOCIATION BETWEEN CANDIDA FLUCONAZOLE MIC AND CLINICAL OUTCOMES

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**Purpose:** Candida species are the 4th leading cause of nosocomial bloodstream infections in the United States.<sup>1</sup> Although reports vary, candidemia is associated with a mortality rate ranging from 15-47%.<sup>1</sup> Resistance to fluconazole has historically been classified by minimal inhibitory concentration (MIC), however there have been several studies that postulate stronger correlations to clinical outcomes with other pharmacodynamic parameters, such as dose to MIC ratio.<sup>2</sup> Despite this data, the Clinical and Laboratory Standards Institute has recently lowered the fluconazole susceptibility breakpoints from  $\geq 64$  to  $\geq 8$ , imposing further restrictions on the use of fluconazole.<sup>3</sup> The purpose of this study is to assess if there is utility of fluconazole in patients outside of the newly defined susceptibility breakpoints, and further, what patient populations may be appropriate for fluconazole use.  
**Methods:** Eligible patients will be adult inpatients with confirmed Candida growth by laboratory in a blood specimen with reported or retrievable speciation and fluconazole MIC who were treated with fluconazole for 3 days or more. Patients will be excluded if diagnosed with endocarditis or Candida krusei infection. The case group will include patients achieving microbiological success, and the control group will include patients experiencing microbiological failure. Microbiological success or failure will be defined by the eradication or presence of Candida species as determined by follow-up culture at or before 7 days from the first day of fluconazole therapy. Initial univariate analysis will be used to determine variables that have significant trends leading to microbiological success. Variables meeting statistical criteria with biologic plausibility for affecting the primary outcome will be assessed with multivariable logistic regression. Results and conclusions: To be determined.

### Learning Objectives:

Describe what markers have been historically used to classify fluconazole resistance

Describe the change in MIC breakpoints recently put in place by the Clinical and Laboratory Standards Institute

### Self Assessment Questions:

What marker has historically been used to predict fluconazole resistance?

- A Dose of fluconazole
- B: Fluconazole MIC
- C: White blood cell count
- D: Presence of fever

What has the Clinical and Laboratory Standards Institute recently done to the MIC breakpoints for fluconazole in regards to Candida albicans?

- A Lowered this MIC breakpoint from  $\geq 64$  to  $\geq 8$
- B Increased this MIC breakpoint from  $\geq 0.25$  to  $\geq 32$
- C Increased this MIC breakpoint from  $\geq 8$  to  $\geq 64$
- D The Clinical and Laboratory Standards Institute has not changed it

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-560L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION AND EVALUATION OF A POST-PROCEDURE WARFARIN LOADING DOSE AT A VETERANS AFFAIRS ANTICOAGULATION CLINIC

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**Purpose:** A previous retrospective review found a faster time to therapeutic international normalized ratio (INR) in patients undergoing peri-procedural bridging who received a loading dose of warfarin versus no loading dose after a procedure, though loading dose amount differed among patients. Based on this evaluation, the anticoagulation clinic implemented a warfarin loading dose protocol in select patients. The purpose of this evaluation was to determine if a protocol-driven warfarin loading dose could facilitate a faster time to therapeutic INR without increasing bleeding risk.  
**Methods:** This single-center retrospective review evaluated patients undergoing an invasive outpatient procedure requiring warfarin interruption. To be eligible for the warfarin loading dose protocol, patients must have required a warfarin interruption of at least 5 days with planned LMWH bridging and had a stable warfarin maintenance dose. Patients were excluded if they had previously demonstrated a rapid return to therapeutic INR post procedure (within 7 days without the use of a loading dose), had labile INRs/were not on a stable dose of warfarin for at least 1 month prior, had planned admission following the procedure, or had a left ventricular assist device (LVAD). The warfarin loading dose was a 100 percent increase on the day warfarin was restarted with a 50 percent increase on the second day. The increase was based on the weekly dose and not the actual dose for that day. The primary outcome was time to therapeutic INR. Secondary outcomes included number of days of enoxaparin use, minor and major bleeding and thromboembolic events within the first 30 days after the procedure. Results: pending Conclusion: pending

### Learning Objectives:

Identify patients that are eligible and ineligible for a warfarin loading dose based on the methods used for this presentation.

Select the proper warfarin loading dose based on the procedure defined in this presentation.

### Self Assessment Questions:

1. Which of the following patients might be eligible for a warfarin loading dose based on the methods used in this presentation?

- A A patient with widely varying INRs
- B: A patient that is a new start to warfarin
- C: A patient that will be an inpatient following the procedure
- D: A patient receiving bridging with LMWH

2. What would this patient's warfarin loading dose be (assuming he/she meets inclusion criteria)? Dose: 15 mg Tue/Thu/Sun and 10 mg 4x/week takes warfarin in the PM, uses a 5 mg tablet, and has a colo

- A 27.5 mg total on Tuesday and 15 mg total on Wednesday
- B 12.5 mg total on Tuesday and 5 mg total on Wednesday
- C 30 mg total on Tuesday and 15 mg total on Wednesday
- D 22.5 mg total on Tuesday and 20 mg total on Wednesday

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-561L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF ADVERSE OUTCOMES AND APPROPRIATE USE OF DIRECT ORAL ANTICOAGULANTS (DOAC) IN PATIENTS DISCHARGED FROM PHARMACIST MONITORING AT A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** Patients receiving DOACs are educated and receive laboratory monitoring prior to initiation, 1 month, and 3 months after starting the medication by the pharmacy anticoagulation clinic. If stable at 3 months, patients are discharged from clinic, and the primary care provider manages DOAC. Currently, objective data assessing patient outcomes upon discharge from pharmacy monitoring does not exist and there is limited information in current literature pertaining to long-term monitoring of DOAC use. Concerning areas include patients lost to follow-up, changes in health warranting dose modification, patients not adherent to prescribed regimen, and initiation of interacting medications without appropriate DOAC adjustments. This study is designed to assess patient outcomes upon discharge from pharmacy monitoring and to identify areas to change current management to improve safety. **Methods:** This study is a retrospective electronic medical record review that will be conducted at the Richard L. Roudebush VA Medical Center in Indianapolis, Indiana. The electronic medical record system will be used to identify patients who are  $\geq 18$  years old, have a history of prescription for a DOAC, have been discharged from the anticoagulation clinic monitoring program for a period of at least 3 months with intention to continue DOAC, and utilizing DOAC for an FDA approved indication. The following data will be collected: patient demographics, chronic disease medications that have significant interactions with DOAC, pertinent lab values, and relevant past medical history. Provider documentation will be reviewed to assess reason for DOAC dosing change (if applicable) and adverse outcomes. Basic descriptive statistics, including mean, standard deviations, ranges and percentages will be used to characterize the study subjects. **Results/Conclusions:** To be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Outline the current monitoring process for patients prescribed a DOAC at the Indianapolis VAMC

Identify common drug-drug interactions involving DOACs at the Indianapolis VAMC

### Self Assessment Questions:

In the current DOAC monitoring process at the Indianapolis VAMC, at what points are patients monitored?

- A: Initiation, 2 weeks, 1 month, 3 months
- B: Initiation, 1 month, 3 month, 6 months
- C: Initiation, 2 weeks, 1 month, 6 months
- D: Initiation, 1 month, 2 months, 3 months

Which of the following was the most common drug-class interaction seen among patients utilizing DOAC at the Indianapolis VAMC?

- A: Proton Pump Inhibitors
- B: HMG CoA Reductase Inhibitors
- C: Antiplatelets
- D: Selective Serotonin Reuptake Inhibitors

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-941L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PHARMACY SERVICES IN A TRANSITIONS OF CARE CLINIC

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**Purpose:** Hospital discharge can be a tumultuous time for patients, and it is crucial that these transitions are handled appropriately. Pharmacists, as the medication experts, are well poised to effectively handle these transitions and can play an integral role in avoiding costly readmissions and medication-related adverse events. The purpose of this study was to demonstrate this effect by measuring the impact that a pharmacist has in a Transitions of Care Clinic through making clinical and educational interventions. **Methods:** The primary investigator (PI) met with patients who were seen in the Transitions of Care Clinic one half-day per week over a period of four months. The PI discussed any medication-related concerns with the patient that were brought up by the prescriber, by the patient, or as identified by the pharmacist. After the visit, the pharmacist interventions were documented on the study-specific Data Collection Form. Patient-specific data collected included age, gender, date of visit, length of hospitalization, admission chief complaint, comorbidities, and discharge destination. Interventions documented fell into the categories of education/counseling, medication access, medication history discrepancy, adverse drug reaction, therapeutic optimization recommendations, and other. At 30 days following discharge, the PI reviewed the medical record to determine if patients were readmitted. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify conditions that Centers for Medicare & Medicaid Services (CMS) considers at high risk for readmission

Describe the patient population and the types and number of pharmacist interventions made in this study

### Self Assessment Questions:

Which of the following conditions, according to CMS, is a publically reported outcomes measure for 30-day readmission?

- A: Acute Myocardial Infarction
- B: Chronic Obstructive Pulmonary Disease (COPD) Exacerbation
- C: Type 2 Diabetes
- D: Hypertension

Which of the following was the most common pharmacist intervention made during the course of this study?

- A: Medication Access
- B: Therapeutic Optimization Recommendation
- C: Education/Counseling
- D: Medication History Discrepancy

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-562L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PREEMPTIVE THERAPY VERSUS UNIVERSAL PROPHYLAXIS WITH VALGANCICLOVIR FOR THE PREVENTION OF CYTOMEGALOVIRUS (CMV) DISEASE IN LIVER TRANSPLANT RECIPIENTS

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Cytomegalovirus (CMV) is an opportunistic infection that can result in significant morbidity and mortality in immunocompromised patients including solid organ transplant recipients. CMV infection can occur through either reactivation of latent virus or through de novo transmission. Although the risk is highly variable depending on the CMV serological status of the donor and recipient, CMV disease can occur in up to 18-29% of liver transplant recipients. Universal prophylaxis and preemptive therapy are two strategies commonly employed to prevent CMV disease and its negative repercussions. In September of 2014, the practice for liver transplant recipients at our institution changed from the preemptive strategy to universal prophylaxis in intermediate and high risk patients. The objective of this study is to evaluate the incidence of CMV disease in liver transplant recipients under the new protocol and to assess the effect of CMV on patient and graft survival. Ninety-seven patients identified by the electronic medical record system were included if they received a liver transplant at our institution prior to October 1, 2015. Patients were excluded if both the donor and recipient were CMV seronegative prior to transplant, if the patient underwent re-transplantation, or if the patient survived less than 4 weeks after transplant. Data collected included donor and recipient baseline characteristics and CMV serostatus; CMV diagnosis; patient and graft survival; readmissions after transplant; and adverse events of antiviral medications. All data recorded was de-identified during data collection. The primary outcome was the incidence of CMV disease. Secondary endpoints included adverse events and discontinuation of therapy due to intolerance or toxicity, late-onset CMV disease, patient survival, graft survival, readmission rates, time to CMV infection, and the estimated cost. Data analysis is in process and the results of this study will be used to evaluate the protocol for CMV prevention at our institution.

### Learning Objectives:

Describe the differences between preemptive therapy and universal prophylaxis for the prevention of cytomegalovirus (CMV)

Identify liver transplant recipients who are at highest risk of CMV disease and who would benefit most from universal prophylaxis for CMV prevention

### Self Assessment Questions:

Which of the following may be a benefit to universal prophylaxis therapy compared to preemptive therapy for the prevention of CMV disease?

- A: Ease of implementation
- B: More frequent laboratory monitoring
- C: Less drug exposure
- D: Reduced risk of late-onset CMV disease

In which of the following scenarios of donor/recipient CMV serostatus does the transplant recipient have the highest risk of CMV disease with immunosuppression?

- A: Donor negative/Recipient negative
- B: Donor negative/Recipient positive
- C: Donor positive/Recipient negative
- D: Donor positive/Recipient positive

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-563L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF TIME TO THERAPEUTIC ANTI-FACTOR XA LEVEL FOR ENOXAPARIN GIVEN VIA INDWELLING SUBCUTANEOUS CATHETER VERSUS VIA SUBCUTANEOUS INJECTION

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Introduction: Anticoagulation with enoxaparin in pediatric patients requires twice-daily injections for prophylaxis and treatment indications alike. In addition to needle-associated discomfort, the drug depot can cause pain, irritation, bruising, hematomas, and skin necrosis. In turn, this can lead to dose anticipation, injection anxiety, dose avoidance or refusal, and patient dissatisfaction. Indwelling subcutaneous catheters (ISCs) are soft plastic cannulae that allow for multiple injections without additional skin punctures, and can be left in place for up to seven days. The objective of this study is to compare enoxaparin administered via ISC versus direct subcutaneous injection and time to therapeutic anti-Xa level. Secondary outcomes include dose of enoxaparin and number of anti-Xa draws required to achieve therapeutic levels. Methods: This IRB-approved study is a retrospective cohort study of pediatric patients admitted to Riley Hospital for Children from July 1, 2012 to June 30, 2015 who received treatment doses of enoxaparin. Patients were excluded if they experienced bleeding, >48 hour interruption in therapy prior to attaining a therapeutic Xa, developed acute kidney injury or mult organ failure, or if enoxaparin was used for bridging without monitoring of anti-Xa levels. Data collection is pending and will include patient demographics, anti-Xa levels, initial and therapeutic enoxaparin doses, and indication. Data will be analyzed using the Student t- and  $\chi^2$  tests. Results/Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the available evidence for medication administration via indwelling subcutaneous catheter.

Discuss the pharmacokinetic ramifications of the use of indwelling subcutaneous catheters.

### Self Assessment Questions:

For which of the following medications is there evidence for administration via indwelling subcutaneous catheter?

- A: Furosemide
- B: Heparin
- C: Hydromorphone
- D: Insulin glargine

Which of the following pharmacokinetic parameters is not affected by use of an indwelling subcutaneous catheter?

- A: Half-life ( $t_{1/2}$ )
- B: Peak serum concentration ( $C_{max}$ )
- C: Time to peak serum concentration ( $T_{max}$ )
- D: Total drug exposure (AUC)

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-564L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **ALEMTUZUMAB FOR THE TREATMENT OF CHRONIC LUNG ALLOGRAFT DYSFUNCTION**

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**Rationale** Long-term survival after lung transplantation is limited by chronic lung allograft dysfunction (CLAD). CLAD can be classified into bronchiolitis obliterans syndrome (BOS) and restrictive allograft syndrome (RAS). Optimal treatment for CLAD has yet to be described in published literature. This study aimed to examine the effects of alemtuzumab for the treatment of BOS and RAS. **Methods** In this single-center retrospective cohort study, adult lung transplant patients received alemtuzumab for BOS or RAS. The primary endpoint is the change in lung function at 6 months post treatment, defined as improved if FEV1 increased >10%, worsened if FEV1 declined >10%, or stabilized if ≤10% change in FEV1. Secondary outcomes include infections within 6 months post treatment and death from any cause post treatment. **Results** Alemtuzumab was administered to 28 patients for the treatment of CLAD (BOS=20, RAS=8). Patients were on average 59 years old, 43% male, 96% Caucasian, transplanted primarily for chronic obstructive pulmonary disease (46%) and idiopathic pulmonary fibrosis (32%). The median time from transplant to CLAD was 1400 days (range 232-5048) and most recent BOS stage to treatment of CLAD was 68 days (range 7-576). BOS grades were evenly distributed (29% BOS 1, 39% BOS 2, 32% BOS 3). Graft function improved or stabilized in 71% of patients with CLAD; 70% in BOS and 75% in RAS. After treatment with alemtuzumab, change in FEV1 was not statistically significant compared to pre-treatment. Graft function continued to decline in 30% of patients with BOS and 25% in those with RAS. At the most recent follow up, 8 (28%) of patients had died, with progressive respiratory failure as the most common cause of death (75%) post treatment. **Conclusion** Allograft function appears to stabilize in the majority of patients treated with alemtuzumab for post lung transplant CLAD.

### **Learning Objectives:**

Recognize chronic lung allograft dysfunction (CLAD) contribution to mortality following lung transplant.

Identify the effect of alemtuzumab on lung function for the treatment of CLAD.

### **Self Assessment Questions:**

Which of the following statements is true about lung transplantation?

- A Infection is the most common cause of death after the first year.
- B: Cellular rejection is the most common cause of death after the first year.
- C: CLAD is the most common cause of death after the first year.
- D: Malignancy is the most common cause of death after the first year

How does alemtuzumab have the potential affect lung function in patients with CLAD?

- A Alemtuzumab may improve lung function
- B Alemtuzumab may stabilize lung function
- C Alemtuzumab may cause a decline in lung function
- D Alemtuzumab has no effect on lung function

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-565L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **SAFETY AND EFFICACY OF ANTIPSYCHOTIC MEDICATIONS FOR THE TREATMENT OF DELIRIUM IN THE INTENSIVE CARE UNIT (ICU) WITHIN A VETERANS AFFAIRS HEALTHCARE SYSTEM**

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**Purpose:** Delirium occurs in 60-89% of ventilated ICU patients. The impact of delirium extends beyond the hospital stay causing an increased need for chronic care facilities and long-term cognitive impairment. The economic impact of delirium is a public health concern, costing more than 164 billion USD annually. Currently, there are no FDA approved medications for the treatment of delirium. This retrospective cohort study will evaluate the safety and efficacy of antipsychotics for the treatment of delirium in ICU patients. The results of this study will be used to develop an institution-specific guideline for the management of ICU delirium. **Methods:** A retrospective cohort study was conducted using the Computerized Patient Record System (CPRS) medical database. Data was obtained from critically ill patients treated for delirium at the VA Ann Arbor Healthcare System between August 15, 2014 and August 15, 2015. Critically ill patients were defined as patients who spent at least a portion of their hospital admission in the ICU, including both the medical and surgical ICU. Critically ill patients must have been administered at least two doses of antipsychotic medications with corresponding baseline and follow-up EKGs. Patients on antipsychotics prior to admission were excluded from the study. For the primary safety endpoint, EKGs were evaluated for QTc prolongation. The primary efficacy endpoint is length of stay (LOS) in the ICU. Secondary efficacy endpoints include the following: days of mechanical ventilation, days confirmed Confusion Assessment Method (CAM) positive, length of stay (LOS) in the hospital, hospital discharge disposition and 30- and 90-day mortality. Additional collected data includes: age, sex, ethnicity, relevant comorbidities, and other pertinent medications administered, including QTc prolonging medications.

**Results:** Data collection and analysis are currently being conducted. **Conclusions:** To be presented at the Great Lakes Resident Pharmacy Conference.

### **Learning Objectives:**

Identify the risk factors associated with the development of delirium.

Explain the current treatment modalities for ICU delirium recommended by the 2013 Society of Critical Care Medicine (SCCM) Pain, Agitation and Delirium guidelines.

### **Self Assessment Questions:**

Which of the following is an independent risk factor for the development of delirium in the ICU?

- A History of alcoholism
- B: Coma
- C: Pre-existing dementia
- D: Use of propofol

According to the 2013 Society for Critical Care Medicine (SCCM) Clinical Practice Guidelines for the Management of Pain, Agitation and Delirium, what is recommended for preventing and managing ICU delirium?

- A Use of IV haloperidol for the initial treatment of delirium in the ICU
- B Use of IV haloperidol or quetiapine to prevent delirium in the ICU
- C Use of quetiapine to reduce the duration of delirium in the ICU
- D Use of IV lorazepam to reduce the duration of delirium in the ICU

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-566L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEFINING AND EVALUATING THE IMPACT OF CLINICAL PHARMACY SERVICES IN AN AMBULATORY PSYCHIATRIC CLINIC

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**Purpose:** Limited literature exists assessing pharmacy involvement in psychiatric care. This research was conducted to define and evaluate an ambulatory care practice model integrating a psychiatric pharmacist providing clinical services to improve outcomes. The purpose is to describe pharmacist-provided clinical services in the psychiatric outpatient setting and evaluate the impact of these services. This study aims to highlight a pharmacist's role as an ambulatory healthcare provider improving patient outcomes and satisfaction. The intervention includes pharmacist-provided clinical services, consisting of: medication and nonpharmacological therapy management, side effect assessment, adherence assessment, patient education, and patient support.

**Methods:** The study is a retrospective cohort analysis of psychiatric patients initially seen at the University of Michigan Health System Michigan Psychiatric Assessment and Care Transitions (MPACT) Clinic in Ann Arbor, Michigan, from January 1, 2014, to November 30, 2015. Patients who receive the pharmacy contact in addition to a provider visit will be compared to patients who only see the provider. Patients 18 years of age or older referred to the MPACT clinic with a diagnosis of depression and/or anxiety are included. Patients are also included if they require a medication change and have at least one return visit to the clinic. Exclusion criteria includes patients who were previously included in either study arm. The specific aims of this study are to 1) describe services the clinical psychiatric pharmacist provides in the MPACT clinic; 2) evaluate the impact of psychiatric clinical pharmacy services on the outpatient management of psychiatric disorders. The primary outcome is the difference in Patient Health Questionnaire (PHQ)-9 and/or General Anxiety Disorder (GAD) Scale scores at the initial evaluation and completion of time in the MPACT clinic. Secondary outcomes include time spent in MPACT clinic, time to target dose, patient adherence, and patient satisfaction. **Results/Conclusion:** Data collection and analysis are ongoing.

### Learning Objectives:

Describe the benefit of patients being evaluated and managed in an ambulatory psychiatric clinic such as the MPACT care model  
List services a clinical psychiatric pharmacist may perform to optimize outpatient therapy management during an ambulatory care psychiatric patient visit

### Self Assessment Questions:

The goal(s) of patient assessment and development of a treatment plan within the MPACT clinic is(are):

- A: To provide patients with a team-based approach to their care
- B: To assess, stabilize, and provide brief treatment interventions with
- C: To improve psychiatric service access for the UMHS affiliated population
- D: All of the above

A 31 year old female is referred by her PCP to be evaluated at the MPACT ambulatory care psychiatric clinic after a recent hospital admission for suicidal ideation. Following meeting with the provider

- A: Patient medication education, medication adherence assessment,
- B: Medication reconciliation, suicidality assessment, assessment of patient
- C: Discuss and answer medication-related questions/concerns, solely
- D: Mood assessment, side effect monitoring, patient medication education

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-835L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INTERPROFESSIONAL APPROACH TO SAFE INJECTION PRACTICES

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**Purpose:** The reduction of infection risk with the use of multi-dose vials is an important medication-use safety initiative. Safe injection practice was identified as an area in which increased emphasis is needed to create sustainable practice changes to ensure patient safety. The objective of this quality improvement project is to implement practice change pertaining to safe injectable medication practices and to ensure this change is adopted successfully through interprofessional collaboration. **Methods:** A team was formulated to develop and implement a new policy pertaining to this practice change. In addition to key stakeholders, this team included a nurse patient safety fellow, a pharmacist medication use safety resident, and a physician chief resident in quality in safety. A pre-implementation knowledge assessment was distributed to medical residents, pharmacy staff, and nurses in selected pilot areas to determine potential barriers to implementation, perceptions of staff related to safe injection practices, and potential education gaps. Process mapping was utilized to document pre-implementation procedure for nursing and physician administration of injectable medications as well as pharmacy distribution of specified injectable medications. Three medical-surgical pilot units were identified to target nursing staff. Unit #1 received in-person education; unit #2 received online/printed education; unit #3 received standard education as deemed appropriate by the unit manager. Medical residents received in-person education and pharmacy staff received education via staff meetings and email. Practice compliance will be monitored through analysis of barcode medication administration (BCMA) records, missing medication reports, pharmacy distribution records, direct observation, and event reporting. Change in perception and knowledge will be measured with a post-implementation survey.

**Preliminary results:** The pre-implementation survey was completed by 110 clinicians. There is no statistically significant difference among the professions or among the nursing units when evaluating misconceptions and correct practice. Additional results pending. Conclusion pending

### Learning Objectives:

Recognize risk associated with unsafe injection practices  
Discuss the benefits of interprofessional collaboration in executing a quality improvement project

### Self Assessment Questions:

Which of the following statements is correct about safe injection practice?

- A: Multi-dose vials can be shared among multiple patients
- B: Opened single-dose vials may be saved for later use on the same patient
- C: Improper aseptic technique and sharing of injectable medications
- D: Multi-dose vials contain a preservative, therefore it is not possible to share

Which of the following statements is a benefit of interprofessional collaboration on quality improvement projects?

- A: Varying perspectives allow for looking at the project from multiple angles
- B: Differences of opinions hinder progress of the project
- C: Everyone believes the aspect of the project pertaining to their work
- D: There are no benefits to interprofessional collaboration

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-942L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ORAL ANTICOAGULANTS AS A PREDICTOR FOR HOSPITAL READMISSIONS

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**Purpose:** In 2012, the Hospital Readmissions Reduction Program was created with the signing of the Affordable Care Act, thus impacting

reimbursement rates from Centers for Medicare and Medicaid Services (CMS) for hospital readmissions they deemed unnecessary or

excessive. CMS defines unnecessary readmissions as those that occur within 30 days of being discharged from the same or another hospital. Adverse drug reactions account for a large portion of hospital readmissions, with the most common offending agents being warfarin, oral antiplatelets, and hypoglycemic agents. Several studies have examined the link between warfarin and increased rates of hospital admissions or emergency room visits. However, the new oral anticoagulants have not been studied as much and have not been

definitely linked to increasing hospital readmission rates. Therefore it is necessary to determine if these medications increase a patient's risk for hospital readmissions and if so determine patient safety strategies to improve patient safety, especially during transitions of care.

**Methods:** A retrospective cohort study will be performed including all patients 18 years of age or older who were admitted to the University of Chicago Medicine between January 1, 2013 and December 31, 2014. Data collection will include patient demographics, discharge medications, Elixhauser comorbidity measure, and readmission data. The primary endpoint of interest is to determine if exposure to oral anticoagulants is an independent risk factor for unplanned hospital readmission within 30 days. Secondary endpoints include time to readmission and emergency department visit rates within 30 days.

**Results & Conclusions:** Demographic data has been collected and analyzed for 15817 patients. The mean age for the sample population

is 52.20.5 years, 38.9% of patients are male, 63.5% are African American, and mean Elixhauser comorbidity score is 1.5. Final

results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify medications that are associated with increased rates for hospital admissions and emergency department visits.

Describe the impact the Hospital Readmissions Reduction Program from CMS will have on future hospital reimbursement rates.

### Self Assessment Questions:

Which of the following medications are associated with increased rates of hospital admissions and emergency department visits?

- A: Clopidogrel
- B: Warfarin
- C: Sulfonylureas
- D: All of the above

Which of the following is the correct impact likely to be seen by the Hospital Readmissions Reduction Program created by CMS?

- A: Increased CMS reimbursement for hospital readmissions occurring
- B: Decreased CMS reimbursement for all hospital admissions
- C: Decreased CMS reimbursement for hospital readmissions occurring
- D: Increased CMS reimbursement for all hospital admissions

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-943L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION AND EVALUATION OF A PHARMACY TEAM-BASED INPATIENT TOBACCO TREATMENT SERVICE

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**Purpose:** A hospitalization can serve as an opportunity to review health behaviors such as tobacco use with patients. Furthermore, treating and counseling inpatients on tobacco use are components of a Joint Commission Core Measure Set. The purpose of this study is to implement and review the impact of a pharmacy team-based approach to an admission inpatient tobacco treatment service.

**Methods:** Training materials, in-services, competencies, and templated documentation notes were developed for both pharmacists and pharmacy technicians. Pharmacy technicians and inpatient pharmacists expanded their roles through this process. Pharmacy technicians assessed patients for tobacco use and treatment interest, and they provided non-pharmacologic tobacco treatment counseling utilizing motivational interviewing. These activities were incorporated within the technician admission medication history service. Inpatient pharmacists prescribed FDA approved tobacco treatment medications for the duration of an inpatient stay and upon discharge. This new service was implemented in November 2015. The primary outcome of the study is to review changes in facility performance after implementation of three Joint Commission measures: percentage of patients admitted that are screened for tobacco use, percentage of patients who refused/ received counseling to quit and refused/received FDA approved cessation medications, and percentage of patients who received counseling to quit and received FDA approved cessation medications. Secondary outcomes include comparison of patient care outcomes for pharmacy technician versus pharmacist-led non-pharmacologic counseling, workload assessment, comparison of study facility to health-system wide and regional performance averages, and employee satisfaction. Data analysis will be completed using the Chi-Square test for categorical variables and a two-tailed t-test for continuous variables. **Results/Conclusion:** The results and conclusion are pending.

### Learning Objectives:

Identify Joint Commission Tobacco Treatment measures.

Describe non-pharmacologic methods utilized by pharmacy technicians.

### Self Assessment Questions:

Which of the following is a Joint Commission inpatient tobacco cessation measure?

- A: Screening for tobacco use
- B: Providing tobacco cessation education material
- C: Ordering nicotine replacement therapy
- D: Prohibiting patients to use tobacco in designated areas

For patients who screen positive for tobacco use, the pharmacy technician may complete the following task:

- A: Determine appropriate pharmacologic therapy
- B: Provide counseling on non-pharmacologic strategies
- C: Order nicotine replacement therapy
- D: Provide counseling on medications

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-836L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF BARCODE SCANNING TO STERILE PRODUCT COMPOUNDING AND DISPENSING AT A COMMUNITY HEALTH SYSTEM

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**Purpose:** The preparation and accuracy of compounded sterile products (CSPs) is a responsibility that resides with pharmacy. Adding barcode-scanning to the preparation process, when utilized properly, can help to ensure that CSPs contain the appropriate ingredients, prevent look-alike sound-alike errors, and facilitate retrieval during a drug recall. The American Society of Health-System Pharmacists encourages hospitals to utilize barcode-scanning during compounding, repackaging, and labeling processes to enhance patient safety. NorthShore University Health System has barcode-scanning functionality available through their electronic health record (EHR) vendor specific to medication compounding, dispensing, and verification. The purpose of this project is to implement scanning technology into sterile product preparation areas in the inpatient, oncology, and operating room pharmacies. The goal is to improve patient safety and advance to a closed-loop medication distribution system; end-to-end flow of technology from ordering to preparing to verifying to administering. **Methods:** A taskforce was formed comprising of frontline sterile area technician staff technician supervisors, inpatient pharmacy managers, technical support and analysts. Current sterile product workflow and processes were observed within the sterile preparation areas in the inpatient, oncology and operating room pharmacies at all four hospital sites. Batch prepared CSPs were compiled into a database for consistency and built into the EHR. Equipment needs were determined for all four hospitals and installed into the sterile product areas. Training and education on new workflows will be provided across all four sites. Daily compliance reports will be generated following implementation to allow managers to oversee staff adoption of new workflows. **Results and Conclusions:** Data collection is in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify how a closed-loop medication distribution system can be used to promote patient safety.  
Describe challenges to workflow when implementing new equipment into a sterile product area.

### Self Assessment Questions:

Which of the following defines a closed-loop medication distribution system?

- A: A closed environment in which sterile products are prepared
- B: End-to-end seamless flow of technology from ordering to preparing
- C: Preparation and verification of sterile products performed by the staff
- D: Sterile product compounding completed within a single vial

What is an advantage of barcode-scanning during medication preparation?

- A: Improved patient safety
- B: Prevention of look-alike sound-alike errors
- C: Facilitation of drug retrieval during a recall
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-944L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## MEDICATION REGIMENS OF PATIENTS WITH SCHIZOPHRENIA AND RELATED DISORDERS WITH 30-DAY READMISSIONS COMPARED TO PATIENTS WITHOUT 30-DAY READMISSIONS

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**Purpose:** Readmission into an inpatient psychiatric facility has been proposed as one indicator of the quality of inpatient psychiatric services. The Hospital Readmission Reduction Program (HRRP) penalizes hospitals for 30-day readmissions of Medicare patients after initial hospitalizations for selected conditions. Currently, psychiatric hospitals are exempt from HRRP, but it is unknown if psychiatric diagnoses will be included in future years. As a result, hospitals are focusing on reducing 30-day readmissions when possible. While there are a number of studies published on factors affecting readmission into an inpatient psychiatric facility, few studies have been published specifically on 30-day readmission rates in patients with schizophrenia and related disorders. The objectives of this study are to determine which medication factors are associated with reduced risk of readmission within 30 days of discharge and describe the trends and prescribing patterns of medications for patients with schizophrenia and related disorders at Community Health Network. **Methods:** A retrospective, observational chart review study was performed. Inpatients admitted to the Behavioral Health Pavilion between January 1, 2014 and August 31, 2015 with a diagnosis of schizophrenia and related disorders (ICD-9 codes 295.00-295.95) and an inpatient readmission within 30 days of discharge were identified by social work report. Subjects were matched to a control group with a diagnosis of schizophrenia and related disorders without an inpatient readmission within 30 days of discharge. Data collected included patient demographics, length of stay, diagnosis code, comorbid psychiatric diagnosis codes, readmission post discharge day, and medications at discharge. Medication information collected included name, dose, dosage form, classification, and total number of antipsychotics. **Results/Conclusion:** To be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review factors associated with readmission to an inpatient psychiatric facility.  
Identify potential recommendations pharmacists can make to increase medication adherence.

### Self Assessment Questions:

Which of the following is associated with an increased risk of readmission to inpatient psychiatric treatment?

- A: Longer length of inpatient stay
- B: Nonadherence to medication
- C: No medical comorbidities
- D: No previous psychiatric hospitalizations

Which of the following recommendations could potentially increase medication adherence for patients with schizophrenia and related disorders

- A: Prescribing without considering insurance coverage of medication
- B: Combining first and second-generation antipsychotics
- C: Switching from an oral antipsychotic to a long-acting injectable antipsychotic
- D: Increasing frequency of antipsychotic

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-567L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **VIROLOGICAL RESPONSE AT 4 WEEKS WITH A SOFOSBUVIR-BASED ANTIVIRAL REGIMEN IN LIVER TRANSPLANT RECIPIENTS WITH RECURRENT HEPATITIS C**

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Purpose: Literature is growing in the area of safety, efficacy and tolerability of sofosbuvir (SOF)- based antiviral therapy (AVT) in recurrent hepatitis C virus (HCV) post liver transplantation (LT). We aim to report the response after 4 weeks of SOF-based AVT defined as rapid virological response (RVR) in recurrent HCV infection. Methods: Single center cohort study of adult LT recipients who received SOF-based AVT from January 2012 to October 2015. Primary end point was RVR. Predictors of RVR were also studied. Results: Forty-one LT performed for HCV during study period. Of these, 37 {90%; mean age: 60; IQR= 56-63 years, 30 (81% males) with recurrent HCV infection were treated with SOF based AVT. Thirty-two were treated with SOF/ledipasvir and 5 with SOF/ribavirin. AVT was started within 12 months in 13 (35%) patients and in the rest (65%) ≥12 months after LT. A majority of patients (n=31; 83%) had genotype 1 infection. Pretreatment mean HCV viremia was 4,000,000 copies/mL (IQR: 1,400,000- 7,500,000 copies/mL). High viremia (>6 million copies/mL) was reported in 11 (30%) patients. Overall 27/37 (76%) achieved RVR, while 24/31 (77%) with GT-1 achieved RVR. Among those who did not achieve RVR mean HCV viremia was <12 copies/mL (IQR= <12 to 26.5 copies/mL). On univariate analysis, predictors of RVR were cyclosporine use (n=18; 64%) as compared to tacrolimus (n=9; 32%), p=0.03. Another predictor of RVR was start of AVT ≥12 months post LT (p=0.02). Fatigue (20%) and insomnia (9%) were the most commonly reported adverse effects. No difference in genotype, MELD score or fibrosis score was observed between patients. Conclusions: RVR was achieved in 76% of our recurrent HCV patients; those not able to achieve RVR had very low viremia and expect to achieve SVR-12 and SVR-24. Predictors of RVR were use of cyclosporine and treatment ≥12 months post LT.

### **Learning Objectives:**

Describe Virological response at 4 weeks to predict outcome of hepatitis C treatment with sofosbuvir-based antiviral regimen

Identify potential measurable outcomes with the use of Sofosbuvir-based antiviral therapy in recurrent hepatitis C virus post liver transplantation

### **Self Assessment Questions:**

Which of the following sentences is true:

- A Liver transplant is curative for hepatitis c virus (HCV)
- B: After liver transplant HCV will reoccur histologically in some capac
- C: HCV is the leading cause of graft loss in liver transplant patients w
- D: B and C

According to study results, predictors of rapid virological response (RVR) were the following:

- A Use of cyclosporine
- B Use of sofosbuvir-Ledipasvir (Harvoni™)
- C Start of antiviral therapy ≥12 months post liver transplant
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-568L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **EVALUATION OF VACCINE ERRORS AT THE JESSE BROWN VA MEDICAL CENTER**

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Background: Vaccines are vital for protection against communicable diseases and have been considered one of the most significant public health achievements, preventing an astounding two to three million deaths per year worldwide. Jesse Brown VA Medical Center (JBVAMC) recognizes the importance of preventative care through vaccinating its veteran patient population. Vaccine use has increased at Jesse Brown VA Medical Center over time. With the complex administration schedules and nuances of each vaccine, it is especially important that vaccines are ordered, dispensed, stored, administered, and documented appropriately. Therefore, the pharmacy department, along with the help of the nursing staff, has been conducting vaccine quality assurance to assess vaccine-related events occurring at the institution. While there are multiple checks to help minimize errors, vaccine errors still remain a problematic issue. The purpose of this study is to evaluate the vaccine-related errors in the facility and to propose system solutions that may reduce them. Methods: This study will be a retrospective, electronic chart review of patients at JBVAMC that will evaluate vaccine-related errors that occurred from March 1, 2015 to August 31, 2015. The primary endpoint of the study is to evaluate the processes related to vaccine errors and to identify the root cause. Secondary endpoints include the incidence of various types of vaccine related errors and the contributing factors of these errors. Results and Conclusion: Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

List the steps of the vaccine administration process.

Identify the types of vaccine errors associated with each step of the vaccine administration process.

### **Self Assessment Questions:**

Which of the following is a correct step of JBVAMCs vaccine administration process?

- A A vaccine that is administered must be documented in both a vacc
- B: Pharmacy typically verifies a vaccine order prior to administration
- C: Administration of a vaccine occurs before the ordering process
- D: Complete documentation of a vaccine occurs before the administr

Which of the following type of vaccine error is related to the documentation process?

- A Duplicate vaccine ordered
- B Duplicate vaccine administered
- C Wrong vaccine administered
- D Incorrect vaccine information documented in the vaccine administ

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-945L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CREATION OF A MULTIDISCIPLINARY CONTROLLED SUBSTANCES DIVERSION PREVENTION AND DETECTION TASKFORCE

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**Purpose:** Detecting drug diversion in health care facilities is a challenge due to the numerous access points in the medication distribution cycle, beginning with the purchase of medications to administration to the end user. Studies suggest drug diversion by healthcare professionals is similar to that of the general public, except it is more likely to be diversion of prescription medications due to accessibility. Diversion of controlled substances by healthcare professionals is a serious matter that affects the individual them self, colleagues, patients, and the organization. The purpose of this project is to develop a high level taskforce that will guide the health systems policies, procedures, and strategies in the area of controlled substance management. The taskforce has been asked to develop and maintain a program to prevent diversion and ensure mechanisms in place to detect diversion. The taskforce will review policy changes and audits related to controlled substances. When diversion has been identified, the taskforce will lead the investigation process and provide recommendations to the appropriate personnel. Lastly, the taskforce will work together to provide education and increase awareness of drug diversion. **Methods:** To ensure success, the first step was to complete background research on diversion of controlled substances in hospitals and health systems. Next, current policies and procedures related to controlled substances were reviewed. Once the review was completed, the stakeholders within the organization were identified and their role was defined. After the preliminary planning process was done, the pharmacy department sent out an invitation to the stakeholders who were identified to join the taskforce. Once the members accepted the invitation, a kick-off meeting was scheduled to review the literature on diversion of controlled substances, the purpose of the taskforce and the next steps moving forward. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Explain the importance for the creation of the diversion prevention and detection taskforce

List the tasks assigned to the diversion prevention and detection taskforce

### Self Assessment Questions:

Select who is directly affected when a healthcare professional diverts a controlled substance for their own use

- A: The neighbors
- B: The government
- C: The hospital
- D: The local high school

Identify which task should not be completed by the diversion prevention and detection taskforce

- A: Provide education about drug diversion
- B: Complete weekly unit inspections
- C: Assist in the annual pharmacy inventory
- D: Review the medication purchase history

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-837L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PHARMACIST IMPACT ON IMPROVING TRANSITIONS OF CARE IN ALLOGENEIC STEM CELL TRANSPLANT PATIENTS

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**Purpose:** Allogeneic hematopoietic stem cell transplant (HSCT) patients are prone to medication errors due to the complexity of their medication regimen and frequent changes made during transplant admission, discharge, and follow-up visits. Pharmacists at Froedtert are incorporated into both the ambulatory and acute care HSCT teams. Initial education is provided by the ambulatory pharmacist prior to transplant and reinforced by an acute care pharmacist at discharge post transplant. This quality improvement initiative aims to implement a standardized pharmacist post-discharge follow-up program and assess impact on patient outcomes during this transition of care. Patients will be scheduled for an appointment with an ambulatory HSCT pharmacist within one week of discharge to complete a medication review, identify drug-related problems, assess adherence, and optimize medication therapy. **Methods:** This project will be a descriptive analysis assessing the impact of a post-transplant follow up program with the ambulatory HSCT pharmacists. Adult patients undergoing allogeneic HSCT with a date of transplant and completed post-discharge follow up visit with an ambulatory HSCT pharmacist from October 19th 2015 through April 19th 2016 will be included. Patients who received an autologous or syngeneic stem cell transplant will be excluded. Pharmacist impact will be measured by quantifying drug related problems identified, including renal/hepatic dose adjustments, unnecessary medications, inappropriate adherence, additional therapy needed, drug interactions, and optimization of drug therapy. Each intervention will be given a severity rating using the National Coordinating Council for Medication Error Reporting and Prevention Index. Emergency department visits and hospital readmission data will be collected and compared to a pre-intervention group. Medication acquisition issues pending at discharge will also be reported for quality improvement, including the names and number of pending prior authorizations at time of discharge.

**Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify potential causes of medication errors during the transition from acute care to ambulatory setting

Review the clinical impact of a pharmacist post-transplant discharge program in addition to standard of care pharmacy services on improving patient adherence and optimizing medication therapy in allogeneic stem cell transplant patients

### Self Assessment Questions:

1. Evaluate the clinical impact of a pharmacist post-transplant discharge program in addition to standard of care pharmacy services on improving patient adherence and optimizing medication therapy in

- A: 10%
- B: 20%
- C: 30%
- D: 50%

2. ACCP identified risk factors for experiencing an adverse drug event during transition of care include all of the following except:

- A: older adult
- B: lower income
- C: patients who take more than 5 medications daily
- D: poor social support system

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-838L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**THE IMPACT OF DAILY INTERVENTION BY A CLINICAL PHARMACIST ON NURSE AND PATIENT SATISFACTION (HCAHPS) AND READMISSION RATES: A PILOT STUDY**

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**Purpose:** Pharmacists can increase medication adherence and decrease medication-related readmission rates by ensuring patients understand the purpose of their medications and how to use them effectively to achieve better outcomes. The purpose of this pilot study is to evaluate the impact of a pharmacist on readmission rates, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) results, and nurse satisfaction through independent pharmacy rounds. **Methods:** This quality improvement initiative included subjects admitted to and discharged from a single unit of Spectrum Health Meijer Heart Center from 11/1/15 to 01/31/16. Patients were included in the pilot group if they were seen by a pharmacist for medication education. All other patients on the unit during the same timeframe who were not seen by a pharmacist were included in the non-pilot group. Before this initiative, pharmacists provided medication education only to selected patients being discharged on new medications. During this pilot, pharmacists performed daily independent pharmacy rounds utilizing a mobile workstation to provide education on new medications administered inpatient. The primary endpoints were improvement in 30-day readmission rate, medication related HCAHPS results, and nurse satisfaction. Secondary endpoints included hospital length of stay, frequency of discharge medication counseling, targeted pharmacy interventions, and medication safety events. **Results:** A total of 136 patients were educated by a pharmacist through independent rounds in November. To date, 54 HCAHPS surveys have been received from patients discharged in November. The top box percentage for questions focusing on medication side effects, indication and understanding the purpose of each medication at discharge improved by 8%, 12%, and 11% in the pilot group compared to the non-pilot group. **Conclusions:** Interim analysis demonstrates that daily independent pharmacy rounds have improved medication related HCAHPS results. Further results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

State the measures evaluated in the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey regarding medication communication.

Identify potential ways to measure the impact of a pharmacist-led independent bedside rounding in direct patient care areas.

**Self Assessment Questions:**

Which of the following is a HCAHPS measure evaluated in regards to medication communication?

- A: Medication storage
- B: Medication administration
- C: Medication purpose
- D: Missed medication doses

What are some effective ways to assess the success of a pharmacist-led independent bedside rounding in direct patient care areas?

- A: Documentation of types of interventions made
- B: HCAHPS scores or quality metrics related to medication communication
- C: Frequency of nurse phone calls
- D: A and B

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-839L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**IMPLEMENTATION AND EVALUATION OF AN ALGORITHM-BASED ORDER SET FOR THE OUTPATIENT TREATMENT OF URINARY TRACT INFECTIONS IN THE SPINAL CORD INJURY POPULATION IN A VETERANS AFFAIRS MEDICAL CENTER**

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**Purpose:** Treatment of urinary tract infections (UTIs) in the spinal cord injury (SCI) population is often difficult due to the lack of symptoms, increased resistance, and increased morbidity and mortality associated with UTIs. The goal of this study is to develop an algorithm-based order set for the treatment of UTIs for patients with SCI in order to assess current antimicrobial prescribing practices at the Zablocki Veterans Affairs Medical Center (ZVAMC). The order set will be based on SCI-specific antibiogram data with the ultimate purpose of improving appropriate treatment and outcomes in this population. **Methods:** This study is a retrospective, pre- and post-implementation analysis of an order set based on SCI antibiogram data. The primary outcome measured will be the percentage of appropriate outpatient treatment of UTIs in the SCI population, with appropriate treatment defined by the Infectious Diseases Society of American (IDSA) catheter associated (CA)-UTI guidelines. Appropriate empiric treatment will also be influenced by the SCI-specific antibiogram. Secondary outcomes will include the association between number of antibiotics prescribed and catheter type (indwelling versus intermittent), association between incidence of UTI and prophylactic antibiotic use, and inpatient admission rate following treatment. Descriptive statistics will be used to gather baseline data and characteristics. Chi squared tests will be used to evaluate the primary outcome as well as all secondary outcomes. The goal will be to assess 45 patients pre-implementation and 45 patients post-implementation in order to achieve a power of 80% with an effect size of 0.3. **Results and Conclusions:** To be presented at Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Explain why urinary tract infections are more difficult to treat in patients with spinal cord injury compared to the general population.  
Discuss different methods to help improve the treatment and outcomes in patients with spinal cord injury and urinary tract infections in the outpatient setting.

**Self Assessment Questions:**

Which of the following explains one reason why UTIs are more difficult to treat in patients with SCI?

- A: Symptoms of UTI are often completely absent in patients with SCI
- B: Urinary tract infections occur less frequently in patients with SCI
- C: Offending organisms are often significantly more resistant in patients with SCI
- D: Patients with SCI have a significantly weakened immune system

Which of the following would be an example of a method to improve treatment of UTIs in patients with SCI?

- A: Use a local unit-specific antibiogram to help choose antimicrobial treatment
- B: Obtain urine culture prior to starting therapy and modify antimicrobial treatment
- C: Treat all patients with SCI for fourteen days for UTIs
- D: Do not use ciprofloxacin or other fluoroquinolones for the treatment of UTIs

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-569L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PHENYTOIN DOSING AND MONITORING GUIDELINE IN TRAUMATIC BRAIN INJURY PATIENTS

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**Purpose:** Patients with a traumatic brain injury (TBI) often experience complications that may lead to prolonged disability and reduced quality of life. Seizures are particularly concerning due to the potential to acutely precipitate adverse events if preventive strategies are poorly managed. Current TBI guidelines recommend administering an anticonvulsant for one week following injury, but do not specify which agent to utilize. As a level one trauma center, Froedtert Hospital provides care for numerous TBI patients who require seizure prophylaxis. Phenytoin is frequently utilized due to provider familiarity and evidence supporting its use. However, minimal information is available regarding dose adjustments and monitoring of phenytoin levels in TBI patients. This lack of guidance creates inefficiency and inconsistency in patient care. Phenytoin levels are often excessively ordered and improperly scheduled, resulting in unnecessary costs and reliance on suboptimal data for dose adjustment decisions. The purpose of this project is to develop a standardized phenytoin guideline for TBI seizure prophylaxis and advance the role of pharmacists through implementation of a pharmacist managed phenytoin protocol. This project may serve as the foundation for future expansion of pharmacist services to include all patients receiving phenytoin at Froedtert Hospital. **Methods:** Retrospective chart review of TBI patients who received seizure prophylaxis with phenytoin between July 1st, 2013 and June 30th, 2015 will provide data regarding current phenytoin dosing and monitoring. Strategies that resulted in optimal phenytoin management, defined as correctly timed phenytoin levels and dose adjustments resulting in therapeutic levels, will be assessed for incorporation into the guideline. Development of the guideline will occur simultaneously with chart review, and data collected will be used as evidence to support recommendations made within the guideline.

**Results and Conclusions:** Data collection and guideline development are ongoing. Available results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe how phenytoin ordering and monitoring patterns were utilized during guideline development  
Discuss potential benefits of standardizing the utilization and monitoring of phenytoin in TBI patients

### Self Assessment Questions:

Which data parameters are useful for the development of a phenytoin dosing and monitoring guideline?

- A: Correlation of phenytoin loading dose with post-loading dose free level
- B: Frequency, timing, and result of free phenytoin levels
- C: Percentage of patients on multiple anticonvulsants
- D: A & B

Which of the following is a potential benefit of standardizing the dosing and monitoring of phenytoin for TBI seizure prophylaxis?

- A: Increased overall cost of monitoring phenytoin levels
- B: Decreased percentage of therapeutic phenytoin levels
- C: Decreased provider variability for phenytoin dose adjustments
- D: Increased use of alternative anticonvulsant agents

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-570L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF A PHARMACY-DRIVEN MEDICATION BEDSIDE DELIVERY PROGRAMS IMPACT ON 30-DAY HOSPITAL READMISSION RATES

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**Purpose:** Hospital readmissions are considered key contributors to rising health care costs. Medication-related adverse events contribute a significant proportion of these re-hospitalizations, with up to 10% related to medication non-adherence. Published literature has demonstrated that through transition of care programs, pharmacy services have the ability to favorably impact patient outcomes. Although pharmacy-run medication bedside delivery programs have become a common approach in hospitals for increasing prescription volume and medication adherence, there is a lack of current research assessing this service as a single predictor of readmission rates. The purpose of this descriptive, retrospective cohort study is to evaluate the impact of a pharmacy-driven medication bedside delivery service on hospital readmission rates and composite healthcare resource utilization for post-discharge. **Methods:** Cleveland Clinic Department of Pharmacy established a medication bedside delivery service hospital-wide in 2014. The intervention group includes all patients who utilized this service during May 1, 2014 to September 30, 2015, while the control group includes all patients during the same time period who did not utilize the service. For the primary outcome, unplanned all-cause 30-day readmission rates for both the intervention and control groups will be calculated as the percentage of discharges with a readmission. Planned readmissions will be excluded, which are defined as (1) a non-acute readmission in which a planned procedure occurs, or (2) a readmission for maintenance chemotherapy. For secondary outcomes, composite 30 day healthcare resource utilization for both groups will be calculated as the percentage of discharge with any of the following: emergency department visit, urgent care clinic visit, and unscheduled physician office visits. Multivariate regression analysis will be used in determining primary and secondary outcomes adjusted for clinical and demographic patient characteristics. **Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the impact of transition of care programs during hospital discharge on health care outcomes  
Discuss current literature evaluating the impact of pharmacy services or reducing hospital readmission rates

### Self Assessment Questions:

Hospital transition of care programs have been shown to have which of the following health care outcome(s)?

- A: Increase total health care costs
- B: Improve overall health outcomes
- C: Reduction in 30-day readmission rates
- D: B & C

Which of the following pharmacy-bundled intervention programs have been shown to reduce 30-day hospital readmission rates?

- A: Patient home visits with medication education between 7-14 days
- B: Bedside delivery of discharge medications and 72 hour follow-up pharmacist
- C: Nurse follow up phone calls with pharmacist-provided education at discharge
- D: A & B

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-840L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PATIENT BENEFIT AND SATISFACTION WITH A PHARMACIST-LED MEDICARE PART D PLAN SELECTION PROGRAM

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### Purpose:

The purpose of this study is to evaluate patient benefit and satisfaction with a pharmacist-led Medicare Part D selection service within a patient-centered medical home (PCMH). The primary objective of this study is to assess patients' perceptions of their current Medicare Prescription Drug Plan (PDP) in 2015 compared to 2014. A secondary objective is to evaluate patients' interest in returning for a visit with a pharmacist in 2015.

### Methods:

A report was generated from the electronic health record to identify all patients at a general internal medicine PCMH who participated in a pharmacist-led Medicare Part D selection service in 2014. Pharmacists made 3 attempts to contact patients in August or September of 2015 to offer participation in this study. Patients provided verbal consent for their participation in the telephonic survey prior to answering a series of standardized multiple-choice questions. Answers were collected in a Microsoft Excel spreadsheet and analyzed using descriptive statistics.

### Results:

A total of 111 patients were contacted for participation in this study. Of these patients, 88 answered, provided verbal consent, and completed the telephonic survey. Only 6 patients reported not being satisfied with their current plan, and 7 stated their current plan was more expensive. All others were either more satisfied or just as satisfied and felt their overall medication costs were less expensive or the same as the previous year. Most patients felt neutral when asked if they were more or less likely to take their medications as prescribed with their current PDP. Over 50% of patients were interested in returning for a visit with the pharmacist in 2015.

### Conclusion:

In conclusion, the value of a pharmacist-led Medicare Part D selection service in a PCMH has been demonstrated through reported patient satisfaction with their PDPs, medication cost savings, and interest in returning for a visit with the pharmacist.

### Learning Objectives:

Discuss patient perceptions of their current Medicare Prescription Drug Plan in 2015 compared to 2014

Describe patient outcomes based on their participation in a pharmacist-led Medicare Part D Plan selection service within a patient-centered medical home

### Self Assessment Questions:

1) What is the projected annual cost savings per patient after participation in a pharmacist-led Medicare Part D selection service?

- A: \$0-300
- B: \$300-600
- C: \$600-900
- D: \$900-1,300

2) Which of the following patient reported outcomes were identified as a result of participating in a pharmacist-led Medicare Part D selection service in a patient-centered medical home?

- A: Improved cost
- B: Decreased number of prior authorizations
- C: Patient satisfaction with their current prescription drug plan
- D: A and C

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-973L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RETROSPECTIVE REVIEW OF BLEEDING COMPLICATIONS WITH IBRUTINIB AND CONCOMITANT ANTIPLATELET, ANTICOAGULANT OR SUPPLEMENTAL THERAPY

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**Background/Purpose:** Ibrutinib, a first in class small molecular inhibitor of Bruton's tyrosine kinase (BTK), is an effective oral chemotherapeutic option in chronic lymphocytic leukemia (CLL), mantle cell lymphoma (MCL), and Waldenström's macroglobulinemia (WM). Despite the demonstrated efficacy of ibrutinib in these settings, it is known that BTK inhibition is associated with selective antagonization of collagen-mediated platelet signaling, leading to a demonstrable increase in the incidence of serious bleeding when combined with the anticoagulant warfarin in clinical trials. Although it is known that serious bleeding incidence is increased by approximately 1-5% when ibrutinib is used concomitantly with warfarin, little is known about the potential increase in serious bleeding incidence with other agents that affect the clotting cascade or platelet function. **Methods:** This retrospective chart review evaluates the incidence of major bleeding and bleeding leading to hospitalization in patients receiving ibrutinib concomitantly with antiplatelet agents, anticoagulants, or supplements with potential anticoagulant activity. Major bleeding events were identified using criteria developed by the International Society on Thrombosis and Haemostasis. Data were collected on approximately 530 patients treated with ibrutinib for CLL, MCL, or WM between March 1, 2010 and March 1, 2015. Patients of at least 18 years of age and less than or equal to 89 years of age who have received ibrutinib were included. The primary objective of this study was to evaluate the incidence of major bleeding, while the secondary objective was to identify risk factors associated with the development of major bleeding in the above setting. **Results/Conclusions:** The results of this study will assist in describing the overall bleeding-related safety profile of ibrutinib in a generalized oncological population and may also help to further define patient-specific risk factors associated with these bleeding complications. Data collection and analysis is currently ongoing.

### Learning Objectives:

Recall the proposed mechanism by which ibrutinib adversely affects platelet function.

Recognize the most commonly utilized definitions of major bleeding, minor bleeding, and clinically-relevant minor bleeding.

### Self Assessment Questions:

Which of the following agents has been associated with a significantly increased rate of major bleeding when used in combination with ibrutinib?

- A: Enoxaparin
- B: Warfarin
- C: Clopidogrel
- D: Dabigatran

Which of the following sets of patient characteristics constitutes an instance of major bleeding as classified by International Society on Thrombosis and Haemostasis guidance?

- A: Intractable epistaxis requiring multiple episodes of nasal packing
- B: Well-feeling with extensive bilateral upper extremity contusions
- C: Bilateral flank contusions and CT abdomen/pelvis consistent with injury
- D: Requiring 2 units of PRBCs for symptomatic control of CLL-related bleeding

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-571L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## ESTABLISHMENT OF ANTIBIOTIC TIMEOUT PROCEDURE IN A MEDICAL INTENSIVE CARE UNIT (MICU)

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Multidrug resistant organisms (MDROs) remain a major public health threat. The 2014 presidential executive order addressed the plan to combat MDROs through antimicrobial stewardship programs and mandatory antibiotic time-outs. The Centers for Medicaid Services (CMS) are currently surveying 48-hour antibiotic time out procedures and by 2017 citations, will be issued to facilities without a time-out program. To address the upcoming CMS changes, Henry Ford Health System implemented an antibiotic time out procedure in the MICU. We believe this program will optimize antimicrobial therapy and successfully serve as a pilot program to later implement throughout the health system. This was an IRB approved cluster randomized study conducted in four of the MICU pods at an acute care facility. Randomization occurred via an online randomizing tool. All patients admitted to the MICU with active systemic or inhaled antimicrobial therapy  $\geq$  48 hours were included. Patients admitted to a general practice unit, all other ICUs, and/or lack of active antimicrobial therapy were excluded. The timeout procedure in the intervention group included a standardized set of antimicrobial questions designed to help optimize therapy that were incorporated into the already established MICU quality rounds tool performed by the rounding clinical pharmacist. The control group consisted of patients who had their antimicrobial therapy managed according to standard of care without formal timeout procedures. The intervention was performed weekdays during morning multidisciplinary rounds. The primary endpoints were optimization of therapy and time to optimization. Optimization was defined as escalation or de-escalation that resulted in pathogen directed therapy. Sample size of 260 was used to detect a 35% difference in de-escalation. Descriptive statistics, Mann-Whitney U, Chi squares for categorical variables, and a multivariate analysis for severity of illness and amount of therapy optimization will be performed. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the best practices in antimicrobial stewardship recommended by regulatory agencies to combat multidrug resistant organisms  
Review the role of an antibiotic timeout procedure in a medical ICU

### Self Assessment Questions:

AM is a 47 y.o. M being treated for community acquired pneumonia with Moxifloxacin 400 mg PO daily. Today is day 3 of therapy. According to the proposed CMS requirements for reimbursement, which of the following is correct?  
A: An antibiotic timeout is currently not indicated since AM has not been on therapy for 48 hours.  
B: AM meets criteria for an antibiotic timeout since antimicrobial therapy has been initiated.  
C: An antibiotic timeout is not indicated since AM is only receiving oral therapy.  
D: Antibiotic timeout is not required for CMS reimbursement

Which of the following represents a goal of an antibiotic timeout procedure in a medical ICU?

- A Escalation of therapy only
- B De-escalation of therapy only
- C Decreases the amount of stop dates entered
- D Optimize antimicrobial therapy

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-841L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF ANTITHROMBIN III DOSE RESPONSE IN NEONATAL EXTRACORPOREAL MEMBRANE OXYGENATION

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Purpose: Anticoagulation is necessary during extracorporeal membrane oxygenation (ECMO) to prevent thrombus formation within the ECMO circuit. Unfractionated heparin, the anticoagulant of choice in pediatrics, enhances the action of antithrombin III (ATIII), an endogenous anticoagulant. As such, ATIII deficiency can be a risk factor for thrombosis. Neonates characteristically lower baseline concentrations of functional ATIII, critical illness, and circuit dilution put this population at a particular risk of ATIII deficiency. Functional ATIII concentrations are routinely monitored during ECMO support, and often replenished if considered suboptimal and anticoagulation goals are not achieved. ATIII replacement is possible via fresh frozen plasma (FFP) and ATIII concentrates. Currently, there is no consensus on appropriate ATIII concentrate dosing strategies for pediatric patients. In fact, the adult dose equation provided by the manufacturer and many variations of this equation have been used in pediatric patients with variable results. The primary objective of this study is to evaluate the dose response of neonates to ATIII concentrate through the rise in ATIII concentrations after administration. The secondary objective of this study is to evaluate the effects of ATIII concentrate on heparin requirements up to 24 hours after a dose. Methods: This is a single-center, retrospective review of neonates receiving at least one dose of ATIII concentrate while on ECMO at Riley Hospital for Children between January 1, 2013, and September 28, 2015. Data collected includes ATIII dose, heparin requirement up to twenty-four hours after ATIII; FFP requirement on day of ATIII dose, ATIII concentration before and after repletion, and incidence of bleeding and/or thrombosis. Data analysis will include descriptive statistics for patient demographics, student t-tests for continuous data, and linear regression to evaluate ATIII dose response. Results & Conclusion: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the impact of antithrombin III concentrations on heparin function in neonates on ECMO.  
Describe strategies for increasing functional antithrombin III concentrations.

### Self Assessment Questions:

At what point do pediatric functional antithrombin III concentrations typically reach those of adult?  
A: One week  
B: 6 months  
C: 5 years  
D: Neonates are born with adult antithrombin III concentrations

Which of the following blood products contains 1 unit/mL of antithrombin III?

- A Whole Blood
- B Granulocytes
- C Platelets
- D Fresh Frozen Plasma (FFP)

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-572L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING IMPACT OF AURORA SPECIALTY PHARMACY IN THE TREATMENT OF HEPATITIS C

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Background: Current guidelines recommend newer therapies over interferon-based treatments for hepatitis C virus (HCV). A specialty pharmacy program was implemented to promote adherence and treatment accessibility within our institution. Objective: To evaluate the impact of a specialty pharmacy program regarding safety and efficacy with use of current Hepatitis C virus (HCV) regimens. The primary outcome was to compare efficacy based on sustained virologic response (SVR) to clinical trials. The secondary outcome included reviewing adverse drug reactions for safety. Methods: A retrospective review of HCV patients who had prescriptions filled through a specialty pharmacy program between 1/17/14 and 6/30/15 was conducted. A total of 204 patients received prescriptions. Five (2.4%) were excluded due to de-enrollment. Kaplan-Meier Method was used to examine time to SVR after regimen completion. Results: A total of 199 patients completed treatment. A majority 156 (78%) of patients were HCV genotype 1 (119 (60%) were 1A), 17 (8%) were genotype 2, and 20 (10%) were genotype 3. Roughly half, 105 (53%) were given ledipasvir/sofosbuvir ribavirin, 37 (19%) received sofosbuvir/ribavirin, 30 (15%) received sofosbuvir/simeprevir ribavirin, 24 (12%) received sofosbuvir/peg interferon/ribavirin, and 3 (1%) received another combination. Six months after completion, 92% of patients achieved SVR. There was no difference in SVR rates between previously treated and treatment-naïve patients (92% vs. 92% at 6 months,  $p=0.56$ ). HCV Genotype 1A was associated with lower SVR rates (87% vs. 98% at 6 months), though not statistically significant ( $p=0.11$ ). The side effects reported were: no side effects 112 (56%), 32 (16%) headaches, 10 (5%) nausea, 5 (3%) anemia, and 17 (8%) other. Conclusion: SVR rates are comparable to clinical trials in this real-life clinical setting. Those with HCV genotype 1A had lower SVR rates, though this did not reach significance. There was no difference between previously treated and treatment-naïve patients.

### Learning Objectives:

Describe how sustained virologic response (SVR) rates of patients filling current hepatitis C regimens at Aurora Specialty Pharmacy compare to clinical trials.

List 3 common side effects experienced by patients filling current hepatitis C regimens at Aurora Specialty Pharmacy

### Self Assessment Questions:

How do SVR rates of patients filling current hepatitis C regimens at Aurora Specialty Pharmacy compare to clinical trials?

- A: Aurora Specialty Pharmacy population has significantly lower cure
- B: There was a statistically significant difference between genotype 1
- C: The Aurora Specialty Pharmacy population showed higher cure rate
- D: Genotype 1A rates were lower than the rest of the population at Aurora

What are the three most common side effects of current Hepatitis C regimens filled at Aurora Specialty Pharmacy?

- A: Severe anemia, depression, and diarrhea
- B: Headache, nausea, and anemia
- C: Diarrhea, vomiting, and anemia
- D: Anemia, back pain, and depression

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-573L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OVERCOMING BARRIERS TO ACCESSING A PHARMACIST-RUN METABOLIC SYNDROME MONITORING CLINIC

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Purpose: The metabolic syndrome monitoring clinic at the Zablocki Veterans Affairs Medical Center is intended to monitor patients at risk of developing metabolic syndrome due to the use of second generation antipsychotics (SGAs). There are a number of barriers that prevent access to the clinic and affect metabolic monitoring rates. These include: lack of awareness about the clinic, financial hardships affecting patient follow-up, and inadequate tools to conduct baseline and continued monitoring. The objectives of this project are to improve access by overcoming these barriers and to conduct a medication use evaluation comparing rates of metabolic monitoring pre- and post-interventions. Methods: An educational pamphlet describing metabolic syndrome and the clinic was developed for dispersion into patient care areas to inform patients and providers of the purpose of the clinic and necessity of monitoring. A short presentation was created to increase provider awareness of the clinic and guidelines on metabolic monitoring for patients taking SGAs. A consult for the clinic was added to the SGA ordering menu in the Computerized Patient Record System (CPRS) so providers can more easily refer patients to the clinic. Tape measures and a better quality scale were obtained so other providers can assist with baseline and ongoing monitoring. Methods of transportation for patients unable to return for follow up due to financial or travel reasons were explored, and information on free van rides for ambulatory veterans was dispersed to providers. Following the implementation of these interventions, referral and metabolic monitoring rates are now being examined and compared to pre-intervention rates using data obtained from CPRS. Patients taking SGAs for indications other than schizophrenia, bipolar disorder, or major depressive disorder, or those receiving less than 50mg of quetiapine per day will be excluded from analysis. Results and Conclusions: Results and conclusions will be presented at the conference.

### Learning Objectives:

Identify potential barriers to accessing a pharmacist-run metabolic syndrome monitoring clinic.

Recognize the monitoring protocol recommended by the 2004 American Diabetes Association/American Psychiatric Association consensus on antipsychotic drugs and obesity and diabetes to a patient taking a second generation antipsychotic.

### Self Assessment Questions:

1. Which of the following is a potential barrier to accessing a pharmacist-run metabolic syndrome monitoring clinic?

- A: Increased patient or provider awareness about the clinic
- B: Few or no financial constraints limiting patient ability to return for follow up
- C: Proper tools to conduct baseline or follow up monitoring
- D: Lack of patient or provider awareness about the need for monitoring

2. Which of the following tests/assessments should be obtained at baseline for a patient initiated on a second generation antipsychotic, according to the American Diabetes Association/American Psychiatric Association?

- A: Liver function tests, thyroid function tests, fasting lipid panel, personal or family history
- B: Family history, thyroid function tests, pulmonary function tests, basic metabolic panel
- C: Personal or family history, weight, waist circumference, blood pressure
- D: Basic metabolic panel, fasting lipid panel, waist circumference, blood pressure

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-574L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE REVIEW OF FECAL MICROBIOTA TRANSPLANT USING FROZEN SAMPLES AND THE ASSOCIATED OUTCOMES

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**Objective:** To characterize patients undergoing fecal microbiota transplant (FMT) using frozen samples for the treatment of Clostridium difficile infection (CDI) and their associated clinical outcomes. **Methods:** A retrospective chart review was completed of patients who underwent their first FMT using a frozen sample for the treatment of CDI between May 1, 2014 and August 31, 2015 at The Ohio State University Wexner Medical Center (OSUWMC). Patients were excluded if they were younger than 18 or older than 89 years of age, incarcerated, or pregnant. Data collected included baseline demographics, Charlson Co-morbidity Index, number of CDI recurrences prior to FMT, CDI treatment failures, time to clinical response post-FMT, clinical resolution at 8 weeks post-FMT, number of repeat FMTs, number of CDI-related admissions post-FMT, mortality and FMT adverse effects. This review utilized descriptive statistics with data described using number as a percentage, median with range, or mean with standard deviation where appropriate. **Results:** Twenty-three patients met inclusion criteria. Median time to clinical response was one day (range 0-11 days). Of the 22 patients with follow-up data available, 14 (63.6%) experienced clinical resolution of CDI at 8 weeks following FMT. Of the patients transplanted in the inpatient setting, 4 (40%) experienced clinical resolution of CDI at 8 weeks versus 10 (83.3%) outpatients. Median Charlson score was higher in inpatients vs outpatients (4 vs 1). Seven patients (31.8%) were hospitalized post-FMT for CDI-related reasons. Four patients (17%) underwent repeat FMT within six months of initial FMT. Three patients (13.6%) died during the study period but none were attributed to CDI post-FMT. The most commonly reported adverse effects were diarrhea (45.5%), abdominal discomfort (36.4%), nausea (22.7%), and bloating (13.6%). **Conclusion:** Clinical resolution post-FMT was more common in the outpatient versus inpatient setting. From a safety standpoint, adverse effects were mild.

### Learning Objectives:

Describe the burden of Clostridium difficile infections on the US healthcare system.

Outline the potential role of fecal microbiota transplants in the management of Clostridium difficile infection.

### Self Assessment Questions:

In 2011, Clostridium difficile infections caused approximately how many deaths across the US?

- A: 4,000
- B: 29,000
- C: 90,000
- D: 160,000

Guidelines published by the American Journal of Gastroenterology suggest the use of FMT for which recurrence of CDI after a trial of pulsed-dose vancomycin?

- A First
- B Second
- C Third
- D Fourth

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-575L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CLINICAL AND FINANCIAL OUTCOMES ASSOCIATED WITH AN INPATIENT THERAPEUTIC INTERCHANGE OF INSULIN DETEMIR TO GLARGINE

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**Background:** Despite prior interest in transitioning patients from insulin glargine to insulin detemir, there may be significant cost and efficacy benefits in switching patients from detemir to glargine. These may include fewer administration times, lower sliding scale insulin requirements, and decreased number of interchanges due to a greater current market share, in general, of insulin glargine. **Purpose:** The purpose of this study is to evaluate the safety, efficacy, and cost associated with an insulin therapeutic interchange of detemir to glargine during inpatient admissions compared to a historical interchange of glargine to detemir. **Methods:** This study will use an electronic medical record (EMR) system to identify patients whose insulin detemir was interchanged to insulin glargine upon admission to ProMedica Toledo Hospital. Retrospective EMR data will also be used to review an equal number of patients whose insulin glargine was interchanged to insulin detemir upon admission to ProMedica Flower Hospital. The following data will be collected: date of admission, length of stay, home basal insulin and dose, interchange insulin and dose, daily fasting blood glucose, total daily requirements of sliding scale insulin, as well as episodes of hypoglycemia. Fasting blood glucose goals will be defined in accordance to current American Diabetes Association (ADA) guidelines. This data will be used to calculate number of days fasting blood glucose at goal, number of hypoglycemic episodes, as well as total daily sliding scale insulin requirements. All data will be recorded without patient identifiers and maintained confidentially. Finally, the data collected will be used to compare, contrast, and assess which therapeutic interchange program is the most safe, efficacious, and cost effective.

**Results:** Results and conclusions to be presented at Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Identify the pharmacotherapeutic variables involved in establishing a therapeutic interchange between insulin glargine and insulin detemir  
Describe rates of hypoglycemia and differing insulin requirements when converting between insulin glargine and insulin detemir

### Self Assessment Questions:

A patient is admitted to ProMedica Toledo Hospital. Included in their admission medication reconciliation is an order for their home insulin: detemir 10 units subcutaneously daily. Utilizing the thera

- A Insulin detemir 10 units subcutaneously daily
- B: Insulin detemir 7 units subcutaneously daily
- C: Insulin glargine 7 units subcutaneously daily
- D: Insulin glargine 10 units subcutaneously daily

Which of the following statements is correct?

- A Historically, patients on insulin detemir have required less insulin
- B Historically, patients on insulin glargine have required less insulin
- C Historically, patients on insulin glargine have had significantly mor
- D Historically, patients on insulin detemir have had lower hemoglobin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-576L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECTIVENESS OF MULTIDISCIPLINARY POST-TRANSPLANT ENDOCRINE CLINIC

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**Purpose:** Due to limited time and access to primary care resources, management of diabetes (DM) during the early post-transplant period can be suboptimal. At the University of Michigan Health System (UMHS) Transplant Endocrine Clinic (TXP-ENDO), a team of a pharmacist, endocrinologist, and a dietitian provides comprehensive and collaborative care to help patients achieve glycemic control and lifestyle changes, provides education and self-management goals, and makes appropriate referrals for diabetic complications during the immediate transition time period (3-6 months post-transplant). The purpose of this study is to evaluate the effectiveness of the TXP-ENDO in DM management of kidney transplant recipients (KTR). **Methods:** This is a retrospective matched-cohort study including adult KTR with either pre existing type 2 DM or diagnosed new onset post-transplant DM at UMHS between January 1, 2014 and December 31, 2015. The intervention group includes KTR whose DM was managed in the TXP-ENDO clinic and the control group will include KTR whose DM was managed by other providers. Patients were matched based on the time of initial HgbA1c from transplant date and cumulative prednisone dose given during the 90 days prior to the initial HgbA1c. The two groups were compared for percent change in HgbA1c from the baseline measurement (at initial visit) to a 3-month follow-up visit, using a two-sided Student t-test with a significance level of 0.05. The following data was summarized in the intervention group using descriptive statistics: appropriateness of hypertension and hyperlipidemia therapy, pharmacologic and non-pharmacologic interventions, screening, monitoring, and referral for DM complications, and establishment of long term management for DM at the clinic discharge. The TXP-ENDO clinic patients and referring nephrologists were asked to complete surveys on their satisfaction with the service. **Results:** In progress **Conclusion:** In progress

### Learning Objectives:

Describe the negative impact of diabetes mellitus on post-transplant patient outcomes  
List the challenges involved with managing diabetes mellitus post-transplant

### Self Assessment Questions:

Compared to non-diabetic patients, kidney transplant recipients with diabetes were shown to have increased mortality due to which of the following related deaths?

- A Cardiovascular
- B Infectious
- C A and B
- D Respiratory

Which of the following present(s) a challenge when managing diabetes post-transplant?

- A Need for frequent titrations of insulin and oral hypoglycemic agent:
- B Change in medical and prescription insurance
- C Limited time and access to primary care resources
- D A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-577L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF IN-HOUSE SPECIALTY PHARMACY USE ON HEPATITIS C TREATMENT OUTCOMES

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**Purpose:** In January 2015, Indiana University Health began providing health system-based specialty pharmacy services to the patients treated for hepatitis C infection at the IU Health Digestive and Liver Disorders (DALD) clinic. These services include medication procurement, patient counseling, drug-drug interaction screening, prescription appropriateness, adverse drug reaction monitoring and management and adherence assessment and counseling during treatment. Results from this study will assist in the assessment of program effectiveness and justification for continued services. **Methods:** This will be a retrospective cohort study comparing time to treatment (time from prescription written to patient reported date of regimen initiation) and regimen adherence, measured by proportion of days covered (PDC), between patients serviced by the IU Health Specialty pharmacy versus those serviced by an outside pharmacy. Secondary outcomes will involve descriptions of types of interventions made by the IU Health Specialty pharmacy staff. All patients receiving a prescription for Harvon monotherapy by an IU Health DALD prescriber during the study period of January 1 to June 30, 2015 will be included. PDC will be calculated based on insurance claims data available in the IU Health electronic medical record. Data to be collected during chart review include: age, gender, race, time between prescription written and initiation, concomitant medications, insurance carrier, HCV genotype and sub-genotype, planned treatment duration, and if available, liver staging, other disease states, HCV RNA levels, prior treatment experience, residence during treatment, and any inpatient admission during treatment. Primary outcomes will be analyzed utilizing a Student's T Test, with Chi-Squared tests utilized for baseline characteristics. The institutional review board has approved this study. **Results:** Data collection and analysis is ongoing. Final results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify appropriate treatment options for patient with hepatitis c genotype 1.  
Describe the advantages and disadvantages of implementation of a health-system specialty pharmacy.

### Self Assessment Questions:

Which of the following are appropriate treatment options for treatment naive patients with hepatitis c genotype 1? I. Simeprevir (Olysio) + Ribavirin II. Ombitasvir-Paritaprevir-Ritonavir + Dasabuvir

- A I
- B II and III
- C I and II
- D I, II, and III

According to data presented today, which of the following metrics is most likely to be impacted when using a health system specialty pharmacy.

- A Time to treatment
- B Patient satisfaction
- C Payor reimbursement
- D A and B

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-842L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **INTRANASAL NALOXONE TRAINING: EFFECTS ON UNDERSTANDING AND UTILIZATION IN PATIENTS CURRENTLY RECEIVING METHADONE REPLACEMENT THERAPY FOR OPIOID ADDICTION AND THEIR DESIGNEES**

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BackgroundMethadone is often used in narcotic replacement programs (NTP) to deter opioid use in patients with substance use disorders. However, methadones unpredictable pharmacokinetics and multiple drug interactions increase the risk for opioid overdose leading to respiratory depression, coma, and death. Naloxone is the opioid antagonist of choice for overdose reversal. Intravenous naloxone is the preferred route of administration. However, due to increased risk of blood borne pathogens and difficult administration, this route is infrequently used in non-hospital settings. A solution has been intranasal naloxone. Intranasal naloxone administration is easily used by trained individuals to provide overdose symptom reversal. The alarming number of opioid overdose deaths has caused legislation to expand access to intranasal naloxone. The purpose of this prospective study is to train current methadone narcotic treatment program patients and their designees about appropriate use of intranasal naloxone and subsequently provide access to the medication.MethodsOur Opioid Overdose and Naloxone Dispensing (OEND) training sessions will take place at the treatment facility and address the risks and symptoms of opioid overdose and appropriate intranasal naloxone administration technique. Immediately thereafter, the participant can choose to receive intranasal naloxone via a pharmacist-initiated e-prescription to an outpatient pharmacy within our health system. Compliance will be assessed by reviewing the pharmacy dispensing records for participants who opted to pick up their prescription. Secondary endpoints will be to analyze the participant training experience and knowledge using pre- and post-surveys around the OEND session. Additionally, a review of emergency department records will be conducted for admissions with a primary diagnosis of opioid overdose, in those patients who participated in the OEND sessions.OutcomesOur study will support the use of pharmacist-driven OEND throughout Eskenazi Health, a safety net healthcare system, and provide validation of the necessary educational tools for individuals to prevent opioid overdose deaths.

### **Learning Objectives:**

Identify the risks of opioid overdose associated with methadone use.  
Discuss the use of an Opioid Overdose Education and Naloxone Distribution (OEND) program in a Narcotic Treatment Program (NTP).

### **Self Assessment Questions:**

The most appropriate dose for intranasal (IN) naloxone in the event of an opioid overdose is:

- A 0.4mg IN titrated to response over 3-5 minutes
- B: 1mg IN per nostril (2mg total) – may repeat in 3-5 minutes if no response
- C: 2mg IN per nostril (4mg total) – may repeat in 3-5 minutes if no response
- D: 2mg IN in one nostril – may repeat in 3-5 minutes if no response

When first arriving on the scene of a suspected opioid overdose.

Choose the correct order in which to perform the following activities:

- A Assemble the naloxone syringe and administer the first dose, call 911
- B Assemble the naloxone syringe and administer the first dose, try to arouse that individual, call 911, assemble the naloxone syringe
- C Carefully examine the individual for other signs that indicate he/she is in respiratory distress
- D Try to arouse that individual, call 911, assemble the naloxone syringe

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-946L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **MEDICATION ALERT ANALYSIS AND DEVELOPMENT OF A PROCESS IMPROVEMENT STRATEGY TO MANAGE THE MEDICATION ALERT REVIEW PROCESS**

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Introduction: Various studies have been done on alert override rates and factors that contribute to alert fatigue for users of clinical decision support (CDS) and computer physician order entry (CPOE) systems. Studies state alert override rates could lead to alert fatigue and consequently lead to high risk alerts being dismissed alongside low risk alerts.Purpose: The purpose of this project is to identify and develop governance for facilitating efficient identification of alerts, removal of inappropriate alerts, re-classification of alert severity, and thereby, a reduction in alert fatigue in a health system network utilizing CPOE.

Methods: This is a retrospective study that analyzed alerts and override data for an 11 month period from May 2015 to March 2016. Alert data was extracted from the electronic medical record CPOE software. Alerts will be compiled and analyzed by a core pharmacist committee based on override rate, reason for override, and clinical significance. Proposal for alert suppression, filtration or re-classification of severity will then be presented to a panel of experts for consensus. Acknowledgement reasons are utilized by clinical staff when overriding an alert to provide feedback on significance of alert. New acknowledgement reasons will be implemented to facilitate end user feedback on existing alerts. The primary endpoint is the change in alert override rates. Results: A description of the governance structure will be presented. Preliminary results show a standardized method of presenting alerts for removal to an expert committee is required to facilitate appropriate discussion of alert changes. Final results will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe how medication alerts are defined at Parkview Health and the opportunities for improvement in alert quantity and management.  
Identify obstacles, instructions, and strategies for the implementation of a governance process for removal of unnecessary alerts in CPOE system.

### **Self Assessment Questions:**

Which type of alert should be suppressed?

- A Duplicate therapy within an order set with specific parameters for individual patients
- B Duplicate therapy warnings for the whole CPOE system
- C Low frequency warning within an order set
- D All of the above

Which of the following groups should be included in determining changes to medication alerts?

- A Pharmacy
- B Physicians
- C Informatics
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-843L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE IMPACT OF TARGETED EDUCATION AND IMPROVED ORDER SET FUNCTIONALITY ON THE UTILIZATION OF AN ENOXAPARIN ORDER SET

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**Purpose:** Enoxaparin is a high-risk medication due to its antithrombotic property and the subsequent risk of bleeding. In June, 2015, the Child Health Patient Safety Organization issued a serious safety event action alert reporting that a patient received a ten-fold overdose of enoxaparin. Order sets serve as effective clinical decision support tools that guide prescribers to order medications within the constructs of evidence-based dosing and monitoring recommendations. One risk mitigation strategy proposed after this safety event was to evaluate the use of an existing enoxaparin order set. At this institution the enoxaparin order set may be used to order either enoxaparin treatment or prophylaxis, however, the order set is utilized infrequently. The objective of this study is to implement interventions to increase enoxaparin order set utilization. Baseline data from January 1, 2015, to June 30, 2015, indicated a total of 648 enoxaparin orders. Of those orders, there were 233 unique admissions where an order set could have been used. From these 233 admissions, the order set was used 49 times, demonstrating a utilization rate of 21%. The diversity of the admitting service, the non-standard approach to hematology consultation, and the lack of awareness about the order set may be contributing factors to the low utilization rate. Other baseline data include the frequency of enoxaparin orders with or without hematology consultation, stratified by service, and the utilization of the order set by admitting service. **Methods:** Baseline data was collected by retrieving enoxaparin order data from this institution's electronic medical record. An interdisciplinary team was convened to review and improve the order set to align with enoxaparin evidence-based dosing and monitoring guidelines. Unnecessary laboratory monitoring was removed and consultation orders were refined. Prescriber education will be completed with individual prescriber services. Revised enoxaparin order set utilization will be analyzed prospectively. **Results/Conclusion:** To be presented at Great Lakes Residency Conference.

### Learning Objectives:

Identify evidence-based dosing and monitoring recommendations for enoxaparin use in pediatrics.  
Describe the purpose of using order sets as a clinical decision support tool to enhance medication safety.

### Self Assessment Questions:

Which of the following anti-factor Xa level ranges is considered therapeutic for enoxaparin administered subcutaneously twice daily?

- A: 0.1-0.3 units/mL
- B: 0.3-0.8 units/mL
- C: 0.5-1.0 units/mL
- D: 0.8-1.3 units/mL

Per the CHEST guidelines, at what age in pediatric patients do age-dependent dosing recommendations change?

- A: 1 month
- B: 2 months
- C: 6 months
- D: 9 months

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-947L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## STANDARDIZATION OF ONCOLOGY SPECIFIC TRAINING FOR PHARMACISTS

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**Purpose:** The Aurora pharmacy department provides oncological services through a variety of specialized branches including outpatient clinics, inpatient medical floors, specialty pharmacies, and central order verification (COV). Each unique branch is comprised of pharmacists, pharmacy technicians, residents, and students. Currently onboard training and ongoing reassessment is managed independently at each Aurora entity, resulting in knowledge and skill differences amongst pharmacy staff. The primary objective is to standardize onboarding and ongoing oncology specific training resources for pharmacy staff across an integrated health care system. **Methods:** All current organizational training tools and resource documents for oncology pharmacists were gathered. A proposed training checklist was created for each of the four branches of oncology practice. The checklist identified which training items required initial and ongoing competency evaluation. Proposed training checklists were presented to pharmacy directors and leaders of the four respective branches for input. Additional feedback was gathered from front-line staff. Final training proposals were vetted through the organization's pharmacy training committee for implementation. A gap analysis was conducted to determine what additional resources would need to be created based on approved training. New resources will be assigned to pharmacists, residents or students as appropriate. In addition, each existing and newly created training resource will be assigned an owner responsible for long-term maintenance. **Results:** Results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe 3 potential benefits of standardizing oncology training  
List 2 potential challenges when standardizing system-wide training

### Self Assessment Questions:

What are three potential benefits of standardizing oncology training?

- A: Increase pharmacy privileges beyond the established policies
- B: Ensure consistent care for oncology patients throughout the health system
- C: Organizes available resources from different locations which can be leveraged
- D: B and C

What is/are true regarding potential challenges when standardizing system-wide training?

- A: Training structure may be limited to existing hospital standards
- B: Establishing a process to track completion of ongoing assessment
- C: Budget is not a potential challenge
- D: A and B

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-844L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF A PHYSICIAN AND PHARMACIST-DRIVEN ANTIMICROBIAL STEWARDSHIP (AMS) PROGRAM AT A COMMUNITY HOSPITAL

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**Purpose:** The purpose of this project is to implement a formalized AMS program to optimize appropriate use of antimicrobial agents through selection of an ideal antimicrobial regimen including dosing, route of administration, and duration of therapy. **Methods:** A gap analysis was performed based on the CDCs Core Elements of Hospital Antibiotic Stewardship Programs and it was found that the following elements of an AMS program were lacking: formal leadership support, physician leader, pharmacist co-leader, key support from other staff, facility-specific treatment recommendations, 48-hour time outs, and education to clinicians on AMS. After implementation of these components, defined daily dose and antimicrobial drug expenditures were measured and compared to data prior to implementation. The project also consists of retrospective and prospective chart reviews and was exempt from the Institutional Review Board. A retrospective chart review was conducted for 160 patients hospitalized between January and March 2015, prior to full implementation of the AMS program. Patients were randomly selected based on a diagnosis of community-acquired pneumonia (CAP), hospital-acquired pneumonia (HAP), urinary tract infection (UTI), or chronic obstructive pulmonary disease (COPD) exacerbation/bronchitis. Patients were excluded if they were less than 18 years of age. The following information was collected from the chart: type of infection, date of birth, gender, race, CrCl, WBC, Tmax, initial and final antibiotic regimen, urinalysis, culture results, radiology reports, probiotic use, length of stay, duration of antibiotics, and mortality.

The prospective chart review is being conducted evaluating the antimicrobial regimen of patients with CAP, HAP, UTI, or COPD exacerbation/bronchitis to determine appropriateness of therapy, based on IDSA treatment recommendations. The physician is contacted if the ordered antibiotic is inappropriate. Antimicrobial medications are modified based on renal function and formulation changes (IV to PO) per policy if clinically appropriate. **Results/Conclusion:** Will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the importance of an antimicrobial stewardship program.  
Identify the key components of an antimicrobial stewardship program.

### Self Assessment Questions:

All of the following are advantages to implementing an antimicrobial stewardship program except?

- A: Decreased rates of Clostridium difficile infection
- B: Decreased adverse effects from antibiotics
- C: Decreased antibiotic expenditures
- D: Decreased antimicrobial availability

When is the recommended time to perform antibiotic time outs?

- A: 24 hours after antibiotics initiated
- B: 48 hours after antibiotics initiated
- C: 72 hours after antibiotics initiated
- D: 96 hours after antibiotics initiated

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-845L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RESPONSE RATES OF PD-1 INHIBITORS IN REFRACTORY CANCERS, A RETROSPECTIVE BASKET REVIEW

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**Statement of Purpose:** The primary objective of this study was to assess PFS in patients treated with PD-1 inhibitor therapy for refractory cancer. Secondary objectives were to evaluate the response rates of PD-1 inhibitor therapy for patients in the refractory setting and define PD-1 and PDL1 positivity in relation to tumor response/PFS. **Statement of Methods Used:** This study was a retrospective case-control chart review of patients treated with a PD-1 inhibitor based on recommendations by the Indiana University Health, Simon Cancer Center Precision Genomics Clinic from April 2014 to December 2015. All patients had progressed on a minimum of one previous line of standard therapy prior to genomic sequencing and PD-1 inhibitor therapy. Provided the magnitude of patient variability, including: primary diagnosis, genetic aberrations, and number of previous lines of therapy, a population-based case-control was not feasible. Thus, patients served as their own control and a PFS ratio was calculated for each patient by dividing their PFS on a PD-inhibitor over the PFS of their prior line of therapy. Patients with a PFS ratio of >1.3 were considered to have a positive benefit from PD-1 inhibitor therapy. **Summary of Results to Support Conclusion:** Results will be presented at the conference. **Conclusions Reached:** Conclusions will be presented at the conference.

### Learning Objectives:

Describe the mechanism by which PD-1 inhibitors work.  
Recognize the potential patient population that may benefit from treatment with PD-1 inhibitors.

### Self Assessment Questions:

Which of the following best describes the mechanism of PD-1 inhibitors'?

- A: Bind to T-cells → block recognition of PD-L1 expressing tumor cells
- B: Bind to T-cells → allow for recognition of PD-L1 on tumor cells
- C: Bind to APC → block recognition of PD-L1 expressing tumor cells
- D: Bind to APC → allow for recognition of PD-L1 on tumor cells

KM is a 60 yof recently diagnosed metastatic NSCLC. She was treated with carboplatin/paclitaxel x4 cycles but was found to progression. She is negative for EGFR, ROS1, and ALK mutations. Which of the

- A: Erlotinib only
- B: Erlotinib or Pembrolizumab (if an FDA-approved test finds her to be positive)
- C: Nivolumab only
- D: Nivolumab or Pembrolizumab (if an FDA-approved test finds her to be positive)

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-578L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**ASSOCIATION OF LOW VITAMIN D AND OTHER RISK FACTORS WITH MYALGIA IN PATIENTS TAKING HIGH-INTENSITY ATORVASTATIN: A RETROSPECTIVE REVIEW**

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Purpose: HMG-CoA reductase inhibitors, or statins, are a commonly prescribed medication for treatment of dyslipidemia and prevention of atherosclerotic cardiovascular events. Despite the beneficial effects of statins in reducing morbidity and mortality, patients may discontinue these medications due to myalgia. As association between low vitamin D levels and statin-induced myalgia has been reported in the literature. Atorvastatin, a commonly prescribed statin at the VA, is highly lipophilic with an increased risk of causing myalgia. Vitamin D is expected to increase the metabolism and decrease the risk of myopathy with atorvastatin. The purpose of this study is to analyze the incidence of myalgia in a veteran population taking high intensity atorvastatin (40mg and 80mg), and identify risk factors for myalgia. Methods: A retrospective chart review will be conducted evaluating patients taking high-intensity atorvastatin in 2014 at the Edward Hines, Jr. VA Hospital. The first 200 patients meeting inclusion criteria from a list of patients on high intensity atorvastatin will be included in the study. All patients  $\geq 18$  years old prescribed high intensity atorvastatin for any indication will be included. Patients will be divided into those experiencing myalgia and those who are not. Subjects who meet the inclusion criteria will be evaluated for the following: demographics, reported myalgia, duration of time prescribed atorvastatin, laboratory data, comorbid conditions, and medications with increased risk of causing myalgia. The primary outcome is the difference in vitamin D level between those with and without myalgia. Secondary outcomes include the difference between additional risk factors including comorbidities, interacting medications, laboratory parameters, duration of atorvastatin treatment, history of myalgia, and demographics. Results and Conclusion: Data is currently being collected, and results will be presented at the Great Lakes Resident Conference.

**Learning Objectives:**

Identify risk factors that contribute to statin-induced myalgia.  
Explain the relationship between vitamin D and atorvastatin.

**Self Assessment Questions:**

Risk factors that may contribute to the development of statin-induced myalgia include:

- A Low vitamin D levels
- B: male gender
- C: advanced age
- D: A and C

Myalgia would most likely be reversed with the administration of vitamin D for which for the following statins?

- A pravastatin
- B atorvastatin
- C rosuvastatin
- D pitavastatin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-579L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**IMPACT OF THE AFFORDABLE CARE ACT (ACA) REQUIREMENT ON UTILIZATION OF TOBACCO CESSATION MEDICATIONS IN A COMMERCIAL POPULATION**

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Purpose: The Affordable Care Act (ACA) requires health benefit providers to cover preventative services. This requires seven FDA-approved tobacco cessation medications to be covered at no charge to member, for two-90 day periods per year. This study aims to determine the impact of the ACA requirement on utilization of tobacco cessation medications in a commercial population located in the Midwest. Methods: A retrospective pre/post longitudinal analysis of pharmacy claims data was performed for two major commercial clients. The analysis was performed for a total of 4019 members who had a paid claim for any of the seven qualifying Generic Product Indicators (GPIs) for smoking cessation products between August 1, 2013 and July 31, 2015. The following outcomes were evaluated: number of prescriptions filled, total quantity of medication, total day supply, amount the member paid, and amount the plan paid. A comparison of the initial year of the intervention to the following year of the intervention was conducted. Results/Conclusions: The preliminary analysis for both plans for all endpoints indicated statistical significance ( $p < 0.05$ ), with an overall increase in utilization of 13.1%. Overall, pharmacy claims for average plan paid significantly increased by 27.7% (\$170.25 to \$217.34) while the average cost paid by the members significantly decreased by 97.4% (\$13.63 to \$0.36) ( $p < 0.05$ ). Further analysis indicated these favorable changes in utilization and cost for 12 months following implementation of the requirement were realized only among Plan A members while Plan E members did not change on these outcomes over the duration of the study. These findings indicate the coverage of tobacco cessation medications can result in a favorable impact on utilization of tobacco cessation products. The disparities that resulted between the two plans can be attributed to a number of variables including advertisement of this benefit to the plans members.

**Learning Objectives:**

Report on the utilization of tobacco cessation products pre and post implementation of the ACA requirement  
Identify how a Pharmacy Benefit Manager can positively impact tobacco cessation

**Self Assessment Questions:**

Which of the following barriers to access of tobacco cessation products are addressed the ACA Requirement?

- A Provider Education
- B: Financial
- C: Adverse Effect Management
- D: PHARMA Involvement

Promotion of this covered benefit to [BLANK] could potentially increase utilization to tobacco cessation products among members?

- A Government Officials
- B Teachers
- C Physicians
- D Pharmacy Benefit Managers

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-705L03-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A PHARMACIST-MANAGED REFILL PROGRAM WITHIN AN ADULT MEDICINE CLINIC

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**Purpose:** Refill authorization requests (RARs) are a common task among all primary care practice sites. Both nurses and physicians spend a significant amount of time processing these requests. The purpose of this pilot program is to have the pharmacist overtake the refill process with the goal of identifying drug-related problems while conserving physician and nursing time. A collaborative practice agreement will allow the pharmacist to authorize all prescriptions without physician cosign (excluding CII-CIV prescriptions). The pilot will allow the pharmacist to assess and solicit referrals for patients who would benefit from the clinic's established medication therapy management (MTM) service.

**Methods:** The electronic medical record was queried from August 3rd to September 4th of 2015 for patients who had a refill encounter entered by a nurse and routed to an adult medicine provider for approval. Data collection included: total number of RARs, number of refills approved and declined, number of labs ordered by nursing staff, and number of appointments scheduled with providers. A second query was performed for refill encounters addressed by a pharmacist from September 14th through October 16th of 2015. Information collected incorporated the above, in addition to interventions identified by the pharmacist including: number of encounters routed to a provider for clarification, number of labs ordered by a pharmacist, pharmacist-initiated changes to an alternative route or formulation, number of referrals accepted and declined to MTM service, and number of times a pharmacy or patient was contacted for clarification of the RAR. The total number of prescriptions and approximate time spent per prescription was collected for each time period. An anonymous survey was given to providers to evaluate their time spent on refill-related tasks and level of satisfaction during both time periods. **Results/Conclusions:** Final results and conclusions will be presented at the Great Lakes Residency Conference

### Learning Objectives:

Discuss the impact of a pharmacist-managed refill program on other pharmacist services offered.

Identify potential benefits of a pharmacist-managed refill program.

### Self Assessment Questions:

Of the following statements, which best describes the relationship between provider satisfaction and a pharmacist-managed refill service?

- A Provider satisfaction decreases with a pharmacist managing refills
- B: Pharmacist satisfaction increases with a pharmacist managing ref
- C: Provider satisfaction increases with a pharmacist managing refills.
- D: There is no relationship between provider satisfaction and a pharr

Potential benefits of a pharmacist-managed refill authorization service include which of the following:

- A Expedite the refill process.
- B Alleviate provider and nursing time spent on refill requests.
- C Reduction in the number of primary care physician office visits.
- D Greater access and ability for patients to receive more refills.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-846L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ANTIMICROBIAL STEWARDSHIP INITIATIVE TO REDUCE ANTIBIOTIC USE FOR ASYMPTOMATIC BACTERIURIA

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**Background:** The most common indication for an antimicrobial use are urinary tract infections (UTIs). However, hospitals have observed the use of antibiotics for UTIs to be inappropriate. This is most evident for asymptomatic bacteriuria (ASB). With the exception of pregnant women and patients who undergo traumatic urologic procedures with mucosal bleeding, ASB does no harm. No difference in the frequency of symptomatic infection or other outcomes were found based on various randomized controlled trials in elderly patients with ASB. Moreover, treating ASB can be a risk factor to the development of symptomatic UTIs and leads to the selection of multi-drug resistant pathogens. This study aims to assess the impact of an antimicrobial stewardship educational intervention directed to reduce inappropriate antibiotic use associated with ASB in a large academic medical center.

**Methodology:** This study will be done in multiple phases; a prospective control phase, educational intervention phase, and prospective intervention phase. During the prospective control phase, no interventions will be made to decrease treatment for ASB. However, during the prospective intervention phase, physicians will be contacted for patients being treated or could potentially be treated for asymptomatic bacteriuria. Patients will be identified based on daily urinalysis reports and will be included if they were admitted to the hospital, greater than 18 years of age and have a urinalysis and urine culture completed. Patients will be excluded if they have documented signs/symptoms of a urinary tract infection, are pregnant, undergoing urologic procedure or with a urologic abnormality, cultures obtained from a nephrostomy bag, cultures containing yeast, neutropenic patients, patients presenting with altered mental status, and patients receiving antibiotics for a concomitant infection.

### Learning Objectives:

List the signs and symptoms of a urinary tract infection.

Identify which patient populations benefit from treatment for asymptomatic bacteriuria.

### Self Assessment Questions:

Which of the following is not a symptom of a urinary tract infection?

- A Pain on urination
- B: Urinary frequency
- C: Urinary urgency
- D: Foul smelling urine

Which of the following patients with asymptomatic bacteriuria benefits from treatment?

- A Diabetic patients
- B Pregnant Women
- C Patients with previous urinary tract infections
- D Patients over the age of 65

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-580L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE CHART EVALUATION OF THE EFFICACY OF HYPERCALCEMIA MANAGEMENT IN ONCOLOGY PATIENTS AT THE UNIVERSITY OF CHICAGO MEDICAL CENTER

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**Objective:** Due to the lack of formal guideline recommendations, available primary literature was used to develop a protocol for management of hypercalcemia of malignancy at the University of Chicago Medical Center (UCMC). The primary objective of this study is to retrospectively validate the proposed protocol by evaluating the efficacy of current management. **Methods:** A retrospective, single center, chart review was performed including adult patients hospitalized between July 1, 2012 and November 1, 2015 with a diagnosis of both hypercalcemia and an active malignancy. The primary outcome for efficacy is normalization of corrected calcium within 4 and 7 days of treatment. The protocol was retrospectively applied and results of patients who received treatment "per protocol" were compared to patients whose treatment did not follow protocol. **Results:** A total of 496 patients with a diagnosis of hypercalcemia were identified to be evaluated for inclusion. Preliminary results of 80 patients included demonstrate that 42 patients were managed per protocol, and 38 off protocol. When managed per protocol, 58% of patients achieved normalization of corrected calcium by day 4 and 47.6% by day 7. This is compared to 47% and 23.7% retrospectively in patients whose treatment did not follow protocol. **Results** are underestimated due to a lack of data for patients discharged. **Conclusions:** Based on preliminary results of this study, utilization of an evidence based protocol can improve normalization rates of corrected calcium in hypercalcemia of malignancy patients. Further data collection and subgroup analysis, to be completed by the time of presentation, will determine the impact on length of hospital stay, utilization of rescue therapy, and cost savings. Ultimately, the results of this evaluation will be used to implement the proposed protocol and lead to an order set in Epic. This will help streamline, and ensure safe and effective management of hypercalcemia of malignancy.

### Learning Objectives:

Outline appropriate, evidence-based management for hypercalcemia of malignancy based on the severity of presentation.

Describe when retreatment with bisphosphonates is appropriate for relapsed or refractory hypercalcemia of malignancy, and should be considered.

### Self Assessment Questions:

What treatment, regardless of severity, should all patients presenting with hypercalcemia of malignancy ideally receive?

- A: Maintenance fluids (normal saline) at rates of 2-4 L/day
- B: Pamidronate
- C: Calcitonin
- D: Glucocorticoids

In patients with relapsed/refractory hypercalcemia of malignancy, how many days after initial treatment would retreatment with a bisphosphonate be appropriate?

- A: 2 days
- B: 4 days
- C: 6 days
- D: 8 days

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-581L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT OF A MULTIDISCIPLINARY TRANSITIONS OF CARE SERVICE FOR COPD MANAGEMENT

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**Purpose:** Chronic Obstructive Pulmonary Disease (COPD) is the third most frequent cause for readmission to hospitals within 30 days and has been added to the Hospital Readmission Reduction Program by the Center for Medicare and Medicaid Services. Pharmacists are uniquely positioned to serve as prescribers in the post-COPD exacerbation period to improve patient outcomes and enhance care delivery. A multidisciplinary COPD ambulatory care service has been implemented at the William S. Middleton Veterans Affairs Hospital in Madison, WI, with pharmacists serving as prescribers to manage patients COPD post-exacerbation. In addition to providing disease state management by ambulatory care pharmacists, the service incorporates patient education from nursing and interpretation of spirometry by primary care providers.

**Methods:** This COPD service was implemented on November 17, 2015 with the goal of pharmacists performing a focused, 45-minute visit for COPD management. Clinic structure includes an assessment of previous exacerbation history and administration of the COPD Assessment Test (CAT). Medication therapy is optimized accordingly by the pharmacist based on GOLD guidelines, with patient education by nursing for how to use a COPD action plan. Prescribing of antibiotic and steroid therapy for action plan development is completed by the pharmacist, along with referrals for tobacco cessation, pulmonary rehabilitation, and telehealth monitoring as indicated. In preparation for clinic participation, a comprehensive training program for clinical pharmacists was developed including a COPD guideline review, pulmonary physical assessment teaching, and spirometry evaluation. Nursing participants also received an in-service on COPD action plan teaching. Clinic outcome measurements include tracking of pharmacist interventions and referrals made, as well as an assessment of services provided in clinic. Pharmacist training was measured utilizing the Kirkpatrick Training Evaluation Model, with a focus on reaction and behavior changes based on knowledge gained.

**Results/Conclusions:** Data collection is ongoing.

### Learning Objectives:

Identify how pharmacists can be integrated within current primary care structures to manage COPD post-acute care transitions.

Recognize the pharmacists role in population health management specific to chronic disease states.

### Self Assessment Questions:

According to the Pharmacy Forecast, what percentage of health systems are projected to have a formal program for rigorously coordinating post-acute care services by the year 2020?

- A: 10%
- B: 25%
- C: 50%
- D: 75%

Which of the following is cited in the literature as a method to increase the value of healthcare?

- A: An increase in specialty providers working within the fee for service
- B: Providers operating independently, rather than as part of an integr
- C: Only providing services with the highest reimbursement rate
- D: Engaging a multidisciplinary team to enhance care delivery around

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-582L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## APPROPRIATENESS OF PROCALCITONIN GUIDED ANTIMICROBIAL THERAPY UTILIZATION IN HOSPITALIZED VETERAN PATIENTS

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**Purpose:** Clement J. Zablocki Veterans Affairs Medical Center adopted a procalcitonin protocol to assist with antimicrobial stewardship in September 2014, after which a short-term appropriateness analysis was performed. The objective of this study is to assess the long-term appropriateness of initial and serial procalcitonin testing and the protocol impact on antibiotic management in the Intensive Care Unit (ICU) and Emergency Department (ED) for patients with suspected lower respiratory tract infections (LRTI) and/or sepsis. **Methods:** This quality assurance study utilized an electronic medical record to identify inpatient veterans who had a procalcitonin test drawn in the ED or ICU between October 1 and December 31, 2014 for a retrospective chart review. Data was collected prospectively from October 1 to December 31, 2015. During this time, a pharmacist ensured serial procalcitonin testing was ordered when appropriate and recommended adjustments to the patients antimicrobial therapy per protocol. Procalcitonin testing use was assessed as appropriate or inappropriate and data will be analyzed for a difference in antibiotic de-escalation between the two review periods. Secondary outcomes such as ICU length of stay (LOS), total LOS, and 30-day readmission rates will also be assessed. **Preliminary Results:** Data analysis is in progress at the time of abstract submission. Following completion of prospective chart review (n=80), 51 procalcitonin levels (63.8%) were assessed as appropriate based on the indication of LRTI (n=34; 66.67%), sepsis (n=7, 13.7%), or both LRTI and sepsis (n=10; 19.6%). Fifteen levels (18.8%) lacked an appropriate indication and 14 patients (17.5%) met exclusion criteria. Twenty-four patients (30%) had antibiotics de-escalated with an average of 6.26 antibiotic days saved and 23 patients (28.8%) saved > 25% of established infection guideline antibiotic days. Retrospective data will be compared to prospective data upon project completion. **Conclusions:** To be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the utility of procalcitonin levels in patients with suspected lower respiratory tract infections and/or sepsis.

Identify medications and disease states which may falsely elevate or depress procalcitonin levels and therefore exclude the use of procalcitonin levels.

### Self Assessment Questions:

Which of the following disease state combinations is procalcitonin FDA approved for?

- A Suspected sepsis and/or lower respiratory tract infections
- B: Cellulitis and/or onycholysis
- C: Otitis externa and/or otitis media
- D: Sinusitis and/or nasopharyngitis

Based on current literature, procalcitonin is associated with which of the following?

- A Reduced mortality
- B Increased length of stay
- C Reduction in the duration of antibiotic therapy
- D Increased number of antibiotic-related adverse effects

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-583L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF CLOSTRIDIUM DIFFICILE PHARMACY CARE BUNDLE

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**Purpose:** Clostridium difficile infection (CDI) is the most common cause of nosocomial infection in the United States and is associated with significant morbidity. Maximizing therapy for CDI can serve to minimize morbidity, including treatment failure and recurrence of infection. Evidence demonstrates that appropriate treatment of CDI involves many components, including initiating optimal antibiotics to treat CDI, minimizing antibiotics that can reduce CDI treatment efficacy, and discontinuing anti-peristaltic medications, pro-motility agents, and acid suppressive therapy. Care bundles have recently been implemented in the treatment of various infections and function to promote the initiation of multiple evidence-based treatments related to a single disease. Development and implementation of a pharmacist-driven care bundle for the treatment of CDI will help ensure optimal treatment, thereby improving the burden of disease for patients and hospital. **Methods:** This pre-post quasi-experimental study will evaluate institutional adherence before and after implementation of a treatment bundle for CDI. During the intervention phase, clinical pharmacists will be alerted to a positive C. difficile result and will implement the bundle utilizing workflows developed within the electronic medical record. Data from this period will be compared to historical data from the previous year, prior to bundle implementation. The primary outcomes include the percentage of cases compliant with each of the following individual components: treatment of CDI per guideline recommendation, discontinuation or de-escalation of unnecessary antibiotic therapy, discontinuation of anti-peristaltic and pro-motility agents, and discontinuation of acid suppressive therapy. Secondary outcomes include overall bundle compliance, 8-week CDI recurrence rate, and 8-week CDI-related hospital readmission rate. **Results and Conclusion:** Data collection and analysis is currently ongoing and will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the rationale for implementing a care bundle

Identify the individual evidence-based components of the CDI care bundle

### Self Assessment Questions:

What is the rationale for implementing a care bundle?

- A To create guidelines relating to a single disease state
- B: To increase adherence to a single evidence-based measure relating to a single disease state
- C: To increase adherence to multiple evidence-based measures relating to a single disease state
- D: To create guidelines for multiple related disease states

Which of the following is a component of the CDI care bundle?

- A Start pro-motility agents
- B Stop proton pump inhibitors
- C Start anti-peristaltic agents
- D Start probiotics

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-584L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PREEMPTIVE WARFARIN DOSE REDUCTION AFTER INITIATION OF SULFAMETHOXAZOLE-TRIMETHOPRIM OR METRONIDAZOLE

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**Purpose:** The purpose of this research is to evaluate the utility of a preemptive warfarin dose reduction of at least 10% at the time of antibiotic initiation. This retrospective review will provide data regarding the total time in therapeutic range, outcomes of non-therapeutic INRs, a comparison of the average warfarin dose reduction before and after implementation of an innovative order flagging practice and evaluate the need for preemptive warfarin dose reduction as a standard of practice at the Dayton Veteran Affairs Medical Center anticoagulation clinic (DVAMC ACC). **Methods:** A retrospective chart review will be conducted of patients who received an outpatient prescription for warfarin and either sulfamethoxazole-trimethoprim, metronidazole or the combination from July 2011 to July 2015. Demographic information, comorbidities, indication for and duration of warfarin therapy, concurrent antibiotic, dose and duration of antibiotic therapy, total weekly dose of warfarin prior to and during antibiotic therapy, as well as time timing of antibiotic initiation and dose adjustments will be collected. Any serious bleeding or thromboembolic event in the 30 days following concomitant use will be collected for outcome data. Multivariate analysis comparing the clinical outcomes of treatment in the warfarin dose reduction and warfarin dose continuation cohorts will be conducted. **Results & Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the mechanism of interaction and clinical implications of warfarin and sulfamethoxazole-trimethoprim and metronidazole when coadministered

Describe the effect of a preemptive warfarin dose reduction following the initiation of sulfamethoxazole-trimethoprim or metronidazole

### Self Assessment Questions:

What is the usual onset of interaction when initiating sulfamethoxazole-trimethoprim in a patient on chronic warfarin therapy?

- A: 6-12 hours
- B: 2-5 days
- C: 7-10 days
- D: It's highly variable and patient specific

Which of the following antibiotics have been found to have the most significant impact on INR?

- A: sulfamethoxazole-trimethoprim and metronidazole
- B: metronidazole and doxycycline
- C: metronidazole and ciprofloxacin
- D: all antibiotics have the same impact on INR

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-585L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECT OF TITRATING ORAL DIURETICS PRIOR TO DISCHARGE FROM THE HOSPITAL ON THE OUTCOMES OF HEART FAILURE PATIENTS

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**Background:** In the management of an acute heart failure exacerbation 90% of patients receive intravenous loop diuretics. However, the oral absorption of furosemide is reduced in the setting of an acute heart failure exacerbation. This change in absorption makes converting diuretics from intravenous to oral more difficult. Based on this, the 2013 ACCF/AHA heart failure guidelines and the 2010 HFSA guidelines recommend that patients with a heart failure exacerbation should be titrated on oral diuretics prior to discharge from the hospital. **Objective and Purpose:** The primary objective of this study is to determine if patients who are titrated on oral diuretics prior to discharge from the hospital after a heart failure exacerbation have lower post discharge weight, fewer 30 day readmissions, and fewer 30 day emergency room visits. Secondary objects are to identify factors that correlate with patients who are not titrated on oral diuretics prior to discharge.

**Methods:** This study was a retrospective chart review of patients referred to a hospital-run heart failure clinic. This referral occurs when patients are admitted for new heart failure or a heart failure exacerbation, and are not currently clinic patients. This study was approved by the institutional review board. The medical electronic medical records were reviewed for the hospitalization that caused the referral to the clinic, as well as the data from the first clinic follow up. The following data were collected: patient age in a range, gender, medical specialty of physician managing diuretic therapy, length of intravenous diuretic therapy, length of oral diuretic therapy, diuretics used, doses administered, length of hospital stay, weights during hospital stay and at follow up clinic visit, adjustments to diuretic therapy made at clinic follow-up, 30 day readmissions, and emergency room visits within 30 days. **Results & Conclusions:** To be determined

### Learning Objectives:

Describe the role of loop diuretics in the management of heart failure exacerbations

Identify how the pharmacokinetic factors of furosemide are altered in the setting of an acute heart failure exacerbation

### Self Assessment Questions:

Which of the following statements is correct regarding the use of loop diuretics for the treatment of acute decompensated heart failure?

- A: They should be given orally since intravenous absorption varies
- B: They increase survival by halting the progression of heart failure
- C: They reduce the symptoms of congestion in the setting of volume
- D: They have no role in the management of acute decompensated heart failure

Which of the following statements is true about the pharmacokinetics of furosemide?

- A: Furosemide has predictable absorption patterns from patient to patient
- B: Furosemide absorption may be reduced by edema in the gastrointestinal tract
- C: Furosemide distribution is altered by increased levels of natriuretic peptide
- D: Furosemide metabolism is impaired in the setting of decompensated heart failure

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-586L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF THE BEHAVIORAL PAIN SCALE IN A COMMUNITY TEACHING HOSPITAL

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Purpose: Pain is not easily assessed in intensive care unit (ICU) patients. At our institution, the Face, Legs, Activity, Cry, Consolability scale along with vitals signs are used as pain assessment tools. Current guidelines recommend the use of the Behavioral Pain Scale (BPS) or the Critical-Care Pain Observation Tool (CPOT) to assess pain. Each of these scales is validated for pain assessment in ICU patients. The purpose of this study is to evaluate the effectiveness of the newly implemented BPS. The primary objective is to evaluate the percentage of time within the targeted BPS score of 5 or less post-BPS implementation. Secondary objectives include analyzing the percentage of BPS scores of 5 or less, change in use of opiate analgesia and/or sedatives; duration of hospital and ICU stay; and change in duration of mechanical ventilation post-BPS implementation. Methods: This is a retrospective, single-center, chart review pre- and post-BPS implementation study from January 2014 through January 2016. A report was generated through the electronic medical record for patients in the medical ICU requiring opiate analgesia. Patients included were 18 years of age or older, unable to communicate pain, admitted to the medical intensive care unit for 48 hours or more, mechanically ventilated, and requiring opiate analgesia. Excluded patients were those requiring neuromuscular blocking agents (except for intubation) or quadriplegic. Results and Conclusions: Post-BPS implementation data collection and analysis is ongoing. The results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

List the components of the Behavioral Pain Scale.

Recognize the patient population that the Pain, Agitation and Delirium guidelines recommend to utilize the Behavioral Pain Scale in.

### Self Assessment Questions:

Which of the following contains the components of the Behavioral Pain Scale?

- A Facial expression, Movement of upper limbs, Compliance with me
- B: Face, Legs, Activity, Cry, Consolability
- C: Blood pressure, Heart rate, Respiratory rate
- D: Muscle tension, Vocalization, Body movements, Facial expression

The 2013 Pain, Agitation and Delirium guidelines recommend the use of the Behavioral Pain Scale in which specific patient population?

- A Diabetic patients
- B Quadriplegic patients
- C Patients unable to self-report
- D Patients over the age of 65 years old

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-847L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PENDING OF ORDERS AT MEDICATION RECONCILIATION

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Purpose: Admission and discharge medication reconciliation can be time consuming and cumbersome for providers. Exploring pharmacist pending of orders for medication reconciliation was requested from physicians on the system medication reconciliation steering committee. Currently, pharmacists retrospectively review provider admission and discharge medication reconciliation. Discrepancies and opportunities are identified during this process necessitating provider contact. With the aim of improving provider and pharmacist efficiency and satisfaction during medication reconciliation a process for pending orders at admission and discharge was developed. Methods: Standardized workflows were developed for pharmacists to pend orders and for providers to review and sign pending orders at admission and discharge. The electronic medical record was leveraged to notify pharmacists to pend orders and facilitate seamless communication between pharmacist and provider. Pharmacist scope and expectations for pending orders were developed in collaboration with physician project leads. Training materials were developed and pharmacists, providers, and nursing caregivers were trained on the workflows and pending service. The pharmacy department partnered with hospitalists, surgeons, and physicians extenders at three facilities to pilot and optimize the service. Additionally, the largest facility piloted centralized, admission pending at an off-site location. Results and conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List two steps vital to ensure successful implementation of a new, pharmacist-provided service

Describe downstream benefits of pharmacist pending of orders for the provider at admission and discharge

### Self Assessment Questions:

Which of the following are considered important steps in the implementation of a new, pharmacist-provided transition of care service?

- A Provider and pharmacist communication and collaboration through
- B: Development of training resources
- C: Development of pharmacist and provider workflows within pharmacy
- D: A and B

Which of the following statements is a benefit of pharmacists pending of orders for medication reconciliation?

- A Appropriate formulary alternatives are pending by the pharmacist to
- B Increased workload and confusion for the pharmacist
- C Timing of next dose for prior to admission orders is often incorrect
- D Disjointed communication between pharmacist and provider

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-848L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RENAL FUNCTION AFTER CONVERSION TO MTOR-INHIBITOR IN LIVER TRANSPLANT RECIPIENTS

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**Purpose:** The purpose of this study is to assess whether immunosuppression with mammalian Target Of Rapamycin-inhibitors (mTORi) can result in a clinically significant improvement in renal function through the minimization of calcineurin inhibitor exposure in live transplant recipients. In addition, a secondary endpoint composite of mortality, rejection, and graft loss will be analyzed in order to assess the safety of the mTORis. The patient population to be studied will consist predominantly of African Americans and Hispanics as well as patients with larger body mass indices (BMI) which have not been well-studied in the current literature for mTORi use in liver transplant. **Methods:** This is a retrospective cohort study. Subject selection will be performed through a review of the electronic medical record (EMR) from January 2004 through July 2015. Adult patients undergoing liver transplantation who received either everolimus or sirolimus during the time period of chart review will be included. Patients receiving or who have received multiple transplants and patients with unstable allograft function will be excluded from the study. Demographic and clinical data including parameters that assess the safety and efficacy of therapy with mTORi will be collected. Time points of data collection will be at time of switch to mTORi as well as follow-up at 1, 3, 6, and 12 months after the conversion. The intention will be to develop a comparator group of patients that were not converted to therapy with an mTORi. The comparison of baseline characteristics as well as rates of adverse events will be evaluated via a chi-square or Fishers exact test. The primary objective of the study, mean change in GFR after switch to mTORi, will be assessed via the ANCOVA test. For the secondary objective, composite endpoint of graft loss, rejection, and/or mortality a logistic regression will be performed. **Results:** Pending **Conclusion:** Pending

### Learning Objectives:

Recognize the potential benefits of switching liver transplant recipients from calcineurin inhibitors to mTOR inhibitors

List adverse events associated with mTOR inhibitor therapy

### Self Assessment Questions:

Which of the following is a side effect of mTOR inhibitors?

- A: Hirsutism
- B: Neurotoxicity
- C: Proteinuria
- D: Gingival hyperplasia

What property of mTOR inhibitors has been theorized to aid in recurrence or progression of malignancies?

- A: Inhibition of vascular endothelial growth factor
- B: Binding FKBP
- C: IL-2 receptor antagonist
- D: Binding cyclophilin

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-587L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE ANALYSIS OF TACROLIMUS LEVELS IN ALLOGENEIC STEM CELL TRANSPLANT RECIPIENTS AT ADVOCATE LUTHERAN GENERAL HOSPITAL

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**Purpose:** Graft-versus-host disease is the major cause of morbidity and mortality following allogeneic hematopoietic stem cell transplantation (HSCT). Despite prophylaxis, acute graft-versus-host disease (aGVHD) occurs among 35-47% of related and unrelated allogeneic HLA-matched graft recipients. Combinations of Methotrexate and calcineurin inhibitors such as tacrolimus, are commonly utilized for the prevention of GVHD in HSCT patients. A role of tacrolimus in the prevention of acute and chronic GVHD in allogeneic HSCT patients has been demonstrated in various studies. The therapeutic range of tacrolimus is broad and varies between studies. The lack of consistent target levels used in these studies has led to various dosing regimens and target levels used at different institutions. Currently at Advocate Lutheran General Hospital (ALGH), the starting IV dose of tacrolimus is 0.03 mg/kg/day given as a continuous infusion which is then adjusted to maintain whole blood therapeutic concentration between of 8 and 12 ng/mL. The goal of this retrospective chart review is to evaluate current tacrolimus dosing strategies and resultant blood levels on patient outcomes. The impact of various confounding factors and concomitant medications will be reviewed. Information from this review will be used to summarize the ALGH experience with dosing and monitoring of tacrolimus. **Methods:** A single-center, retrospective chart review will be performed to evaluate the tacrolimus levels in 31 patients, who underwent allogeneic HSCT at ALGH between January 1, 2006 and December 31, 2015. Tacrolimus levels, dose, and adverse events will be recorded during the patients hospitalization for transplant. The primary endpoint of this study is time to therapeutic range. Secondary endpoints are percentage of patients within the therapeutic range, incidence of aGVHD and impact of the confounding factors on tacrolimus levels. **Results/Conclusion:** Data collection and analysis are pending and will be presented at the Great Lakes Pharmacy Resident Conference in April 2016.

### Learning Objectives:

Explain the correlation between the risk of developing aGVHD and tacrolimus concentration after allogeneic Hematopoietic Stem Cell Transplantation

Describe the impact of confounding factors on tacrolimus levels for the prevention of aGVHD in allogeneic HSCT

### Self Assessment Questions:

Which one of the following is a major adverse effect associated with tacrolimus?

- A: Nephrotoxicity
- B: Hepatotoxicity
- C: Ototoxicity
- D: Bone marrow suppression

What is least likely to influence tacrolimus levels?

- A: Drug interactions
- B: Inappropriate sample collection technique
- C: Patient's gender
- D: Hepatic function

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-588L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ANTIMICROBIAL USE TRENDS IN PATIENTS ADMITTED WITH A NEUTROPENIC FEVER DIAGNOSIS

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**Purpose:** Fever during chemotherapy-induced neutropenia may be the only indication of severe underlying infection. Fever is defined by the Infectious Diseases Society of America (IDSA) as a single temperature  $\geq 38.3$  degrees Celsius or  $\geq 38$  degrees Celsius orally over a one hour period. Patients are considered to be neutropenic per IDSA guidelines if they have  $< 500$  neutrophils/microliter or an absolute neutrophil count (ANC) predicted to decline to  $< 500$  neutrophils/microliter over the next 48 hours. Empiric antimicrobial selection should include an anti-pseudomonal beta-lactam antibiotic. The purpose of this descriptive study is to evaluate the appropriateness of treatment for febrile neutropenic patients at a regional community hospital when compared to recommendations made by the IDSA guidelines. **Methods:** This study was approved by the Institutional Review Board. This study was a retrospective chart review of not more than 400 randomly selected patients from May 1, 2012 through December 31, 2015. To select patients, the medical record was searched for the following terms: "fever and neutropenia", "neutropenia and fever", "neutropenic fever", and "febrile neutropenia". Additionally, patients meeting fever and neutropenia criteria per the above guidelines within six hours of admission were also included. Data collection included the following: demographic information, ANC, temperature, antibiotic selection/regimen, time to guideline-appropriate antibiotics, and time to de-escalation of antibiotics. The primary analysis was done by comparing study data to IDSA guidelines. Key secondary end points included time to guideline recommended antibiotic therapy, percentage of patients who received colony-stimulating factor, and analysis of inappropriate prescribing habits. Data analysis was conducted using descriptive statistics. **Results and Conclusions:** Results to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the rationale for guideline-selected empiric anti-pseudomonal beta-lactam antimicrobials

Define appropriate time to de-escalation of MRSA coverage

### Self Assessment Questions:

Which of the following are true regarding the empiric use of anti-pseudomonal beta-lactams?

- A: Pseudomonas aeruginosa is historically associated with severe infection
- B: Pseudomonas aeruginosa is the most common pathogen isolated
- C: There is a need to cover pathogens, such as Pseudomonas aeruginosa
- D: Both A and C

According to IDSA guidelines, which is most appropriate for discontinuation of MRSA coverage?

- A: If cultures have finalized indicating no gram positive infection.
- B: If no evidence of gram-positive infection after three days of therapy.
- C: If patient has completed a seven day course of antibiotics.
- D: If no evidence of gram-positive infection after two days of therapy.

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-589L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PROVIDER ADHERENCE TO PEDIATRIC, ANTIMICROBIAL DOSING RECOMMENDATIONS: EFFECT OF A PROGRESSIVE, CUSTOMIZED CLINICAL DECISION SUPPORT ALERTING STRATEGY

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**Purpose:** Previous literature has shown that reducing interruptive alerts improves the effectiveness of decision support and reduces alert fatigue. Introducing non-interruptive dose recommendations earlier in the order entry process may reduce the frequency of downstream interruptive maximum dose warnings and therefore improve provider adherence to electronic decision aides. The purpose of this project is to compare provider adherence to University of Michigan Health Systems (UMHS) antimicrobial dosing recommendations in pediatric inpatients before and after implementation of a non-interruptive dose guidance tool and an interruptive maximum dose warning in a computerized provider-order-entry (CPOE) system. **Methods:** Non-interruptive dose recommendations were implemented into UMHS CPOE systems during March 2015. Separate recommendations (adjusted for renal function) for mild infections and moderate-to-severe infections appear to users within the order window. In May 2015, a non-interruptive in-line maximum dose warning and a corresponding interruptive alert were implemented. During order entry, a message appears within the order window recommending alternative dosing if the dose entered exceeds a pre-configured limit. Users proceeding through order signing then encounter an alert requesting cancellation or acknowledgement/documentation of rationale. This single-center, retrospective cohort study will focus on initial antimicrobial orders for pediatric inpatients. Orders written for patients with cystic fibrosis, in the NICU, followed by ID, or lacking a documented creatinine/height/weight will be excluded. Additionally, orders written for antimicrobials lacking decision support will be excluded. The primary outcome assessed is provider percent adherence of initial orders (in terms of dose and frequency) to UMHS guidelines before and after each stage of implementation. Categorical results will be interpreted via a mixed model test with a level of significance set at 0.05. Assuming a baseline provider adherence of 50% and a 5% improvement across each phase of implementation, 2638 orders will be assessed to provide 80% power.

### Learning Objectives:

List alternative forms of decision support other than interruptive alerting

Describe the utility in reducing active interruptive alerting

### Self Assessment Questions:

Which of the following clinical decision support strategies provides an alternative to an active interruptive alert?

- A: A drop-down list with limited options
- B: A structured form or pathway
- C: Clinical information posted to work lists, menus, or queues
- D: All of the above

Why is it important to reduce the number of interruptive alerts?

- A: To improve clinical information system responsiveness and latency
- B: To improve clinical decision support by reducing alert fatigue
- C: To replace clinician decision making at the point of care
- D: To reduce dependency on clinician education and training

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-849L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DESCRIBING SAFETY OF TWICE DAILY SOTALOL USE IN PATIENTS WITH RENAL IMPAIRMENT

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**Purpose:** Proarrhythmia and sudden cardiac death are significant concerns linked to the use of antiarrhythmic drugs. Sotalol, a Class III antiarrhythmic agent with non-selective beta-adrenergic blocking properties, is known to effectively treat atrial arrhythmias. Sotalol is not metabolized, and 90% of its elimination occurs by renal excretion of unchanged drug. Sotalol has a dose-dependent proarrhythmic effect. For this reason, the product label recommends once daily dosing when sotalol is used to treat atrial fibrillation (AF) or flutter (AFL) in patients with a creatinine clearance (CrCl) of 40-60 mL/min. The product label recommends monitoring patients starting sotalol in an inpatient setting for the first five doses. Based on experience and to decrease length of stay, The Electrophysiology Service at The Ohio State University Wexner Medical Center (OSUWMC) starts patients with a CrCl of 40-60 ml/min on sotalol twice daily. After discharge, patients follow up for monitoring at OSUWMC's Antiarrhythmic Medications Clinic. The purpose of this study is to describe the safety of sotalol initiated at twice daily in patients with renal impairment during their inpatient stay and outpatient course. **Methods:** The Institutional Review Board at OSUWMC approved this retrospective study. Patients with AF/AFL admitted for initiation of sotalol from July 1, 2012 through June 30, 2015 at OSUWMC were reviewed. Patients were followed into the ambulatory setting, evaluating those in the Antiarrhythmic Medications Clinic up to 18 months after drug initiation to characterize presence of and response to ADRs, as well as arrhythmia control. Patients aged 18-89 years, started on sotalol twice daily for AF or AFL, with CrCl 40-60 ml/min upon sotalol initiation were included. Patients who were pregnant, prisoners, or receiving sotalol for other atrial or ventricular arrhythmias were excluded. Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe safety parameters surrounding twice daily use of sotalol in patients with renal impairment  
Identify appropriate monitoring to allow for assessment of risk versus benefit of twice daily sotalol use in patients with renal impairment

### Self Assessment Questions:

To monitor safety of sotalol, which of the following is NOT necessary?

- A: SCr
- B: Heart rate
- C: Calcium
- D: QT/QTc interval

To assess risk versus benefit of therapy, which of the following variables should be considered?

- A: Presence of ICD
- B: Arrhythmia burden
- C: Patient symptoms
- D: All of the above, plus more!

Q1 Answer: C      Q2 Answer: D

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Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF PHARMACIST PARTICIPATION IN AN ENHANCED TRANSITION OF CARE MODEL

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**Purpose:** Pharmacists have become increasingly involved with transition of care services for patients, specifically with obtaining an inpatient medication history as well as providing discharge counseling. However, rarely is a pharmacist involved in post-discharge outpatient follow up in the clinic setting. The purpose of this project is to assess the utility of pharmacist's participation in the post-discharge outpatient appointments with a physician as well as reimbursement for transitional care management services. **Methods:** Medicare patients aged 60 years and older admitted to the family medicine center medicine service were included in this study. Patients were excluded if they were discharged to a nursing home, skilled nursing facility, inpatient rehab, or to hospice. Eligible patients were identified by the lead researcher and contacted with 2 business days of discharge from the hospital. Patients were assisted with scheduling a follow up appointment with a physician and pharmacist in a transition of care clinic. Pharmacist services provided to patients during the post-discharge follow up visit included reconciling medications, counseling the patient on new medications, and making recommendations to the physician regarding pharmacotherapy. The primary outcome of this study was reduction in 30-day readmission for patients receiving transitional care management. In addition, total reimbursement for these services was tracked and will be reported as a secondary outcome. **Preliminary Results:** Starting in November 2015, a total of 43 patients met initial eligibility criteria. Of those patients, 15 were excluded due to post-discharge status. Of the 28 patients included in the study, 18 (64%) patients received a discharge phone call and a total of 6 (21%) patients received both a discharge phone call and a joint outpatient follow up appointment with both a physician and a pharmacist. **Conclusion:** Final results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Describe the key components of transitional care management needed to successfully bill for services in the outpatient setting.  
Explain which health care professionals are able to participate in transitional care management services.

### Self Assessment Questions:

Which of the following are necessary steps in order to bill for transitions of care services in the outpatient setting?

- A: Discharge phone call within 4 days + office visit within 14 days
- B: Discharge phone call within 4 days + office visit within 7 days
- C: Discharge phone call within 2 days + office visit within 14 days
- D: Discharge phone call within 2 days + office visit within 7 days

Which of the following is true?

- A: The discharge phone call should be provided by a physician
- B: The discharge phone call should be provided by a physician or licen
- C: The discharge phone call should be provided by a physician, licen
- D: The discharge phone call should be provided by a physician, licen

Q1 Answer: C      Q2 Answer: B

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Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF PHARMACIST INVOLVEMENT AND CLINICAL DECISION SUPPORT ON VACCINATION ERRORS AND MISSED OPPORTUNITIES IN A PEDIATRIC PRIMARY CARE CLINIC

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**PURPOSE:** Clinical decision support (CDS) is a tool within an electronic medical record (EMR) that alerts health care providers of vaccination opportunities. Vaccination related CDS is developed based on the routine vaccination schedules published by Centers for Disease Control and Prevention. Considerations not included in the institutions CDS include high risk populations, drug interactions, contraindications, and a four-day grace period. The objective of this study is to determine the impact of pharmacist involvement and CDS on vaccination error rates and missed opportunities by comparing a primary care clinic with a pharmacist and CDS to a primary care clinic with CDS alone. **METHODS:** A randomized, retrospective chart review of 500 patient encounters per clinic will be conducted to compare vaccination errors and missed opportunities between two pediatric primary care clinics. The intervention group has a full-time pharmacist and CDS, and the control group has CDS alone. Encounters will be evaluated for patients  $\leq 18$  years of age presenting for well child visits, sick visits, and immunization visits during a time period of April through June 2015. Patient encounters will be excluded if there is absent vaccine history. A vaccination error is defined as follows: doses administered before minimum recommended age, doses administered before minimum recommended dosing interval, unnecessary doses, and invalid doses for a combination of these reasons. A missed opportunity is defined as a vaccine dose due at date of encounter but not administered, without documented reason for vaccination delay or refusal by provider or patient. Using Pearsons chi-square test to detect an effect size of 2% in vaccine error rate, 495 charts per group will be required to achieve statistical power of 80% with significance level of 0.05. **RESULTS and CONCLUSION** will be presented at the Great Lakes Pharmacy Resident Conference 2016.

### Learning Objectives:

Recognize the complexity of the recommended pediatric vaccination schedule

Describe the benefits and barriers of clinical decision support

### Self Assessment Questions:

How many disease states are routinely vaccinated against in the first 6 years of life?

- A: 2
- B: 14
- C: 35
- D: 50

What is a benefit of clinical decision support?

- A Alerts health care providers of vaccination opportunities
- B Accounts for four-day grace period to administer vaccines
- C Detects high risk populations that may benefit from vaccines
- D Identifies contraindications of vaccines

Q1 Answer: B Q2 Answer: A

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Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF VASOPRESSOR TREATMENTS IN THE SETTING OF SEVERE SEPTIC SHOCK IN A MIXED BED COMMUNITY HOSPITAL INTENSIVE CARE UNIT (ICU)

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**Purpose:** For the critically-ill patient in septic shock, vasopressor agents are recommended after adequate fluid resuscitation in the setting of continued hemodynamic instability. According to the Surviving Sepsis Guidelines, norepinephrine is recommended as first line therapy. Evidence regarding second line options is less clear. In clinical practice, increasing norepinephrine doses or adding additional vasopressor agents are employed to achieve hemodynamic targets. Any vasopressor agent becomes a possible adjunct treatment based on patient-specific considerations and prescriber preference. This study aims to describe current institutional practices regarding vasopressor dosing and selection after norepinephrine and to identify which second-line vasopressor, if any, is associated with better outcomes. **Methods:** This study was determined to be exempt from Institutional Review Board review. The electronic medical record will identify patients with a primary discharge diagnosis of septic shock who were placed on high dose norepinephrine. In order to include only patients with severe septic shock, norepinephrine doses must be greater than 15 mcg/min for at least 3 hours to be included. Patients will then be stratified according to the second vasopressor added. The following data will be collected: age, sex, pre-existing conditions, source of infection, appropriate antibiotic therapy, hydrocortisone use, APACHE II score, norepinephrine dose, second vasopressor added, time second vasopressor was added, second vasopressor dose, lactate level, hospital length of stay, ICU mortality, and survival until hospital discharge. Descriptive analyses will be performed on the data and shared with the appropriate stakeholders.

**Results and Conclusions:** Will follow data collection and analysis.

### Learning Objectives:

Describe patients that would be included in this study based on the inclusion and exclusion criteria

Identify hemodynamic goals when using vasopressors in septic shock

### Self Assessment Questions:

Which patient would be included in this study based on the inclusion and exclusion criteria used to screen patients?

- A 59 y/o female admitted to the ICU for severe sepsis on norepinephrine
- B: 75 y/o male admitted to the ICU in septic shock on norepinephrine
- C: 46 y/o male admitted to the ICU for septic shock on phenylephrine
- D: 62 y/o female admitted to ICU for septic shock on norepinephrine

What is the goal mean arterial pressure for a patient in septic shock according to the Surviving Sepsis Guidelines?

- A >50mmHg
- B >55mmHg
- C >60mmHg
- D >65mmHg

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-591L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **ASSESSMENT AND IMPLEMENTATION OF VACCINE BEST SAFETY PRACTICES ACROSS AMBULATORY AREAS OF AN INTEGRATED HEALTH SYSTEM**

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**Purpose:** There has been an increase in vaccine errors nationally over the last decade. Additionally, vaccines are the most common class of medications with reported medication events within Aurora Health Care ambulatory facilities. To address this need, several governing bodies have created best practices in an effort to minimize the number of errors and near-misses. The objective of this project was to assess and implement vaccine best safety practices across ambulatory areas of an integrated health system. **Methods:** Internal vaccine event data was gathered from the electronic incident reporting system in order to identify the most common vaccine errors as well as the most common vaccines that errors are occurring with. Next, a literature assessment of vaccine safety best practices was performed. An interdisciplinary vaccine safety workgroup was assembled for feedback and support for the project. An assessment tool was created to assess vaccine safety at ten randomly chosen clinics and five retail pharmacies throughout the system. A gap analysis was conducted to compare current organization practices to national best practices to identify opportunities for improvement. Identified opportunities were prioritized based on system medication event data, ability to build in alerts through the EMR, and ability to implement in the short term. Unaddressed opportunities were noted on the gap analysis for future initiatives. Interventions that needed IT support were submitted and a system-wide toolkit of policies, procedures, and resources was created. Finally, a checklist was created to be utilized by a vaccine champion at each site on an annual basis to make sure each site is in compliance with best practices.

**Preliminary Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe a sequential process for initial assessment of organizational compliance with established best practices.

Identify an appropriate strategy to ensure ongoing compliance across an integrated health system to implemented best practices.

### **Self Assessment Questions:**

Which of the following best reflect the proper sequence when assessing organizational compliance with established best practices?

- A Perform gap analysis, gather best practice, conduct site visits, rev
- B: Review internal incidents, perform gap analysis, gather best practice
- C: Review internal incidents, gather best practice, conduct site visits,
- D: Perform gap analysis, review internal incidents, gather best practice

What would be an appropriate strategy to ensure ongoing compliance across an integrated health system to implemented best practices?

- A Create an assessment checklist to be used by a coordinator or "champion"
- B Send one representative to every site in the system every year
- C Post the best practices and related policies in an easily accessible location
- D Assessment of compliance should not be needed once a policy or procedure is established

Q1 Answer: C Q2 Answer: A

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Activity Type: Knowledge-based Contact Hours: 0.5

## **DEVELOPING STRATEGIES TO ASSIST IN ANTIBIOTIC DE-ESCALATION AT A RURAL COMMUNITY TEACHING HOSPITAL**

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**Purpose:** According to the Infectious Diseases Society of America (IDSA) guidelines, antibiotic de-escalation leads to an optimization of

clinical outcomes with a minimization of unintended consequences and a reduction in health care costs without adversely impacting quality of care. The objective of this project is to evaluate the de-escalation practices of selected antibiotics and to educate the medical staff on appropriate de-escalation of antibiotics in a rural community teaching hospital. **Methods:** This study has been submitted and approved by the Institutional Review Board. A retrospective chart review has been

performed on patients admitted from January 1, 2015 to June 30, 2015. Patients included were randomly selected from a list of selected antibiotics. The selected antibiotics include levofloxacin, meropenem, piperacillin-tazobactam, cefepime, and aztreonam. Data collected includes patient demographics, prescriber, indication for antibiotic use, antibiotic agent used and dose, culture results, and length of treatment defined as discontinuation of antibiotics or hospital discharge. The data has been compiled and is currently being assessed to determine the appropriateness of the hospital's de-escalation of antibiotics. The results of this analysis will be used to help refine de-escalation practices and to educate the medical staff on proper antibiotic de-escalation. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Review the importance of antibiotic de-escalation

Discuss barriers to appropriate antibiotic de-escalation

### **Self Assessment Questions:**

Which of the following is associated with appropriate antibiotic de-escalation?

- A Increased antibiotic resistance
- B: Increased hospital length of stay
- C: Decreased adverse drug events
- D: Increased health care cost

All of the following are barriers to antibiotic de-escalation except:

- A Prescribers having preferred antibiotics
- B Multiple prescribers rotating through hospital
- C Time
- D Pharmacy involvement

Q1 Answer: C Q2 Answer: D

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## UNFRACTIONATED HEPARIN INFUSION PROTOCOL EVALUATION USING ANTIFACTOR XA HEPARIN ASSAY IN ACUTE CORONARY SYNDROME

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**Purpose:** Guidelines support the use of therapeutic anti-Xa concentrations of 0.3 to 0.5 IU/ml in the anticoagulation management acute coronary syndromes (ACS). Several publications have shown the efficacy of anti-factor Xa (anti-Xa) monitoring in unfractionated heparin (UFH) nomograms for the management of pulmonary embolism and deep vein thrombosis. However, evaluation of UFH nomogram utilizing anti-Xa levels in management of ACS has not been reported. The objective of this analysis will be to assess the safety and efficacy of the anti-Xa monitoring in UFH use in ACS. **Methods:** After IRB submission, a retrospective chart review on patients admitted from September 1st, 2014 through August 31st, 2015 on the ACS UFH protocol was performed. Collected information included demographics, UFH infusion rates and subsequent changes, UFH boluses, other concomitant medications that increase bleed risk, protamine use, anti-Xa levels, markers of bleeding, and indications. Inclusion criteria included a minimum of two anti-Xa levels drawn while on the UFH ACS protocol. Compliance with UFH ACS nomogram was assessed by comparing UFH infusions and boluses along with anti-Xa levels. The primary efficacy outcome of this study was the amount of hours in therapeutic anti-Xa range (0.3-0.5 IU/mL). Secondary outcomes included time to first therapeutic anti-Xa level, number of patients never in therapeutic range, and number of hours patients were not within therapeutic range. Adverse anticoagulation events included hemoglobin levels decreases greater 2 g/dL over 24 hours and protamine use.

**Results and Conclusion:** Data collection and analysis is pending. Results and conclusions to be presented.

### Learning Objectives:

Select initial management of an unfractionated heparin infusion protocol in acute coronary syndrome

Explain the current options for monitoring unfractionated heparin infusions

### Self Assessment Questions:

A patient is admitted to the emergency department for ACS. The physician is starting a heparin drip. Which of the following is the best option for the initial drip rate?

- A: 8 units/kg/hr
- B: 12 units/kg/hr
- C: 16 units/kg/hr
- D: 20 units/kg/hr

The same patient has now had 2 therapeutic anti-Xa levels. The patient has received the heparin drip, 2 liters of normal saline, ASA, and morphine. The patient's hemoglobin has dropped by 1 g/dL.

- A: Continue the drip at the current rate and continue anti-Xa monitoring
- B: Continue the drip at the current rate and increase the anti-Xa monitoring
- C: Stop the drip as the patient likely has a bleed
- D: Stop the drip as the patient has been therapeutic for the last 12 hours

Q1 Answer: B      Q2 Answer: B

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## IMPLEMENTATION AND EVALUATION OF PHARMACIST INVOLVEMENT IN TRANSITIONS OF CARE SERVICES FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) PATIENTS IN A COMMUNITY, TEACHING HOSPITAL

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**Purpose:** The Centers for Medicare and Medicaid Services (CMS) expanded the Readmissions Reduction Program to include patients admitted for an acute exacerbation of COPD beginning in fiscal year (FY) 2015. Previous studies have demonstrated the potential benefit of having pharmacists involved in transitions of care for this patient population. The purpose of this study is to evaluate a pharmacist's role in reducing readmission rates for COPD patients in a community, teaching hospital. **Methods:** This study is comprised of implementation and evaluation of a new pharmacy service. There are three components to this new service including medication history, patient education, and post-discharge follow-up. The first step in the process will be completion of a medication history with the patient and/or caregiver by a pharmacy staff member. Upon notification of admission, the pharmacist will provide education to the patient and/or caregiver through discussion and written materials. Lastly, a follow-up phone call will be made to the patient approximately three business days after discharge to assess medication acquisition, adherence and tolerability, answer medication-related questions, and perform medication reconciliation. Data collection is taking place December 1, 2015 through February 29, 2016. The primary outcome measured is 30-day readmission rates, which will be compared to data from the same timeframe in FY 2015. Secondary outcomes include any medication-related discrepancies that arise during the post-discharge medication reconciliation. Population information will be gathered including patient age, gender, smoking status, and length of stay. Additionally, COPD exacerbation risk factors will also be recorded including previous hospital admission, oral corticosteroid use, and oxygen therapy. In December 2015, 18 patients qualified as COPD admissions. Of the 18 patients, ten patient educations were conducted. **Results and Conclusions:** Data collection and analysis are currently in progress. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe potential roles for pharmacists within transitions of care services

Identify barriers to the implementation of transitions of care services

### Self Assessment Questions:

Which of the following includes disease states that are currently or will be monitored via the CMS Readmission Reductions Program?

- A: Acute myocardial infarction, heart failure, pneumonia, acute exacerbation
- B: Acute myocardial infarction, heart failure, pneumonia, acute exacerbation
- C: Acute myocardial infarction, heart failure, pneumonia, acute exacerbation
- D: Acute myocardial infarction, heart failure, pneumonia, acute exacerbation

Which care transition service(s) was/were the primary focus of this study?

- A: Medication reconciliation upon admission and discharge
- B: Referral to a skilled nursing facility upon discharge
- C: Patient education and medication reconciliation
- D: Scheduling follow-up appointments for patients upon discharge

Q1 Answer: B      Q2 Answer: C

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## OPIOID OVERDOSE EDUCATION AND NALOXONE DISTRIBUTION FOR INPATIENTS AT THE BATTLE CREEK VETERAN AFFAIRS MEDICAL CENTER (VAMC)

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Over the past decade, the increase in opioid overdose deaths has prompted the need for expanded access to naloxone, an opioid antagonist that reverses the effects of opioids. In response, the Veterans Health Administration implemented a national opioid overdose education and naloxone distribution (OEND) program in 2013 that has currently saved more than 160 lives. In 2015, Battle Creek VAMC implemented this project to assess the reduction in opioid overdose deaths in Veterans admitted to the inpatient acute psychiatry unit with opioid use disorder (OUD) who receive OEND from clinical pharmacy staff. A period of abstinence, such as that associated with an inpatient stay, significantly increases the risk for overdose, making this a target population for OEND. Veterans determined to be at risk for opioid overdose following discharge were provided with OEND. Data collected includes: a patient identifier, demographic information, and receipt of an intranasal naloxone kit. Additionally, the information required to report a reversal to the VHA OEND program is collected for veterans requesting a refill. This information is assessed using descriptive statistics to identify the number of reported reversals and demographics most likely to receive and to use a naloxone kit. While complete results are still pending, between October 2015 and January 2016 nine patients met criteria and received OEND. All Veterans have been male, with a median age of 42 years. To date, there have been no reported reversal or overdoses by these patients. Two significant limitations to this project were the short period of follow up and a change in detoxification treatment procedures resulting in less frequent admissions of eligible Veterans. Given the established efficacy and need of OEND for inpatients with OUD, this service and data collection will be continued with the expectation of finding similar benefit in our population.

### Learning Objectives:

Identify a patient who would be a candidate to receive an intranasal naloxone kit.

List data that should be collected from patients who report using a naloxone kit.

### Self Assessment Questions:

As clinical pharmacist you are tasked with educating providers about which of their patients are candidates for an intranasal naloxone kit.

Which of the following answers best describes a patient population?

- A History of opioid dependence or opioid overdose
- B: Palliative care patients on high dose opioids
- C: Prescribed any opioid, regardless of dose
- D: History of illicit drug use

A Veteran reports using his intranasal naloxone kit to save his friend who had overdosed on heroin. He is very appreciative that he received a naloxone kit because it kept his friend from dying while

- A How much heroin the Veteran's friend had used
- B How many doses of naloxone were used
- C Whether the Veteran performed rescue breathing
- D Whether the Veteran was using heroin as well

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-949L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IDENTIFYING BEST PRACTICES FOR OHIOHEALTH PHARMACY STUDENT INTERNSHIP PROGRAMS

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Purpose: OhioHealth is a health-system in central Ohio with fourteen hospitals and emergency care centers and multiple ambulatory care sites. Pharmacy internship programs currently exist in several hospitals throughout the OhioHealth system. The purpose of this quality improvement study is to develop a best practices guideline for pharmacy intern training at OhioHealth and to determine what resources are necessary for all OhioHealth training sites to achieve best practices. Methods: This is a quality improvement study with prospective survey and interview components. Information will be gathered from pharmacy site managers and pharmacy internship program directors. All information gathered from surveys, interviews, and the literature will be used to develop a standardized set of best practices for pharmacy internship programs within OhioHealth. In addition to the creation of best practices, a gap analysis will be created for OhioHealth hospital sites in order to create a plan to improve existing internship programs and initiate programs at sites that currently do not have pharmacy interns. Results and Conclusions: Data collection and analysis is ongoing. Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recall ASHP policy positions regarding pharmacy internship programs.

State the advantages of internship program standardization within a health-system.

### Self Assessment Questions:

Which of the following statements is correct regarding ASHP's policy position regarding pharmacy internship programs?

- A It is valuable for pharmacies to assign duties limited to those similar to those of other health-care professionals.
- B: Standardization of internship programs may lead to a lack of individualized learning experiences.
- C: Enhanced structure and goal setting leads to valuable learning experiences.
- D: Expansion of internship programs may require significant resource allocation.

What was the goal of the gap analysis?

- A Determine the current gaps in technician work flow that interns may be able to address.
- B Determine the resources needed for pharmacies to initiate or improve their internship programs.
- C Analyze gaps in the internship learning experience identified by current interns.
- D Analyze clinical service areas that may be expanded through internships.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-854L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CLINICAL UTILITY OF VERIGENE FOR ANTIBIOTIC INTERVENTION IN INTENSIVE CARE UNIT (ICU) AND NON-ICU PATIENT POPULATIONS

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**Purpose:** Inadequate antimicrobial treatment is independently associated with increased risk of death in septic patients. Rapid molecular diagnostic methods such as Verigene are utilized to identify microorganism genera/species and resistance mechanisms on positive blood cultures approximately 24-48 hours sooner than standard culture, resulting in faster time to optimal antibiotics and decreased antimicrobial resistance and Clostridium difficile infection incidence. Despite Verigenes proven accuracy and clinical benefits, the possibility of inaccurate test results exists, necessitating interpretation in the context of other clinical and laboratory findings. This consideration is significant when caring for high-risk ICU patient populations. The study purpose is to characterize and evaluate Verigene antibiotic interventions in ICU and non-ICU patient populations at UCMC. The research hypothesis is antibiotic interventions based on Verigene are more frequently performed in non-ICU versus ICU patients due to greater concern for concomitant infections and acuity of comorbid conditions in critically ill patients. **Methods:** This retrospective, single-center, observational cohort study will include patients ≥18 years old admitted to UCMC who have positive blood culture (gram positive or negative). Exclusion criteria include prisoners, pregnant women, and patients with polymicrobial blood cultures or cultured organisms not identified by Verigene. The specific study aims are to: 1) Compare incidence of antibiotic interventions (based on Verigene) in ICU versus non-ICU patients; 2) Compare clinical adverse effects in patients who received intervention versus no intervention; 3) Identify factors associated with no intervention; 4) Describe relationship between Verigene results and concomitant infection. Dichotomous and continuous data will be compared using appropriate statistical tests. A multivariate regression will be performed to identify factors predictive of no intervention. One hundred forty patients will be targeted for enrollment to detect percent difference between ICU and non-ICU patients for Verigene intervention. **Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe advantages of the rapid molecular diagnostic tool Verigene  
Explain limitations associated with the use of Verigene

### Self Assessment Questions:

Which of the following is not an advantage of microbiologic reporting using Verigene:

- A: Verigene can identify a variety of resistance genes, more than any
- B: Verigene is run directly in the blood culture bottle, resulting in faster
- C: Microorganism identification occurs 24 to 48 hours sooner than tra
- D: A and B

Which of the following illustrates a limitation of microbiologic reporting using Verigene:

- A: Resistance mechanisms exist that are not detectable by Verigene
- B: Verigene results must be interpreted in the context of other clinical
- C: Microorganism identification is less sensitive and specific than tra
- D: A and B

Q1 Answer: B      Q2 Answer: D

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Activity Type: Knowledge-based    Contact Hours: 0.5

## ASSESSMENT OF APPROPRIATE ANTIBIOTIC SELECTION AND DURATION OF THERAPY FOR THE TREATMENT OF URINARY TRACT INFECTIONS AND THE IMPACT ON READMISSION IN A COMMUNITY HOSPITAL

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**Purpose:** Studies suggest that antibiotic selection and duration of therapy in the treatment of UTIs does not always follow published guidelines such as those from the Infectious Disease Society of America (IDSA). The purpose of this study is to evaluate prescriber adherence to IDSA guidelines in the treatment of UTIs and determine what impact non-adherence has on all cause 30 day readmissions. **Methods:** This study was submitted to the Institutional Review Board for approval. A report will be generated for all the patients admitted to the hospital from January 1, 2014 through June 30, 2015 and discharged with a diagnosis of complicated/uncomplicated urinary tract infection or pyelonephritis. If population numbers exceed that needed for significance and/or power, participants will be randomly selected using a random number generator. Data will be collected from the Electronic Medical Record (EMR) and will include patient identification/visit number, impression on admission of UTI, age, allergies, comorbidities, urine culture results (including colony counts and bacteria isolated w/ sensitivities), temperature on admission, catheters present on admission, changes to therapy during admission, antibiotic at discharge, duration of therapy prescribed (including inpatient treatment and discharge order) and 30 day readmission. Data collected will be kept confidential and accessible to primary investigator only. All patient identifiers will be excluded from presented materials. Therapeutic regimens will then be compared to IDSA guidelines for adherence. 30-day readmission rate will be determined for those outside of IDSA guidelines in order to determine any impact of non-adherence. **Results and Conclusions:** To be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the different antibiotic recommendations for the treatment of urinary tract infections according to the Infectious Disease Society of America (IDSA) in adult patients.

Identify empiric antimicrobial treatment regimens for acute uncomplicated and complicated urinary tract infections according to the Infectious Disease Society of America (IDSA) in adult patients.

### Self Assessment Questions:

Per Infectious Disease Society of America Clinical Practice Guidelines for the treatment of uncomplicated urinary tract infections in adult patients, which of the following recommendations is true reg

- A: Nitrofurantoin monohydrate/macrocrystals 100 mg oral twice daily
- B: Trimethoprim-sulfamethoxazole 160/800 mg oral twice daily for 5 d
- C: Fosfomycin trometamol 3 g oral in a single dose
- D: Amoxicillin 875 mg oral twice daily for 5-7 days

Per Infectious Disease Society of America Clinical Practices Guidelines for the treatment of acute pyelonephritis, which of the following empiric antibiotics is an appropriate treatment option for pat

- A: Trimethoprim-sulfamethoxazole 160/800 mg, oral
- B: Fosfomycin trometamol 3 g, oral
- C: Amoxicillin 875 mg, oral
- D: Ceftriaxone 1 gram, Intravenous

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-594L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **INFLUENCE OF DOCUMENTED OR REPORTED BETA-LACTAM ALLERGIES ON CLINICAL OUTCOMES IN PATIENTS THAT PRESENT WITH SEPTIC SHOCK**

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**Purpose:** Rapid antimicrobial therapy initiation continues to have a large impact on mortality outcomes in septic shock. The purpose of this study is to determine if the presence of a beta-lactam allergy leads to a delay in the initiation of antibiotic therapy in septic shock patients. Identifying contributing factors to antibiotic therapy delays could lead to the development of strategies to ensure that antibiotics are administered to patients in a timely manner to improve outcomes in septic shock. **Methods:** This study evaluated adult patients diagnosed with septic shock based on International Classification of Diseases, Ninth revision coding through retrospective chart review. It has been approved by the Institutional Review Board. The patient population was obtained from two affiliated hospitals between January 2008 and August 2015. Antibiotic selection, timing of antibiotics, infection type, mortality, hospital length of stay, and intensive care unit (ICU) length of stay were collected from the patients' electronic medical record. Patients were included if they received antimicrobial therapy for septic shock during their admission, and were admitted through the emergency department or via direct ICU admission. Exclusion criteria included immunosuppression, burns greater than 10% total body surface area, infections caused by viral or fungal organisms, and transfers from outside hospitals. Time to first dose of antibiotics, time to appropriate antibiotic therapy, hospital length of stay, and ICU length of stay data were analyzed using a Student's t-test or Wilcoxon rank sum test. Mortality, appropriate therapy, and organism resistance data were analyzed using chi-squared tests or Fisher's exact tests. **Results:** To be presented at Great Lakes Pharmacy Residency Conference (GLPRC). **Conclusions:** To be presented at GLPRC

### **Learning Objectives:**

Discuss the impact of time to antibiotic initiation on mortality in septic shock.  
Describe the effect of beta-lactam allergies on pathogen resistance patterns and antimicrobial resistance rates.

### **Self Assessment Questions:**

Which of the following was demonstrated to be true about the impact of time to antimicrobial initiation on mortality in septic shock in the Kumar study?

- A: Each hour delay in antimicrobial therapy initiation, the survival rate
- B: The appropriateness of antimicrobial therapy initiated does not have
- C: In previous studies, 80% of patients have received effective antimicrobial
- D: The effect on mortality of antimicrobial therapy initiation compared

Which of the following is true concerning the effect of beta-lactam allergies on antimicrobial therapy based on previous studies?

- A: Adequacy of second-line empiric antibiotic agents is often less than
- B: Combination therapy in most facilities is not required for adequate
- C: The antibiotic exposure pattern in beta-lactam allergic patients does
- D: Hospital acquired infections in beta-lactam allergic patients are more

Q1 Answer: A      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-595L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **UTILIZATION OF PHARMACY VACCINATION TRACKING IN ASPLENIC PATIENTS**

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Although asplenic patients are at increased risk of overwhelming post-splenectomy infection (OPSI), vaccination rates for this population continue to be low. The purpose of this retrospective cohort chart review is to evaluate vaccination rates before and after a pharmacy-driven tracking system was implemented using electronic medical record I-Vents in adult patients who received a splenectomy between November 2011 and September 2015. This retrospective cohort analysis will compare adult patients who received a splenectomy before and after implementation of the pharmacy-driven intervention for vaccination tracking with a primary outcome of complete initial vaccination. Patients were identified electronically by ICD-9 and procedure codes and then divided into pre-I-Vent and post-I-Vent groups based on when pharmacists began utilizing the electronic medical record for vaccination tracking. Patient demographics, vaccination administration documentation, and reasons for incomplete vaccination were recorded and analyzed. Complete initial vaccination was defined as documentation of all three of the following vaccines: pneumococcal, meningococcal, and Haemophilus influenzae b. Normally distributed data will be compared with a Student's t-test, and non-normally distributed data will be analyzed using Wilcoxon rank sum. A Chi-square test will be used for nominal and ordinal data as appropriate. Logistic regression will be used to compare vaccination rates between groups, adjusting for confounders. Any variable that changes the coefficient for the group effect by 15% or more will be included in the final model.

**Results and conclusions:** Data collection is complete and analysis is ongoing. Results and conclusions will be presented.

### **Learning Objectives:**

Describe the organisms most likely to cause overwhelming post-splenectomy infection and their risk in asplenic patients  
Outline strategies that may increase vaccination rates amongst asplenic patients

### **Self Assessment Questions:**

Which of the following vaccines should be administered to a 65-year-old male prior to a planned splenectomy?

- A: Haemophilus b Conjugate Vaccine
- B: Zoster Vaccine
- C: Hepatitis B Vaccines (Recombinant)
- D: None of the above

What barriers prevent patients from receiving appropriate asplenic vaccination?

- A: Emergent splenectomy does not allow for appropriate vaccine timing
- B: Previous vaccination records are not accurately updated in the
- C: Institutions do not have standardized vaccine tracking systems
- D: All of the above

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-855L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## INITIATION OF A PAIN AND SEDATION PROTOCOL FOR TRAUMA PATIENT CARE IN THE EMERGENCY DEPARTMENT

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**Purpose:** A new pain and sedation protocol for mechanically ventilated trauma patients was implemented in the adult emergency department (ED) at St. Vincent Indianapolis Hospital in December of 2013. The protocol features aggressive pain management during the first hour of care through multimodal analgesia with bolus dosing of fentanyl (1 mcg/kg, maximum 100 mcg/dose) and ketamine (2 mg/kg, maximum 200 mg/dose). The purpose of this study is to describe protocol utilization and to determine whether or not the quality of pain control and sedation provided by the protocol adequately meets patient needs. The objectives of this study are to describe the rate of protocol order set utilization, doses of medications administered, timing of medication first doses, additional non-protocol sedative or analgesic medication requirements, adverse medication reactions, and assessments of pain and sedation in mechanically ventilated trauma patients during care in the ED. **Methods:** All mechanically ventilated trauma patients, regardless of type of injury, who were admitted to St. Vincent Indianapolis Hospital adult ED from September 1st, 2014 to August 30th, 2015 were included in this retrospective chart review study. Patients were identified for study inclusion through a query of the hospital's trauma registry using the ICD-9 code 96.04 (insertion of endotracheal tube). Data collected includes patient demographics, presence or absence of protocol order set, ordering provider type, doses of fentanyl and ketamine administered, time to first medication doses, Critical-Care Pain Observation Tool and Richmond Agitation-Sedation Scale score assessments, vital signs before and after medication administrations, additional non-protocol analgesic or sedative medications administered, and whether or not a pharmacist was present. Analysis through descriptive statistics will reveal protocol compliance, medication utilization patterns, whether or not adequate analgesia and sedation are being achieved, and potentially identify future areas of improvement. **Results and Conclusions:** preliminary results and conclusions of this study are pending.

### Learning Objectives:

Explain the benefits of utilizing ketamine as a sedative agent in adult mechanically ventilated trauma patients in the Emergency Department. Describe patient and medication considerations when choosing analgesic and sedative agents for trauma patient care in the Emergency Department.

### Self Assessment Questions:

Which of the following is not a benefit of using ketamine for sedation in adult mechanically ventilated trauma patients in the Emergency Department?

- A It causes airway relaxation without affecting respiratory drive
- B: It causes little to no effects on blood pressure or heart rate
- C: It produces amnestic, anxiolytic, analgesic, and dissociative sedation
- D: Its use decreases overall opioid consumption

Which of the following statements is true?

- A Trauma patients should receive a sedative agent with each analgesic
- B Trauma patients should receive aggressive pain management up to 1 hour
- C Utilization of continuous infusions of analgesic and sedative agent is recommended
- D There are currently no established gold standards for managing trauma patients

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-596L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RISK OF ELEVATED CREATINE PHOSPHOKINASE WITH HIGH-DOSE DAPTOMYCIN ( $\geq 8$ MG/KG) VERSUS TRADITIONAL DOSES ( $\leq 6$ MG/KG)

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**Purpose:** The labeled dose for daptomycin is 6 mg/kg every 24 hours for patients with Staphylococcus aureus bacteremia. Daptomycin therapy can cause rhabdomyolysis, thus creatine phosphokinase (CPK) is recommended to be monitored weekly. Previous studies have concluded that daptomycin 8 mg/kg and higher are well tolerated and effective for gram-positive infections, but direct comparisons between doses of 6 mg/kg and 8 mg/kg or higher with regard to toxicity have not been performed. The aim of this study is to compare elevations of CPK between doses of daptomycin 8 mg/kg or greater and a dose of 6 mg/kg. **Methods:** This is a retrospective review taking place at the Detroit Medical Center from July 2012 to July 2015. Patients 18 to 89 years of age, having received daptomycin with a dose of at least 6 mg/kg every 24 hours, who had a baseline CPK and at least 1 CPK recorded greater than 72 hours after initiation of therapy will be included. The primary outcome of this study is to compare the incidence of CPK elevations greater than 5 times the upper limit of normal (200 U/L) between treatment groups. Length of stay, symptoms of rhabdomyolysis, and incidence of in hospital mortality will also be recorded as secondary outcomes. Baseline characteristics to be collected include age, total body weight, height, gender, daptomycin dose, duration of treatment, concurrent medications that can increase CPK (such as HMG-CoA reductase inhibitors, etc.), source of infection, need for additional S. aureus or Enterococcus spp. coverage, and APACHE II score. A Chi-Square test or Fishers Exact test will be used to assess the primary outcome. Binary logistic regression is planned to include all variables with a P-value less than 0.20 in univariate analysis. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify when discontinuation of daptomycin therapy is warranted due to adverse effects

Discuss the risks of using daptomycin doses of 8 mg/kg and higher every 24 hours

### Self Assessment Questions:

1. At what creatine phosphokinase concentration most accurately describes when daptomycin treatment would be discontinued if the patient has no symptoms of rhabdomyolysis?

- A > 400 U/L (2 times the upper limit of normal)
- B: > 1000 U/L (5 times the upper limit of normal)
- C: > 2000 U/L (10 times the upper limit of normal)
- D: > 4000 U/L (20 times the upper limit of normal)

2. Which of the medication(s) listed below are known to increase creatine phosphokinase?

- A Simvastatin
- B Azithromycin
- C Metronidazole
- D A & C

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-950L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COLCHICINE PRESCRIBING PATTERNS FOR GOUT PROPHYLAXIS IN A VA POPULATION

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**Purpose:** Gout is a disorder that results from increased uric acid levels, and is associated with debilitating pain and high recurrence rates. Colchicine is an antimitotic agent that has been used for thousands of years to treat gout; however, its complex regulatory history resulted in its FDA approval in 2009. The new labeling of the medication provides changes to previous dosing, and information for dose adjustments due to the risk of gastrointestinal, myelosuppressive, and neuromuscular toxicities. Colchicine for gout prophylaxis is approved for a limited duration and is intended to be used in combination with urate lowering therapy (ULT) to prevent gout attacks until target serum uric acid levels are reached. The purpose of this study is to evaluate the use of colchicine when prescribed for greater than or equal to 30 days for gout prophylaxis. Appropriate use of colchicine for this duration of treatment is in combination with ULT. **Methods:** This study is a retrospective, electronic chart review of patients with new colchicine prescriptions for ≥30 day supply from October 1, 2012 through June 30, 2014. Information regarding endpoints is collected for up to 15 months after the fill date of the initial colchicine prescription. The primary endpoint is the percentage of patients initiated on concomitant ULT with allopurinol, febuxostat, or probenecid within 30 days of filling the colchicine prescription. Secondary endpoints include incidence of appropriate dose adjustments, documented gout flare recurrence, duration of colchicine treatment, adherence rates, and monitoring of serum uric acid after initiation of ULT. **Results/Conclusions:** Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify situations that warrant empiric colchicine dose adjustment when used for gout prophylaxis.

Select an appropriate duration of colchicine therapy for gout prophylaxis

### Self Assessment Questions:

Which of the following scenarios warrant(s) empiric colchicine dose adjustment in a patient prescribed colchicine for gout prophylaxis?

- A Concomitant ritonavir therapy
- B: Concomitant warfarin therapy
- C: Creatinine clearance <30 mL/min
- D: A and C

What is an appropriate duration of colchicine therapy for a patient with non-tophaceous gout who is also prescribed ULT?

- A One month regardless of serum urate concentration
- B Three months after achieving target serum urate concentration
- C Six months after achieving target serum urate concentration
- D Indefinite

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-597L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## BEYOND COST SAVINGS: THE IMPACT OF A MEDICATION ASSISTANCE PROGRAM ON HEALTH OUTCOMES IN DIABETES

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**Purpose:** The purpose of this study is to evaluate the impact of the medication assistance program on the hemoglobin A1c levels of patients with diabetes who received an injectable diabetic medication through enrollment in the program. In addition, patients will be evaluated to determine the effect of enrollment on hospitalizations and emergency department visits. Patient charts will be reviewed to assess the impact of an ambulatory care pharmacist on outcomes. **Methods:** This study is a retrospective chart review of patients who received an injectable diabetic medication through enrollment in the patient assistance program at Community Health Network. To be included, patients must have received an injectable diabetic medication through enrollment in the program between August 1, 2013 and July 31, 2015, and have a diagnosis of diabetes. Patients were excluded if they were lost to follow-up, aged <18 years or > 90 years, prisoners, or had no hemoglobin A1c within 9 months of enrollment. There were 385 patients identified as having received at least one of the following medications: Apidra (insulin glulisine [rDNA origin]), Byetta (exenatide), Bydureon (exenatide extended-release), Humalog (insulin lispro), Humalog Mix (insulin protamine and insulin lispro), Humulin N (insulin isophane suspension), Humulin R (insulin regular), Lantus (insulin glargine), Levemir (insulin detemir), Novolog (insulin aspart), Toujeo (insulin glargine), Trulicity (dulaglutide), Victoza (liraglutide). Data collected includes: patients age, gender, BMI, type of diabetes, number of hospitalizations/ED one year prior to and one year after enrollment, hemoglobin A1c prior to and at 3, 6, and 9 months post enrollment, and presence of a note from a pharmacist working under a collaborative drug therapy management (CDTM) agreement to help manage the patient's disease state.

**Results:** Research in progress, results to be determined. **Conclusion:** Evaluation of results upon completion of data collection.

### Learning Objectives:

Describe adherence rates in the United States and the factors which contribute to medication non-adherence.

Discuss the prevalence and economic impact of diabetes in the United States.

### Self Assessment Questions:

According to the World Health Organization (WHO) the average adherence rate to long-term therapies for chronic illnesses is approximately:

- A 20%
- B: 30%
- C: 50%
- D: 70%

The number of patients with diabetes in the United States is expected to more than double by the year

- A 2017
- B 2020
- C 2050
- D 2055

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-856L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF ANTITHYMOCYTE GLOBULIN DOSES AND THEIR EFFECT ON IMMUNE-RECONSTITUTION IN PATIENTS WHO RECEIVED FLUDARABINE/BUSULFAN/ATG REDUCED-INTENSITY CONDITIONING REGIMEN: SINGLE CENTER EXPERIENCE

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Purpose: Allogeneic hematopoietic stem cell transplantation (HSCT) has become a recognized treatment option for patients with hematological malignancies. However, the risk of graft-versus-host-disease (GVHD) following transplantation remains high and is one of the leading causes of morbidity and mortality in these patients. Rabbit antithymocyte globulin (ATG) has been successfully used for the prevention of GVHD; however, the optimal dose for its use in reduced-intensity conditioning (RIC) regimens for allogeneic HSCT has not been established. By impairing T-cell function, ATG decreases the risk of GVHD following transplantation, but may delay immune-reconstitution. Successful immune-reconstitution following HSCT has been associated with lower disease relapse and infection rates. At our institution, the total dose of ATG has been decreased several times and is currently 4.5mg/kg. Retrospective studies comparing total ATG doses have suggested that it could be lowered without increasing GVHD or prolonging time to engraftment. Determining an appropriate ATG dose that reduces the risk of GVHD without compromising the risk of infections and disease relapse is crucial. The purpose of this study was to compare immune-reconstitution and infection rates between patients who received 6mg/kg and 4.5mg/kg total doses of ATG as part of a RIC regimen for allogeneic transplantation. Secondary outcomes included the comparison of the incidence of acute and chronic GVHD and differences in progression free survival and overall survival between the two groups. Methods: This was a retrospective cohort study. Clinical data was collected on patients who underwent RIC allogeneic HSCT with fludarabine, busulfan and ATG between January 2010 and July 2015. Exclusion criteria consisted of patients who received bone marrow as the source of stem cells. Descriptive statistics will be used to analyze this data. Kaplan-Meier methods will be used to describe survival data. Results: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review current literature on the use of antithymocyte globulin (ATG) for the prevention of graft-versus-host-disease after hematopoietic stem cell transplantation (HSCT) and how it affects immune reconstitution.

Report immune-reconstitution and infection rates in patients who received a total dose of ATG of 6mg/kg in combination with fludarabine and busulfan as part of a reduce intensity conditioning regimen for allogeneic transplantation as compared to a total ATG dose

### Self Assessment Questions:

Which of the following statements is correct with regards to ATG use in conditioning regimens for allogeneic HSCT?

- A: Increases the risk of graft-versus-host-disease (GVHD)
- B: Has been associated with lower infection rates
- C: Is associated with delayed immune-reconstitution after transplants
- D: The optimal total dose for ATG in reduced-intensity conditioning (RIC)

Which of the following statement is correct with regards to immune-reconstitution following allogeneic HSCT?

- A: Has been associated with lower disease relapse
- B: Has been associated with lower infection rates
- C: May be delayed by the development of acute GVHD
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-598L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE IMPLEMENTATION OF A PHARMACIST DIRECTED PAIN STEWARDSHIP PROGRAM AT A COMMUNITY TEACHING HOSPITAL

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A pharmacist directed pain management stewardship program is being developed at Munson Medical Center, a community based teaching hospital. The institution has elected to participate in the Michigan Health and Hospital Association (MHA) Pain Management Keystone Initiative that commenced in May 2015. This Initiative was created in response to the Sentinel Event Alert, Issue Forty-Nine, that was released by The Joint Commission addressing the safe use of opioid analgesics in hospitals. Data gathered via participation in the Initiative will help direct the plans and goals of the pain management stewardship program.

This project will be submitted to the Institutional Review Board at Munson Medical Center for approval. The following data will be collected from the electronic medical record: percent of inpatients and emergency department patients having IV opioids administered, percent of emergency department patients being discarded with a perception for oral opioid medication(s), percent of patients receiving an assessment for opioid tolerance, percent of patients on intravenous opioid that received a sedation level assessment, and percent of patients treated with intravenous opioids having naloxone administered. Descriptive statistics will be used to analyze the data. In addition, data will be reported on a monthly basis to MHA as part of the Pain Management Keystone Initiative. Findings from this analysis will help direct the initiatives of the pain management team with the motivation of providing safer and more efficacious analgesic therapy for patients. The implementation of the pain stewardship team is anticipated for April 2016. This team will track changes in data pre and post implementation

### Learning Objectives:

Identify the role of the pharmacist in a pain management stewardship team.

Describe methods that can be used to provide safe and effective multimodal pain therapy.

### Self Assessment Questions:

Which of the following can be used as a method to direct the safe and effective use of opioids in the emergency department?

- A: Avoid stocking opioid medications in the Pyxis machine
- B: Develop pain algorithms that can assist providers in selecting the
- C: Require a pain management consult for complicated pain patients
- D: Adopt a policy that prevents those on chronic opioid therapy from

Which of the following can be adopted to help manage the prescribing of opioid analgesics in the emergency department?

- A: Avoid prescribing opioids in the emergency department
- B: Limit the day supply of extended release opioids after chronic pain
- C: Encourage the prescribing of a limited day supply of short acting o
- D: Limit the prescribing of opioids to no more than twice a month for

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-599L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **CALCIUM MONITORING AND REPLACEMENT ACROSS THREE PHASES OF MASSIVE TRANSFUSION IN A TRAUMA POPULATION AT A LEVEL I TRAUMA CENTER**

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**Purpose:** Many complications can arise during massive transfusion, some as a result of traumatic injury and others as a result of rapid administration of blood products. Hypocalcemia in massive transfusion can lead to detrimental consequences, including coagulopathy, QT prolongation, and ventricular depression. Many factors have been implicated in contributing to hypocalcemia during massive transfusion, including acidosis and citrate toxicity. The objective of this study is to assess ionized calcium concentrations and replacement during the assessment, intraoperative, and postoperative phases of massive transfusion in a trauma population at a Level I Trauma Center. **Methods:** The proposed study was approved by the Institutional Review Board. The study is a retrospective qualitative chart review evaluating adult trauma patients who underwent massive transfusion at Grant Medical Center because of trauma-induced hemorrhage. Ionized calcium concentrations as well as the total elemental calcium administered during the assessment, intraoperative, and postoperative phases of massive transfusion will be examined. The primary endpoint is to examine the incidence of hypocalcemia in this trauma population. Secondary analyses will include qualitative assessment of calcium supplementation in response to hypocalcemia. Additionally, the units of packed red blood cells, fresh frozen plasma, and platelets administered during the above mentioned three phases of massive transfusion will be tracked. Ionized calcium measurements will be taken from the arterial blood gases obtained during the massive transfusion, which can be found in the electronic medical record system. Medication administration records and anesthesia records will be used to identify if patients were given calcium gluconate or calcium chloride during the resuscitation efforts. **Results:** N/A **Conclusions:** N/A

### **Learning Objectives:**

Identify risk factors for hypocalcemia during massive transfusion.  
Recall potential implications of hypocalcemia during massive transfusion

### **Self Assessment Questions:**

Which of the following statements is correct?

- A: Metabolic alkalosis is a risk factor for hypocalcemia during massive transfusion
- B: Citrate toxicity is a risk factor for hypocalcemia during massive transfusion
- C: Respiratory alkalosis is a risk factor for hypocalcemia during massive transfusion
- D: Resuscitation with crystalloids is a risk factor for hypocalcemia during massive transfusion

Which of the following statements is correct?

- A: Citrate toxicity is a potential implication of hypocalcemia during massive transfusion
- B: Improved stroke volume is a potential implication of hypocalcemia during massive transfusion
- C: Increased systemic vascular resistance is a potential implication of hypocalcemia during massive transfusion
- D: Ventricular depression is a potential implication of hypocalcemia during massive transfusion

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-600L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **CLINICAL AND ECONOMIC IMPACT OF ANTIMICROBIAL DURATION OF THERAPY FOR INPATIENT, NON-INTENSIVE CARE UNIT (ICU) COMMUNITY-ACQUIRED PNEUMONIA (CAP)**

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Antimicrobial Stewardship Programs have increased in prevalence across the country due to emerging antibiotic resistance and the need for greater financial accountability. These programs generally focus on choice and cost of antibiotic, but do not always address optimal duration of therapy. The purpose of this study is to assess the clinical and economic impact of antimicrobial duration of therapy in patients with CAP who are not admitted to the ICU. This study will be conducted at a community hospital in Lexington, Kentucky. The electronic medical record will be used to identify patients admitted January 2014 through December 2014 who received a 2007 Infectious Disease Society of America/ American Thoracic Society (IDSA/ATS) Consensus Guideline approved inpatient, non-ICU CAP regimen: either levofloxacin (a respiratory fluoroquinolone) or ceftriaxone/azithromycin (a beta lactam plus a macrolide). Exclusion criteria consist of immunocompromising conditions, admission to the ICU within 24 hours of hospital admission, possibility of healthcare-acquired pneumonia (HCAP), a positive influenza polymerase chain reaction (PCR) test, or positive sputum cultures for *Pseudomonas aeruginosa* or methicillin-resistant *Staphylococcus aureus*. Data collected will include patient demographics and pertinent co-morbidities, antimicrobial regimen information, clinical data such as radiographic imaging and culture results, and discharge data. Primary outcome information will include 30 day readmission rate. Secondary outcome information will include inpatient length of stay, time taken to switch from intravenous to oral therapy, time to first antibiotic administration, incidence of *Clostridium difficile* infection, and inpatient, all-cause mortality. Appropriate statistical analysis will be used with a p-value less than 0.05 to convey statistical significance. Data collection is still in progress; results will be presented at the Great Lakes Pharmacy Conference.

### **Learning Objectives:**

Recognize current IDSA guideline recommendations regarding duration of antimicrobial therapy for inpatient, non- ICU CAP  
Identify IDSA guidance on antimicrobial therapy for CAP including time of first antibiotic administration, time to switch from intravenous to oral therapy, and considerations in antibiotic choice

### **Self Assessment Questions:**

What is the 2007 IDSA Guideline minimum recommended duration of therapy for inpatient, non- ICU CAP?

- A:  $\geq$  5 days
- B: 5-7 days
- C: 7-10 days
- D: 10-14 days

Which of the following criteria should be considered when determining the time to switch from intravenous to oral antibiotic therapy? I.

Hemodynamic stability II. Functioning gastrointestinal tract III

- A: I, iv
- B: ii, iii, iv
- C: I, ii, iii, iv
- D: I, ii, iv

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-601L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECTS OF A PHARMACY DRIVEN PREOPERATIVE ANTIBIOTIC DOSING PROTOCOL ON SURGICAL SITE INFECTION RATES AND ADVERSE DRUG REACTIONS

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**Purpose:** In October 2014, a collaborative care agreement was initiated at St. Elizabeth Healthcare that allows pharmacists to dose preoperative prophylactic antibiotics. The primary objectives of this study are to evaluate the effectiveness of this pharmacy-driven antibiotic dosing protocol on the reduction of surgical site infections (SSIs) [reported according to the CDC NHSN definitions]; and the incidence of nephrotoxicity following antibiotic dosing. Secondary objectives include evaluating antibiotic redosing during prolonged procedures; and the effects of antibiotic dosing in obese patients. The hypothesis is that pharmacy-managed surgical antibiotic prophylaxis has led to a reduction in surgical site infections and has not impacted peri-procedural antibiotic adverse drug reactions. **Methods:** This study has been granted approval for exempt certification by the St. Elizabeth Healthcare Institutional Review Board. The collaborative care agreement is automatically implemented for all preoperative antibiotic orders, with the exception of those ordered per Infectious Disease Physicians or Cardiothoracic Surgeons. Eligible patients include all patients in the St. Elizabeth Healthcare system 18 years of age and older who underwent procedures in any of the following NHSN procedure categories: cardiac surgery, orthopedic surgery, colon surgery, and hysterectomy during the time period of January through August 2014 and/or January through August 2015. Exclusion criteria include patients with an active infection; patients diagnosed with human immunodeficiency virus (HIV) infection, tuberculosis, or cystic fibrosis; patients being managed by an Infectious Diseases physician; and patients who died due to a cause other than a SSI before the end of the follow up period. For this retrospective study, patients have been identified using the healthcare systems electronic medical record system, and a randomized sample of patients has been selected for a thorough chart review. **Results & Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define surgical site infection

Discuss the incidence of surgical site infection in the U.S.

### Self Assessment Questions:

The CDC defines a surgical site infection as an infection related to an operative procedure that:

- A. Occurs within 30 days of the procedure
- B. Decreases hospital length of stay
- C. Occurs within 60 days of the procedure
- D. Is an unavoidable threat to patient safety

What percentage of patients undergoing surgical procedures each year develops surgical site infection?

- A. Fewer than 1 percent
- B. 2 to 5 percent
- C. 8 percent
- D. Greater than 10 percent

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-951L05-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATION OF PHARMACIST AND NURSE GUIDED ELECTROLYTE REPLACEMENT

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**Purpose:** Electrolytes play many important roles in the body. Electrolyte deficiencies are common, can range in severity, and often reflect the degree of the imbalance. Deficiency severity ranges from asymptomatic to cardiac arrhythmias, muscle weakness, respiratory failure, or seizures. Historically, physicians addressed low electrolytes while on rounds. It is increasingly common for nurses and pharmacists to monitor and replace electrolytes using approved protocols. There is significant variability in the dosing, timing, and monitoring of replacement by individual clinicians, often due to severity of illness, patient specific factors, and varied clinician background. There are several problems that can arise with this practice variability, which include delayed, or incomplete repletion, unnecessary lab draws, excessive fluid administration, and electrolyte overcorrection. This retrospective chart review will assess the impact of pharmacist and nurse guided electrolyte replacement on the time-to-correction of electrolytes when compared to physician directed standard of care in a community health system. **Methods:** This study is a chart review evaluating time-to-correction of potassium, phosphorus, magnesium, and calcium. Patients who had at least one electrolyte lab value below normal limits and received intravenous or oral electrolyte replacement from June 2015 to November 2015 are included. The two treatment arms will include pharmacist or nurse versus physician directed standard of care. The primary outcome will be time in hours from abnormal electrolyte concentration until correction of electrolyte. Correction will be defined as one lab value within normal limits. The secondary outcome of rate of overcorrection of an electrolyte within 48 hours of replacement will also be assessed. Overcorrection will be defined as one lab value above normal limits. **Results & Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe adverse effects of electrolyte deficiencies

Recognize causes of electrolyte imbalances

### Self Assessment Questions:

A patient with a magnesium level below normal limits may experience which of the following side effects?

- A. Muscle weakness
- B. Emesis
- C. Hyperkalemia
- D. Abdominal pain

Which of the following does not alter potassium homeostasis

- A. Acid base imbalances
- B. Hyperphosphatemia
- C. Diuretics
- D. Renal replacement therapy

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number      0121-9999-16-602L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

**VENOM TRIAL: DEVELOPMENT OF FACILITY-WIDE VANCOMYCIN DOSING NOMOGRAM THROUGH EVALUATION OF THERAPEUTIC STEADY-STATE VANCOMYCIN TROUGHS AT THE HUNTINGTON VETERANS AFFAIRS MEDICAL CENTER**

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**Purpose:** Vancomycin is the gold standard of treatment for gram-positive infections. It is used in the treatment of abscesses, pneumonia, osteomyelitis, bacteremia, and other infections. Vancomycin is a mainstay in the treatment of methicillin-resistant Staphylococcus aureus (MRSA). In a majority of facilities Vancomycin is dosed based off of patients weight and creatinine clearance, and is adjusted based upon troughs drawn at steady-state after administration. The purpose of this project is to develop a Vancomycin dosing nomogram based upon patients weights and renal function in patients that can be utilized by all pharmacists at the HVAMC. **Methods:** This retrospective study will determine the optimal initial mg/kg dose of Vancomycin and dosing interval required to achieve therapeutic levels by majority of patients at the HVAMC. This will be determined through evaluation of Vancomycin steady-state peaks and/or troughs that were estimated based off of population pharmacokinetics. Will collect lab values including serum creatinine, Vancomycin troughs and peaks where applicable, as well as patients age and weight. In the nomogram, patients will be divided based upon their weight. If >95kg, will use adjusted body weight, if <95kg will use actual body weight. Data will be collected from patient charts in those who received Vancomycin for possible gram-positive infection, and had at least one Vancomycin peak and/or trough drawn correctly. As a secondary endpoint, will also determine the occurrence of nephrotoxicity in patients that received at least 4 doses of Vancomycin. Nephrotoxicity in this study will be defined as a SCr increase of 0.5mg/dl or 50% increase from baseline. **Results:** Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Residency.

**Learning Objectives:**

Identify average Vancomycin dose (mg/kg) and dosing interval in the Huntington Veterans Affairs population.  
Discuss empiric dosing of Vancomycin based on evaluation of therapeutic troughs and peaks when applicable.

**Self Assessment Questions:**

Based on the Matze nomogram, what initial maintenance Vancomycin dose and dosing interval should be initiated in the following patient? MO is a 60 year old male to be started on Vancomycin for treatment

- A 1000mg q12hrs
- B: 750mg q12hrs
- C: 1000mg q24hrs
- D: 1250mg q12hrs

Which of the following patients has experienced an acute kidney injury (AKI) per defined parameters in this study?

- A Serum creatinine increase from 1.0mg/dL to 1.3mg/dL.
- B Serum creatinine decrease from 1.5mg/dL to 1.0mg/dL.
- C Serum creatinine increase from 1.2mg/dL to 1.7mg/dL.
- D Serum creatinine increase from 2.0mg/dL to 2.4mg/dL.

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-603L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**OPTIMIZATION OF ANTIBIOTIC REGIMEN SELECTION AND DISPENSING IN THE PERIOPERATIVE SETTING**

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**Purpose:** Postoperative infections are an unfortunate, but preventable, occurrence in today's healthcare society with an estimated 500,000 surgical site infections (SSI) occurring annually, resulting in higher healthcare costs and increased lengths of stay. Compliance with established guidelines and standards of care can lessen the morbidity and mortality associated with SSI. Potential barriers to ideal use of antibiotics in the perioperative setting include perceptions related to timely medication administration and operative throughput, variable assessment of antibiotic allergies, and inefficient use of technology including automated dispensing cabinets and the electronic medical record. The impact of inadequate perioperative antibiotic management is clinical and financial, with reimbursements decreased for SSI. The purpose of this process improvement project is to optimize the use of perioperative antibiotics. **Methods:** A group of pharmacy stakeholders participated in a gap analysis to review the medication use process for perioperative antibiotics. Literature review, as well as a thorough process flow evaluation, provided the foundation for gap analysis. Opportunities identified to improve the use of antibiotics in the perioperative setting were classified into two categories, antibiotic regimen selection and dispensing. Both require standardization and alignment to best practices. Comprehensive and accurate allergy assessment and using increased doses are facets in antibiotic regimen selection. The optimization of dispensing involves standardization of technology, including ordering via the electronic medical record and dispensing via automated dispensing cabinets. A comprehensive action plan was developed for implementation. **Results/Conclusion:** Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify the challenges leading to the misuse of antibiotics in the perioperative setting  
Describe how technology can promote the optimal use of antibiotics in the perioperative setting

**Self Assessment Questions:**

Which of the following would be considered a reason that antibiotics are misused in the perioperative setting?

- A Increased costs
- B: Adverse effects
- C: Variable allergy assessments
- D: Drug unavailable

A way that technology can support suboptimal antibiotic use in the perioperative setting is to:

- A Standardize ordering process
- B Allow antibiotic override at ADC
- C Provide evidence-based allergy assessment
- D Maximize timely throughput

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-857L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSOCIATION BETWEEN RESPONSE TO NUTRITIONAL THERAPY AND DEVELOPMENT OF BRONCHOPULMONARY DYSPLASIA IN VERY LOW BIRTH WEIGHT NEONATES

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**Purpose:** Bronchopulmonary dysplasia (BPD) is the most common cause of long-term morbidity in infants born before 32 weeks gestational age. Adequate nutrition is critical in reducing the risk and severity of BPD as impaired growth is seen early in these patients. Studies show an increased energy requirement for neonates with BPD due to increased work of breathing, inflammation, and medications. Although nutritional requirements are higher for BPD patients, research evaluating traditional nutritional response parameters and association with severity of BPD is lacking. Hypoalbuminemia related to critical illness and loss of intravascular oncotic pressure may lead to pulmonary edema and worsened oxygenation in BPD patients, leading to consideration of diuretic therapy. Understanding the relationship of nutritional response parameters and BPD could shift the focus from medication management to optimizing nutrition. We hypothesize that neonates with favorable nutritional response at 36 weeks post-menstrual age (PMA) will less often develop BPD compared to those with less-than-favorable nutritional response. **Methods:** A single-center, retrospective cohort study of neonates born before 32 weeks gestational age weighing less than 1500 grams at birth will stratify neonates into favorable or less-than-favorable nutritional response groups. Rates of BPD at post-menstrual age 36 weeks with severity classification according to Jobe and Balancari will be compared. Favorable nutritional response will be defined as two of the following: weight and length progression continues as predicted on Fenton growth charts and weekly averages for albumin and BUN are above 2.2 g/dL and 13 mg/dL, respectively, for more than seventy percent of collected data points. Additionally, less-than-favorable nutritional response includes postnatal growth failure and a deviation of more than 12.5 percentiles from the expected growth curve for weight and height. The primary endpoints are proportion of neonates who develop BPD and distribution of BPD severity. **Results:** Data collection and analysis are ongoing.

### Learning Objectives:

Describe the pathophysiology of bronchopulmonary dysplasia.  
Identify current prevention and treatment options for BPD with emphasis on the impact of nutritional therapy.

### Self Assessment Questions:

A patient with mechanical ventilator settings including FiO<sub>2</sub> of 29% at 36 weeks post-menstrual age has what severity classification of BPD?

- A: Does not have BPD
- B: Mild
- C: Moderate
- D: Severe

Term neonates require 110-130 kcal/kg/day. What percent increase would you suspect a neonate with BPD requires for adequate caloric intake?

- A: 10% increase
- B: 30% increase
- C: 50% increase
- D: No increase

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-858L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## REVIEW OF ENOXAPARIN DOSES GREATER THAN OR EQUAL TO 150 MG IN AN OBESE PATIENT POPULATION

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**Purpose:** Enoxaparin is a low molecular weight heparin utilized for the treatment and prevention of acute venous thromboembolism (VTE). Obese patients are at higher risk of VTE when compared to those with a body mass index (BMI) less than 30 kg/m<sup>2</sup>. Unfortunately, the pharmacokinetic profile of enoxaparin is variable in obese patients, who have increased subcutaneous tissue. Due to the unpredictable nature of this medication in this patient population and the possibility of over anticoagulation, some literature suggests monitoring of anti-factor-Xa (anti-Xa) levels. The primary objective is to assess the safety outcomes (recurrent VTE and bleeding) associated with doses of enoxaparin greater than or equal to 150 mg in obese patients. A secondary objective is to determine an average milligram per kilogram dose after dose adjustment from anti-Xa levels. **Methods:** A retrospective review was conducted of patients at The Ohio State University Wexner Medical Center (OSUWMC) and Arthur G. James Cancer Center receiving at least one inpatient dose of enoxaparin greater than or equal to 150 mg. Using The Ohio State University Medical Centers Information Warehouse, patients receiving a dose of enoxaparin greater than or equal to enoxaparin 150 mg between July 1, 2013 and June 30, 2015 were identified. A separate report was requested for anti-Xa levels in these same patients. Only patients with a corresponding anti-Xa level for doses of 150 mg or greater were included for analysis. Ethical approval for the study was granted by the Institutional Review Board at The Ohio State University Wexner Medical Center. **Results and Conclusion:** Data collection and analysis is ongoing. Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference in April 2016.

### Learning Objectives:

List indications for utilization of treatment dose enoxaparin  
Describe the adverse events associated with enoxaparin treatment doses greater than 150 mg

### Self Assessment Questions:

Which of the following is an FDA approved indication for treatment dose (1 mg/kg/dose BID or 1.5 mg/kg once daily) enoxaparin?

- A: Total knee replacement
- B: Pulmonary Embolism
- C: Unstable angina
- D: Two of the above

Which of the following adverse events associated with enoxaparin may be a result of supratherapeutic dosing?

- A: Rash
- B: Recurrent venous thromboembolism
- C: Major bleeding
- D: Two of the above

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-604L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## PHARMACIST IMPACT ON PATIENTS WITH DIABETES AS PART OF A MULTIDISCIPLINARY TEAM IN A PRIMARY CARE SETTING

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**Purpose:** Patients who spend the most on healthcare are more likely to have fair or poor health compared to the rest of the population. In a study conducted by the IMS Institute for Healthcare Informatics, average medical costs for privately insured diabetics in the top 1% of healthcare spenders were nine times higher than the remaining 99% of privately insured patients with diabetes. The objective of this study is to assess pharmacist impact on the percent decrease in hemoglobin A1c in high-risk patients with diabetes as part of the Intensive Primary Care Team. The Intensive Primary Care Team is a multidisciplinary team of pharmacists, registered nurses, licensed clinical social workers, dietitians, and resource coordinators whose aim is to support physicians in caring for complex, high-risk patients. **Methods:** In this retrospective chart review, the charts of patients with diabetes who enrolled in the Intensive Primary Care Team between January 2015 and July 2015 will be compared to those who chose not to participate. Cross referencing medical charts from Epic, an electronic medical record system, with Optum Impact Pro, a healthcare analytic program, will identify these patients. The percent change of hemoglobin A1c will be determined by calculating the difference between baseline A1c and the A1c at the end of October 2015. All secondary endpoints including evaluating appropriate immunizations, cholesterol, blood pressure, cardioprotective, and diabetes medication recommendations will be documented through the end of October 2015. Diabetes related emergency room visits and hospitalizations will be recorded as well. The appropriateness of medication therapy will be determined by the 2015 American Diabetes Association diabetes guidelines. **Results and Conclusions:** Data collection in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the percentage of total healthcare cost that is driven by the highest healthcare spenders

Describe the pharmacists responsibilities within the Intensive Primary Care Team

### Self Assessment Questions:

According to the IMS institute for Healthcare Informatics, which percentage of privately insured patients drives 50.6% of total health care cost?

- A: 1%
- B: 7%
- C: 5%
- D: 10%

Which of the following is one of the primary responsibilities of the pharmacist as part of the Intensive Primary Care Team?

- A: Decrease pharmacy expenses and per member per month costs
- B: Optimize medication therapy
- C: Conduct mental health exams
- D: A and B

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number      0121-9999-16-859L04-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## EVALUATION OF PHARMACIST DRIVEN POST-DISCHARGE EDUCATION FOR PATIENTS FOLLOWING ACUTE MYOCARDIAL INFARCTION.

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**Purpose:** Following an acute myocardial infarction (AMI), patients have an increased risk of re-infarction as well as associated co-morbidities. Additionally, the 30 day re-admission rate following AMI is approximately 20% nationally. As a result, CMS and other payers have begun focusing on this as a quality metric. A key method in minimizing these risks and readmission rates is effective medication reconciliation and patient education. Following an AMI, patients are commonly initiated on aspirin, a statin, a beta blocker, and an ACE inhibitor. Often, this is the first time these patients have taken these medications, and they may feel overwhelmed and not fully benefit from discharge counseling, and may not be aware of non-medication related issues including follow up visits and lifestyle modifications. As a result, a need for improved education and counseling exists for this patient population. **Methods:** Phase 1 will be a retrospective evaluation of patients discharged following an AMI and the rate 30-day readmission rate among patients with a primary diagnosis of AMI. Phase 2 will consist of establishment of a formal medication education and counseling program. Patients will be identified based on documented diagnosis of AMI, and will receive pharmacist directed discharge education. They will receive an informational packet at time of discharge with pamphlets dedicated to one of four specific drug classes on which they were started. Additionally, information on non-medication related aspects of care will be provided, including lifestyle modifications and follow up health care visits. Patients will then receive follow up phone calls to discuss the information. The following data will be collected: patient age, admission length of stay (LOS), readmission within 30 days to this facility, and readmission LOS. **Results/Conclusions:** Data collection is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Review the current pharmacological recommendations for patient care following diagnosis of an acute myocardial infarction.

Identify methods that can increase patient awareness of therapy following myocardial infarction and promote increased "buy-in" to therapy.

### Self Assessment Questions:

Direct patient education has been associated with which of the following

- A: Improved patient satisfaction
- B: Decreased medical utilization
- C: Increased medication adherence
- D: Both A and C

Core Measure requirements and guideline recommendations for AMI include all the following medications at discharge EXCEPT

- A: Beta-adrenergic antagonists
- B: HMG-CoA reductase inhibitors
- C: Loop diuretic
- D: Aspirin

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number      0121-9999-16-605L01-P

Activity Type: Knowledge-based      Contact Hours: 0.5

## THE EFFECT OF INHALER TO NEBULIZER CONVERSION ON HOSPITAL READMISSION RATES IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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**Purpose:** Health systems are increasingly concerned with readmission rates, especially since the implementation of the Hospital Readmission Reduction Program under Section 3025 of the Affordable Care Act in 2012. With the addition of chronic obstructive pulmonary disease (COPD) as a readmission measure by the Centers for Medicare and Medicaid Services, health systems must more effectively reduce readmission rates. The cost and coordination associated with inhalers can be a barrier to appropriate outpatient COPD therapy. The objective of this study is to determine whether switching COPD outpatient medications from inhalers to nebulizers on discharge will result in improved treatment, thereby reducing readmissions. **Methods:** This is a cohort study with a historical control group examining 30-day readmission rates of COPD patients at SwedishAmerican Hospital (SAH). With physician and patient approval, COPD patients are switched from home inhalers to equivalent nebulized medications for the duration of at least one month post-discharge. Eligible patients admitted from September 1, 2015 to February 28, 2016 are compared to a historical group one year prior. Data collected includes zip code, payer type, age, gender, race, BMI, home oxygen requirement, COPD medications, oral steroid use, co-morbid conditions, and smoking habits. Additionally, data is collected on reasons for declining converting to nebulizer treatment. Data analysis will include the number of readmissions related to COPD and the number of readmissions for any cause. This study has been approved by the SAH Institutional Review Board. **Results:** Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize patients who may benefit from utilizing nebulizers in place of inhalers for COPD

Identify reasons for why patients are unwilling to switch to nebulizers

### Self Assessment Questions:

Which of the following may be an appropriate candidate for conversion of inhalers to nebulizers for COPD treatment?

- A: 65 year old with limited mobility and coordination
- B: 42 year old who frequently travels for work and often goes on back
- C: 47 year old with financial difficulties who often skips his inhaler doses
- D: A and C

Which of the following is a potential barrier to appropriate COPD medication compliance?

- A: Financial
- B: Coordination for administration
- C: Education
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-606L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## THE PREVALENCE AND IMPACT OF DOCUMENTING ALLERGIC REACTION IN PENICILLIN ALLERGIC PATIENTS

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**Purpose:** Many previous studies have evaluated the risks and costs associated with a documented penicillin allergy, but none have assessed the impact of having the actual reaction documented in the medical record. This study evaluated the proportion of penicillin allergic patients with a documented allergic reaction and compared patient outcomes based on the presence of reaction documentation. Outcomes analyzed include antibiotic selection, duration and cost of antibiotics, length of stay, and the development of Clostridium difficile infection. **Methods:** A retrospective, single center, cohort study approved by the Institutional Review Board at Akron General Medical Center (AGMC) was conducted. Eligible subjects had a documented penicillin allergy and were discharged from AGMC between 10/1/2010 and 9/30/2015 with a diagnosis of bacterial meningitis, pancreatitis, or non-community acquired pneumonia. These diagnoses were selected because beta-lactam antibiotics are the preferred treatment, but second line agents are available if needed. Subjects were excluded if they were pregnant, under 18 years of age, left the hospital against medical advice, were diagnosed with community acquired pneumonia, did not receive any systemic antibiotics, or if their inclusion diagnosis was not present at admission. The primary outcome was the proportion of penicillin allergic patients who had a documented reaction. Secondary outcomes compared patients with and without a documented allergic reaction; the outcomes assessed were: proportion of patients administered antibiotics in each class, average antibiotic duration (days), average total antibiotic cost per patient (\$), average length of stay (days), and proportion of patients who developed C. difficile infection. A subgroup analysis was performed to compare secondary outcomes between patients with a documented allergic reaction, based on type of reaction. **Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Describe negative outcomes associated with penicillin allergy.

Discuss the importance of documenting allergic reactions in the medical record.

### Self Assessment Questions:

Which of these outcomes is associated with patients having a penicillin allergy?

- A: Average length of stay increased by 5 days
- B: Decreased risk of methicillin resistant Staphylococcus aureus (MRSA)
- C: Increased risk of Clostridium difficile infection
- D: Overall decreased antibiotic costs

Why is it important to document allergic reactions in the medical record?

- A: For a complete risk versus benefit analysis when selecting antibiotics
- B: Gastrointestinal side effects are a contraindication for future use
- C: It is not important, it is only a waste of time and resources
- D: Patients with a history of Stevens-Johnson Syndrome can be safe

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-607L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **SINGLE CENTER CHARACTERIZATION OF MENTAL STATUS CHANGES IN THE POST-LIVER TRANSPLANT PERIOD: A PILOT STUDY**

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**Purpose:** Mental status changes secondary to neurological events occurring in the post-liver transplant period have been well described in the literature, occurring at rates between 9% and 40%. Elevated incidence of mental status changes in the liver transplant population has been attributed to complexity of the surgical procedure, metabolic disturbances, pre-operative hepatic encephalopathy, and neurotoxicity secondary to calcineurin inhibitor administration. Improved and timely characterization of mental status alterations such as PTSD, depression, anxiety, delirium, acute psychosis, and suicidality through the development of a validated screening tool would allow optimization of medication therapy and improved global management of the liver transplant population. The primary objective is to optimize the screening and characterization of mental status changes including PTSD, depression, anxiety, delirium, acute psychosis, and suicidality in the live transplant recipient occurring during the post-liver transplant hospital admission period. **Methods:** This prospective, single-center study will enroll liver transplant recipients admitted to the transplant service at the University of Cincinnati Medical Center. Patients will be enrolled consecutively from the time of approval with a goal to enroll 30 subjects in a projected 4-6 month enrollment period. Informed consent will be obtained before initiation of study procedures. The screening tool will be administered by the study team at specified time points according to the study schedule. Subsequent follow-up screenings will be conducted three days after initial screening and then every seven days until discharge. The screening tool developed will primarily screen for depression, PTSD, anxiety, and suicidality by combining elements of pre-existing, validated screening methods. Symptoms of delirium and psychosis will be captured through CAM/RASS scores and documentation in the electronic medical record. Descriptive data and appropriate measures of central tendency will be utilized for data analysis. **Results:** Enrollment and data analysis are ongoing.

### **Learning Objectives:**

Identify mental status changes that may occur in the post-liver transplant period.

Recognize risk factors that contribute to the development of mental status changes in the post-liver transplant period.

### **Self Assessment Questions:**

Mental status changes that may occur in the post-liver transplant period include which of the following?

- A: PTSD
- B: Suicidality
- C: Psychosis
- D: More than one of the above

Which of the following risk factors is likely to contribute to the development of mental status changes in the post-liver transplant hospital admission period?

- A: Intubation period <5 days
- B: Hyperkalemia
- C: Pre-operative hepatic encephalopathy
- D: Delta sodium <12 mEq/L

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-860L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## **OPTIMIZATION OF MEDICATION WARNINGS: DEVELOPMENT OF A CONTINUOUS QUALITY IMPROVEMENT PROCESS**

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**Purpose:** Medication warnings are an essential safety tool in electronic health record systems (EHR). These clinical decision support tools can be used to screen medication orders for interactions with other medications, patients allergies, and standard dosing recommendations. However excessive alerting leads to alert fatigue, a desensitization to alerts resulting from exposure to a large number of frequent alerts. Alert fatigue can lead to clinicians overriding both the "noise" alerts as well as important alerts, which compromises patient safety. Electronic health records allow medication warnings to be customized based on an institutions analysis and preference. The primary objective of this project is to develop a standardized process to evaluate the appropriateness of medication alerts within the EHR at an academic medical center, and subsequently make adjustments to alerts that appear to end users. **Methods:** Medication warnings from therapeutics classes of medications (ex. anticoagulants, antimicrobials, etc) will be evaluated by a panel of content experts for appropriateness to display to end users. Recommendations for adjustments of warning settings will be presented to the Pharmacy and Therapeutics Clinical Decision Support Subcommittee for approval. Once approved, adjustments to medication warning settings will be made in the EHR. Subsequent medication therapeutic classes will be evaluated by their content experts and medication warning adjustments will be made. Metrics to be collected include the number of alerts per order, percentage of alerts overridden, and satisfaction of end users with the medication warnings as a whole. Metrics will be measured pre and post implementation of changes to the medication warning settings. **Summary of Results:** Results will be presented at Great Lakes Pharmacy Residency Conference. **Conclusions:** Conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Discuss the benefits and risks of suppressing medication warnings

Express the opinions of clinical experts with regards to viewing medication warnings during order entry and verification workflows

### **Self Assessment Questions:**

Alert fatigue is:

- A: The desensitization to alerts from exposure to a large number of fr
- B: Physical exhaustion after a long day's work.
- C: Adverse drug events occurring when alerts do not function correct
- D: Network lag time caused when too many programs are open at on

What is a benefit of suppressing medication warnings from appearing to end users?

- A: Faster network speeds with less alerts firing
- B: Decreased legal liability if medication errors occur
- C: Decrease in alert fatigue
- D: Decreased adverse drug events

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-952L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## DEVELOPMENT OF A PHARMACIST RUN NEW PATIENT ORIENTATION CLINIC IN AN OUTPATIENT VETERANS AFFAIRS (VA) PHARMACY

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**Purpose:** Patients that establish care within the Department of Veterans Affairs (VA) are typically not oriented to the unique policies of the VA healthcare system. Veterans Affairs providers and pharmacists are frequently faced with questions regarding VA policies, which can result in loss of productivity and missed opportunities to address patients' medical concerns. The primary objective of this study is to develop and implement a pharmacist-run orientation clinic, focusing on medication reconciliation and formulary substitutions, for new patients establishing care in an outpatient VA clinic. Secondary objectives include patient and physician satisfaction, and measuring pharmacist interventions.

**Methods:** This study is exempt from Institutional Review Board approval as it is considered a quality improvement project. Project development will include creating a new patient grid and progress note, establishing a method for obtaining medication lists, delivering staff education about the new clinic, and creating documentation for pharmacist interventions. After the development process is complete, the clinic will be based in outpatient pharmacy, in coordination with primary care. Patients will be contacted one to two weeks prior to their primary care appointment to schedule a clinic or telephone orientation appointment. During the visit, patients will be introduced to pharmacy procedures, including how to order medication refills, renewal requests, and how prescriptions from non-VA providers are addressed. Pharmacists will perform a complete medication reconciliation, discuss immunization history and address any medication-related concerns such as therapeutic duplication, drug-drug interactions, inappropriate dosing, allergies, adverse drug reactions, and suggest formulary substitutions. Pharmacists will communicate any recommendations to the patients' primary care provider via the electronic medical record. Pharmacists will document the number of interventions made at the end of each patient contact. Participating patients and providers will be contacted via mailings to complete a satisfaction survey. **Results and Conclusions:** To be presented

### Learning Objectives:

Outline the process for developing and implementing a pharmacy orientation clinic

Identify potential benefits and limitations of implementing a pharmacist run orientation clinic

### Self Assessment Questions:

1. Which of the following could be considered a potential benefit of implementing a pharmacist run orientation clinic?

- A: Increase productivity of the VA healthcare staff
- B: Decrease patient knowledge of outpatient pharmacy procedures
- C: Decrease interdisciplinary care
- D: Increase patient understanding of disease states

What is the correct sequencing of steps in establishing a pharmacy orientation clinic?

- A: Writing a proposal → obtaining leadership approval → creating note template and patient scheduling grids → presenting
- B: Creating note template and patient scheduling grids → presenting
- C: Writing a proposal → obtaining leadership approval → presenting
- D: Creating note template and patient scheduling grids → writing a proposal → obtaining leadership approval → presenting

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-861L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF A ROLE FOR PHARMACISTS IN CULTURE FOLLOW-UP AT A COMMUNITY HOSPITAL EMERGENCY DEPARTMENT

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**Purpose:** Incorrect empiric antibiotic choice is an unavoidable risk when treating patients who have signs and symptoms of an acute infection. This is particularly concerning when patients are discharged from the emergency room where follow-up may be challenging. Incorrect antimicrobial therapy can lead to resistance, increased morbidity, and in extreme cases mortality. The goal of this study is to assess the percentage of mismatched cultures in a community hospital and evaluate whether or not a clinical pharmacist can improve patient care in a setting that does not incorporate pharmacists for culture review follow-up. **Methods:** This observational study will be performed in a two-phase process. Phase 1 will include retrospective data collection and analysis to obtain baseline information on the current culture follow-up process without input from a clinical pharmacist. Phase 2 will include prospective implementation of a clinical pharmacist managed culture review follow-up implementation strategy. Electronic medical records will identify patients with positive culture results who were discharged from the emergency room. Positive cultures will be evaluated to verify that the medication prescribed at discharge covers the microorganism that resulted in the final culture report. Primary outcomes will include average time to contact patients and changes made to empiric therapy. All positive cultures originating from the emergency room will be reviewed unless the patient was admitted, transferred, or the microbiology culture did not include a culture and sensitivity analysis.

**Results/Conclusion:** Data collection and analyses ongoing. Results and conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define key components required for an emergency room based culture review program to prevent unwanted outcomes.

Relate methods and results presented to a similar community hospital setting.

### Self Assessment Questions:

Implementation of an effective culture follow-up program can lead to:

- A: Increased hospital readmissions
- B: Increased emergency room readmissions
- C: Decreased morbidity
- D: Decreased resolution of infection

Choose the correct statement:

- A: The implementation of clinical pharmacists into antimicrobial stewardship programs
- B: All antimicrobial stewardship programs involving culture review follow-up
- C: All antimicrobial stewardship programs involving culture review follow-up
- D: All antimicrobial stewardship programs involving culture review follow-up

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-608L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF A SIX-MONTH PIPERACILLIN/TAZOBACTAM SHORTAGE AT A RURAL COMMUNITY HOSPITAL

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**Purpose:** St. Claire Regional Medical Center is a rural, community hospital, which was recently affected by an acute nationwide shortage of piperacillin/tazobactam. The shortage began January 28, 2015 and lasted for approximately six months. During this time period, prescribing patterns were altered as piperacillin/tazobactam was reserved for use only when absolutely necessary. Other antibiotics, including aztreonam, ceftriaxone, and meropenem, were used in greater quantities than usual. This single-center study seeks to quantify the use of the antibiotics used as substitutes during the shortage period and determine the financial impact of their use in place of piperacillin/tazobactam. **Methods:** A retrospective chart review was performed using the hospital's electronic health record (EHR) system. The hospital's total use of piperacillin/tazobactam, aztreonam, cefepime, and meropenem were measured from January 28, 2014 to July 31, 2014. This data set will serve as the control group as it will minimize variability of the two data sets. This data set will be compared to the usage of the same antibiotics during the period of the piperacillin/tazobactam shortage (January 28, 2015 to July 31, 2015). Comparing the data directly will allow for quantification of the impact of the piperacillin/tazobactam shortage in terms of dosages used and total cost. **Results and Conclusions:** Data collection, analysis and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify potential causes of drug shortages and explain the potential impact of shortages on healthcare institutions

List appropriate alternative antibiotics for piperacillin/tazobactam

### Self Assessment Questions:

Which of the following is the most common cause of drug shortages?

- A Stringent regulation by the FDA
- B: Shortages of raw materials
- C: Manufacturing difficulties
- D: Inappropriate Health Care System practices

Identify the most appropriate antibiotic regimen to use in place of piperacillin/tazobactam for empiric treatment of HCAP.

- A Ceftriaxone 2 g IV q24h
- B Cefepime 2 g IV q8h with Metronidazole 500 mg IV q8h
- C Cefepime 2 g IV q8h
- D Meropenem 1 g IV q8h

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-862L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION AND EVALUATION OF A PRIOR-AUTHORIZATION WORKFLOW IN AN ELECTRONIC MEDICAL RECORD

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**Purpose:** Prior-authorization is the complex, multistep process of obtaining approval from health insurance payers before initiating treatment with a medication. This process serves as a means for payers to ensure that therapies are cost-effective and medically necessary for the patient, barring the use of similar, approved medications on the payers formularies. Many chemotherapy and supportive care medications require prior-authorization, which can create delays in the patient care process. As the number and cost of medications continues to rise, receiving approvals in a timely manner can be challenging. The workflow that has been in place before December 1st 2015 has been resource-intensive, requiring many touch points, including excessive review of treatment plans to identify targeted medications. Such a manual process allowed significant room for error, most concerning being that medications requiring authorization are missed during the review, resulting in a lack of payment. Recent enhancements in the electronic medical record (EMR) have provided opportunities to simplify the prior-authorization workflow and improve the overall process. The objective of this study is to improve the capture of medications requiring prior-authorization via implementation of a prior-authorization workflow within the electronic medical record. **Methods:** Retrospective review of prior-authorization and denial data will be used to determine pre- and post-implementation metrics, which include: 1. number of cases requiring prior-authorization review, 2. number of redundant cases evaluated by prior-authorization staff, 3. prior-authorizations resolved and 4. number of denials associated with a "lack of prior-authorization" reason. **Results and conclusions:** Data collection is currently in process. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the process for obtaining prior-authorizations of oncology and supportive care medications.

Discuss the phases of implementation for a prior-authorization workflow in an electronic medical record.

### Self Assessment Questions:

Which of the following is true regarding prior-authorizations for oncology and supportive care medications?

- A A prior-authorization for a medication lasts for as long as the patient
- B: The insurance payer is contacted and provided supporting evidence
- C: The manufacturer of the medication is contacted and provided support
- D: Only the patient's oncology physician can submit a request for a prior-authorization

Which of the following is not a phase of implementation discussed in the study?

- A New Workflow Design
- B Staff Education and Training
- C System Installation
- D Go-live and Post-go-live support

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-863L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INCIDENCE OF HYPOTENSION ASSOCIATED WITH DEXMEDETOMIDINE VERSUS PROPOFOL USED FOR SEDATION IN MECHANICALLY-VENTILATED MEDICAL-ICU PATIENTS

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Propofol and dexmedetomidine are commonly used sedatives and are preferred to benzodiazepines in mechanically ventilated critically ill patients. Propofol is generally selected first due to familiarity amongst prescribers and lower cost, however, use is often limited by its negative hemodynamic effects. Rather than changing to a benzodiazepine, many intensivists will trial a course of dexmedetomidine despite recent studies and observations showing more hypotension with dexmedetomidine. The purpose of this study is to determine the incidence of hypotension associated with dexmedetomidine versus propofol in the mechanically ventilated medical ICU population. This study design will be a retrospective chart review of mechanically ventilated adult medical ICU patients at ProMedica Toledo Hospital receiving either propofol or dexmedetomidine for sedation. Patients will be identified via billing records, pharmacy, and medical databases and randomized for evaluation. Data collection will include patient demographics, comorbidities, reason and date of ICU admission, length of stay, use of concurrent vasoactive agents, and sedative medication regimen. Inclusion criteria are adult patients 18 years and older who were admitted to our adult medical ICU with blood pressure values documented at baseline prior to study drug administration and through the first 48 hours of receiving dexmedetomidine or propofol. Exclusion criteria are patients on neuromuscular blocking agents (NMBA), non-ventilated or tracheostomy ventilated patients, and patients receiving concurrent dexmedetomidine and propofol. The primary end point is hypotension defined as a systolic blood pressure (SBP) less than 90 mmHg, or mean arterial pressure (MAP) less than 70 mmHg. Results and conclusions to be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the incidence of hypotension associated with dexmedetomidine versus propofol in the mechanically ventilated medical-ICU population

Discuss the appropriateness of switching between the two non-benzodiazepine sedative agents in mechanically ventilated medical-ICU patients

### Self Assessment Questions:

Which of the following about dexmedetomidine is correct?

- A: Quickest onset sedative agent
- B: Not associated with considerable hemodynamic instability
- C: Associated with respiratory depression
- D: Has an opioid sparing effect

In Medical-ICU patients, past literature has shown that dexmedetomidine is associated with more hypotension than

- A: Propofol
- B: Midazolam
- C: Lorazepam
- D: Diazepam

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-609L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION AND RECOMMENDATION OF A CENTRALIZED INVENTORY MANAGEMENT SYSTEM FOR A LARGE HEALTH CARE SYSTEM

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**Purpose**The objective of this project is to evaluate and recommend a centralized drug inventory management system for a large multi-site organization.  
**Methods**The current status of inventory management was assessed across multiple inpatient, retail, and clinic sites. Process optimization opportunities were identified, and inventory management system needs were defined. A market assessment was completed to identify the available inventory management systems, and a core group of Aurora Health Care representatives were assembled to meet with qualifying vendors. Vendors were evaluated by this core group and were ranked based on ability to meet the needed features. Vendor candidates were narrowed, in-depth evaluations were carried out, and return-on-investment analyses were completed for the final contenders. A final recommendation for a vendor software was agreed-upon, and a business model recommendation was outlined.  
**Results & Conclusion**A variety of features were identified as important for both hospital and ambulatory setting inventory management system needs. These common software needs included the ability to see and search for inventory across the system, to automatically recommend and process inventory transfers and returns, to provide sophisticated accounting and reporting capabilities, to provide easy frontline and centralized functionality, to calculate and apply reorder points on a daily basis, to generate a purchase order based on these calculations, and to automatically generate cycle counts. Certain additional features such as diversion monitoring and manual order receiving were important for ambulatory settings, while web-based access and consolidation with existing technology were important for the hospital setting. While no single inventory management system on the market currently provides all desired features, a unique combination of software systems was identified that would provide a robust option. This combination was recommended as the best choice for this large multi-site organization, and future projects will examine plans for implementation.

### Learning Objectives:

Recognize two desirable features of a drug inventory management system.

Describe two important considerations for choosing an inventory management system.

### Self Assessment Questions:

Which of the following is a desirable feature of a drug inventory management system?

- A: The ability to calculate reorder points based on usage history.
- B: The ability to send purchase orders.
- C: A and B.
- D: None of the above.

Which of the following describes an important consideration for choosing an inventory management system?

- A: Ease of integration with a site's existing software and automation systems
- B: A return on investment analysis should be considered.
- C: A and B.
- D: None of the above.

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-864L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF TRANSITION FROM PATIENT CONTROLLED ANALGESIA IN POST SURGICAL PATIENTS

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**Purpose:** The transition of a patient's pain regimen from patient controlled analgesia (PCA) to oral opioids is one area that requires improvement. A limited number of studies have assessed pain management during this transition, with outcomes showing pain control is inadequate. In order to provide adequate pain control, literature suggests a guide to aid in selecting oral opioid regimens. The objective of this retrospective study was to evaluate the transition of a patient's pain medications from PCA to oral opioid therapy after the implementation of an opioid order set. **Methods:** A single-centered, retrospective study was conducted to evaluate post-surgical patients on a PCA. A report was generated from the electronic health record (EHR) of patients on the post-surgical floor at Mount Sinai Hospital with a morphine or hydromorphone PCA. The Numeric Pain Rating Scale was used to assess pain scores. A pain document report was also generated to determine patient pain scores while on oral opioids. The primary outcome measure was the difference in mean opioid pain scores between the PCA and oral opioid groups. The secondary outcome measures were the difference in total opioid consumption in morphine equivalents, patient satisfaction scores, frequency of intravenous breakthrough medication use, and hospital length of stay. The transition order set was approved by the P&T committee and implemented in January. The pre order set-implementation group included patients from May 1, 2015 to August 31, 2015 while the post order set-implementation group was evaluated from February to March 15, 2016. **Results/Conclusions:** Prior to implementation of the order set, baseline analysis showed the median oral morphine equivalents on PCA was two times higher than on oral opioids. The average pain scores were higher on oral opioids than on PCA. Post-implementation data collection and analysis is ongoing.

### Learning Objectives:

Discuss the pharmacology, pharmacokinetics, adverse events and monitoring parameters of opioid medications

Select an effective oral opioid regimen after discontinuation of patient controlled analgesia

### Self Assessment Questions:

Which of the following is a natural opiate?

- A: Morphine
- B: Hydromorphone
- C: Oxycodone
- D: Hydrocodone

Which opioid is equianalgesic in potency to Oxycodone 5 mg PO?

- A: Hydromorphone 4 mg PO
- B: Hydrocodone 7.5 mg/Acetaminophen 325 mg PO
- C: Morphine 15 mg PO
- D: Morphine 30 mg PO

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-610L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF NON-STERILE COMPOUNDING PRACTICES WITHIN A HEALTH-SYSTEM

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**PURPOSE:** Recently, there has been increasing emphasis across health systems on strategies to ensure patients receive safe, and effective compounded preparations. Strategies to reduce medication errors in sterile compounding are always being considered, however, nonsterile compounded preparations are also vulnerable to compromises related to stability and patient safety. The purpose of this project is to evaluate current nonsterile compounding processes, and implement best practices of nonsterile compounding. **METHODS:** A multidisciplinary steering committee was established to provide project oversight. A literature review was conducted to identify non-sterile compounding best practices and serve as the basis for the development of a gap analysis tool. Current practices were evaluated against the developed tool through direct observation of nonsterile compounding workflow, and review of policies, procedures, and documentation practices. Strategies to be compliant with best practices were stratified to determine prioritization of process changes. The stratification was based on ease of implementation, cost, and patient safety. Standard operating procedures and policies were updated based on project recommendations. All project outcomes will be assembled in a comprehensive report that will serve as a guiding document for system-wide nonsterile product practices. **RESULTS:** To be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define USP <795> categories of nonsterile compounding

Describe key elements of USP <795>

### Self Assessment Questions:

Which of the following criteria are used to determine the category of nonsterile compounding?

- A: Potential for risk of harm to the patient
- B: Degree of difficulty or complexity of the compounding process
- C: Stability information and warnings
- D: All of the above

What is the beyond-use date (BUD) for nonsterile preparations made from USP standard bulk?

- A: 30 days
- B: 60 days
- C: 3 months
- D: 6 months

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-953L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PRIOR AUTHORIZATION CRITERIA CHANGE FOR BIOLOGICAL DISEASE MODIFYING ANTIRHEUMATIC DRUGS

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**Background:** Impact of prior authorization (PA) management techniques for biological disease modifying antirheumatic drugs (bDMARDs), adalimumab and etanercept, is not often reported in the literature. On July 1st of 2014, new PA criteria for rheumatoid arthritis based on the American College of Rheumatology guidelines of 2012 and the European League Against Rheumatism guidelines of 2013 was implemented at Navitus. **Purpose:** This provided an opportunity to evaluate the approval rate and cost avoidance of two bDMARDs after implementation of guideline based PA criteria in an adult commercial population with rheumatoid arthritis. **Methods:** A cross sectional descriptive pre/post analysis included adults  $\geq$  18 years old with diagnosed (ICD 9: 714.0) rheumatoid arthritis using adalimumab or etanercept. The approval rate was calculated by the number of approved PA forms from the total submitted for each medication within one year pre-implementation (7/1/2013-6/30/2014) and one year post-implementation (7/1/2014-6/30/2015). Cost avoidance was calculated from the change in the approval rate from pre- to post-implementation multiplied by the number of claims and the average cost in post implementation. **Results/conclusion:** A total of 1,169 PA requests were submitted within pre- and post-implementation: 583 for adalimumab and 586 for etanercept. For adalimumab, 183 PA were submitted during pre-implementation and 400 during post-implementation. Chi-square statistical analysis showed a significant decrease in approval rate from pre- to post-implementation of 88.5% to 68.3% ( $p < 0.05$ ). The cost avoided for adalimumab was \$275,649.20 due to the approval rate decrease. For etanercept, 253 PA were submitted during pre-implementation and 333 during post-implementation. The approval rate decreased from 84.6% pre-implementation to 68.5% post-implementation ( $p < 0.05$ ). The cost avoided for etanercept was \$159,265.00 because of the decrease in approval rate. Implementation of PA criteria that follows rheumatologic guidelines can reduce the use of adalimumab and etanercept, and provide cost avoidance of members with rheumatoid arthritis.

### Learning Objectives:

Recognize that implementation of guideline based PA criteria can provide cost savings to clients.

Describe how prior authorization forms can be designed to manage medication utilization.

### Self Assessment Questions:

Which of the following is correct?

- A Medications with prior authorization criteria will not provide cost savings
- B Having prior authorizations on medications can provide cost savings
- C Prior authorization criteria have no positive or negative benefits.
- D Having prior authorization forms increases utilization of medication

How should prior authorization criteria be developed?

- A Prior authorization criteria should not be developed.
- B Criteria should follow treatment guidelines and clinical studies.
- C Criteria should be developed to allow easy access to all medications
- D Criteria should be developed to be strict so access is denied.

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-865L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF A RAPID-DIAGNOSTIC TIED ANTIMICROBIAL STEWARDSHIP INTERVENTION ON CLINICAL OUTCOMES IN PATIENTS WITH BLOODSTREAM INFECTIONS

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**Purpose:** Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF) is a method of microbe identification that results in more rapid and accurate identification of bacteria and yeasts and an increase in cost-effectiveness compared to traditional methods. Previous data suggest that outcomes are improved following the implementation of a rapid-diagnostic test in conjunction with targeted antimicrobial stewardship. However, a remaining clinical question is whether a targeted antimicrobial stewardship intervention will further improve outcomes when a rapid diagnostic test is already in use. The purpose of the study is to characterize clinical outcomes in patients with bacteremia or fungemia before and after the implementation of a rapid-diagnostic tied antimicrobial stewardship intervention as standard of care. **Methods:** This is a single-center quasi-experimental study of hospitalized adult patients with bacteremia at UI Health. A historical control group after MALDI-TOF implementation but before stewardship-tied interventions (October 1, 2014 - April 1, 2015) will be compared to a prospective group (November 1, 2015 - March 1, 2016) of patients after implementation of systematic MALDI-TOF-tied stewardship interventions. Cases in both the prospective and retrospective arms will consist of patients at least 18 years of age who had a positive blood culture identified by a MALDI-TOF. Pregnant patients, prisoners, and those who developed a bloodstream infection at an outside hospital will be excluded from this study. Potential cases for inclusion in the retrospective arm will be identified using MedMined software. Potential cases for inclusion in the prospective arm will be identified using a designated pager which notifies the antimicrobial stewardship team of bacterial species identification via MALDI-TOF. Prospective patients will be matched 1:2 with retrospective patients. We anticipate approximately 150 prospective patients and 300 retrospective patients will be included in the study. The primary endpoint is time to optimal antimicrobial therapy. **Results:** Data collection and analysis is currently in progress.

### Learning Objectives:

Define MALDI-TOF and describe the advantages of this technology

List and describe various antimicrobial stewardship interventions that can be made as a result of real-time blood culture review

### Self Assessment Questions:

Which of the following is true regarding the data surrounding MALDI-TOF?

- A Results in more rapid organism identification when compared to traditional methods
- B It is more cost-effective when compared to traditional methods
- C Results in a less accurate organism identification when compared to traditional methods
- D Only A and B are true

Which of the following is true regarding the process of MALDI-TOF?

- A Only urine can be utilized to identify bacteria or fungi
- B Ions are separated by mass to charge ratio to be analyzed
- C The mass spectrometry profile is compared to a reference database
- D Only B and C are true

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-611L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**PHARMACOKINETIC/PHARMACODYNAMIC DERIVED PREDICTIONS OF EFFICACY AND CLINICAL OUTCOMES IN OBES AND NON-OBES PATIENTS WITH ENTEROBACTERIACEAE BLOODSTREAM INFECTIONS**

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There is a lack of robust evidence on the degree of difference in clinical infection-related outcomes between obese and non-obese patients. Additionally, there is a paucity of evidence regarding appropriate antimicrobial dosing in the obese despite known alterations in pharmacokinetics in this population. This study sought to evaluate and compare predicted antimicrobial pharmacokinetic/pharmacodynamic (PK/PD) indices and observed clinical outcomes between obese and non-obese patients with Enterobacteriaceae bloodstream infections receiving piperacillin/tazobactam or cefepime. Adult inpatients with Enterobacteriaceae bacteremia from January 2009 to August 2015 were included. Patients with body mass index (BMI) greater than or equal to 30 kg/m<sup>2</sup> were classified as obese and those with BMI less than 30 kg/m<sup>2</sup> were non-obese. Included patients received piperacillin/tazobactam or cefepime within 24 hours of culture collection for at least 48 hours. PK parameters were estimated for each drug using previously published equations in critically ill patients. Following calculation of patient-specific PK parameters, estimations of first-dose concentration-time profiles were conducted and predicted concentrations were generated every 6 minutes throughout the dosing interval. Cefepime and piperacillin/tazobactam minimum inhibitory concentrations (MICs) were determined via automated broth microdilution. The PD parameter evaluated was percentage of dosing interval during which free drug concentrations remained above the MIC for that specific Enterobacteriaceae isolate (%fT>MIC). Primary outcome was clinical cure, defined as resolution of baseline signs/symptoms of infection and clearance of blood cultures. Secondary outcomes included time to clinical cure, mortality and total hospital and infection-related costs. Continuous variables were compared using Student t test (parametric) or Mann-Whitney U-test (non-parametric). Categorical variables were evaluated with  $\chi^2$  or Fisher's exact test. A two-tailed significance of less than 0.05 was considered statistically significant.

**Learning Objectives:**

Explain the link between obesity and risk of infection.  
Identify specific pharmacokinetic parameters that are commonly altered in obesity and critical illness.

**Self Assessment Questions:**

Obesity among ICU patients has been significantly linked to which of the following infection-related characteristics?

- A: Decreased incidence of bloodstream infections
- B: Requirement of multiple/repeated treatment courses for the same
- C: Less use of second-/third-line antimicrobial agents
- D: Shorter treatment lengths than recommended by practice guideline

All of the following represent pharmacokinetic alterations observed in obesity and critical illness:

- A: increase in V<sub>d</sub>.
- B: variable change in renal clearance.
- C: decrease in effective plasma drug concentrations.
- D: all of the above.

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-612L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**IDENTIFYING PHYSICIAN PRESCRIBING PRACTICES FOR HEPATITIS B IMMUNIZATION BASED ON ACIP RECOMMENDATIONS FOR PATIENTS WITH DIABETES**

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Purpose: To characterize physician awareness of, and opinions about, the current Advisory Committee on Immunization Practices (ACIP) recommendations, which recommend the Hepatitis B immunization in adults with diabetes, ages 19-59, and identify barriers to achieving higher immunization rates in patients with diabetes. Methods: An interview guide was developed to ascertain physician awareness of and opinions about the ACIP recommendations for patients with diabetes and to identify barriers physicians may have in prescribing the Hepatitis B immunization. Qualitative semi-structured face-to-face or phone interviews will be used for data collection. Purposeful sampling will be employed; physicians eligible for participation include those who are general practitioners or endocrinologists with at least 25% of their patients having diabetes. A physician champion was identified by the Indiana Immunization Coalition to assist in participant recruiting. Physician key informants who met inclusion criteria were then identified by the physician champion. Interviews will be continued until thematic saturation is reached. A sample size of up to 20 physicians is expected. The audio from the interviews will be recorded and transcribed verbatim. The investigator and partner coder will organize and analyze the qualitative data using qualitative data management software.

Results: N/A Conclusions: N/A

**Learning Objectives:**

List the immunizations that are recommended for patient with diabetes.  
Identify the barriers of pharmacist-administered Hepatitis B immunization in patients with diabetes.

**Self Assessment Questions:**

1. In patients who meet the state protocol age requirements, which immunization requires a prescription in order to be administered by a pharmacist in Indiana?

- A: Tdap
- B: Zostavax (shingles)
- C: Hepatitis B
- D: Hpv

2. Which immunization is recommended by the ACIP for patients with diabetes, ages 19-59?

- A: Hepatitis A
- B: Polio
- C: Zostavax (shingles)
- D: Pneumovax (pneumococcal)

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-866L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RISK FACTORS FOR RECURRENT CLOSTRIDIUM DIFFICILE INFECTION IN ADULT HEMATOLOGY PATIENTS

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**Purpose:** Clostridium difficile infection (CDI) affects 1-2% of the general hospitalized population and 2-8% of adult hematology/oncology patients. Although there is an increased incidence of CDI in this population, a major concern is the propensity of CDI to recur leading to delays in therapy and poor outcomes. Despite the inherent increased CDI risk in hematology/oncology patients, there are little to no data analyzing the risk factors for recurrent Clostridium difficile infection (rCDI) in this population. The objective of this study is to determine both traditional and novel disease-specific risk factors for rCDI in adult hematology patients. **Methods:** This study will be a retrospective case-control study of patients with a positive index Clostridium difficile infection (iCDI) who were treated at the University of Michigan Hospitals for leukemia, lymphoma, or myeloma between January 1st 2004 and August 31st, 2015. Patients diagnosed with CDI will be grouped into cohorts on the basis of developing rCDI or not developing rCDI. The primary outcome will be risk factors for rCDI in hematology patients, and the secondary outcome will be the incidence of rCDI in hematology patients. Baseline data collection points include patient demographics, index CDI treatment, and traditional CDI risk factors (age >65 years, broad-spectrum antibiotic use, acid-suppression therapy, history of CDI, and hospitalization ≥ 14 days). Disease specific data include malignancy (type and stage), chemotherapy regimen <30 days prior to iCDI, chemotherapy administered between iCDI and rCDI, and neutropenia at the time of iCDI. Demographic data will be analyzed by descriptive statistics. Student's t-test and Mann-Whitney U will be used to compare continuous variables that are parametric and non-parametric, respectively. Fisher's exact test will be used to compare dichotomous variables. A logistic regression analysis will be conducted for the primary analysis of the study. **Results:** In progress **Conclusions:** In progress

### Learning Objectives:

Identify traditional and disease-specific risk factors for recurrent CDI.  
Describe the mechanism of virulence for the NAP1/B1/027 strain of Clostridium difficile.

### Self Assessment Questions:

Which of the following is/are traditional risk factor(s) for Clostridium difficile infection?

- A: Age ≥ 65 years old
- B: Broad spectrum antibiotic exposure
- C: Increased duration of hospitalization
- D: All of the above are traditional risk factors for Clostridium difficile infection

The NAP1/B1/027 strain of Clostridium difficile is hypervirulent because it has a(n)

- A: Increased production of toxin A
- B: Increased production of toxin B
- C: Increased production of toxin A and B
- D: Loss of expression of tcdD gene

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-613L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## UTILIZATION OF INTRAVENOUS TRANEXAMIC ACID IN TOTAL KNEE OR TOTAL HIP ARTHROPLASTY: RETROSPECTIVE ANALYSIS OF EFFECTIVENESS AND SAFETY

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**Purpose:** Perioperative bleeding is a major concern surrounding orthopedic surgical procedures. There are noteworthy risks as well as increased post-operative complications and healthcare costs associated with perioperative blood loss and resulting blood transfusions. Antifibrinolytic agents have been used to effectively reduce perioperative bleeding in cardiac surgeries for several years. Intravenous tranexamic acid was first utilized at Saint Joseph East in September 2013. A comparison is needed to evaluate the potential risks and benefits of intravenous tranexamic acid use at our hospital. **Methods:** This project will be conducted as a single-center, retrospective, observational cohort study. The study will include patients who underwent primary total knee replacement, primary total hip replacement, or revision procedures at Saint Joseph East from September 2012 to August 2013 and patients from the intervention group from October 2013 to March 2015. The primary endpoint will be incidence of major bleeding and venous thromboembolism during postsurgical hospitalization. Secondary endpoint will be 30-day all-cause readmission rate. Data will be obtained utilizing a pre-printed data collection sheet using electronic medical records, surgical procedure codes, and medication charge histories. Categorical data will be evaluated utilizing the chi-squared test and Fisher's exact test where appropriate. Continuous data will be evaluated utilizing the Student's t-test or ANOVA where appropriate. An a priori alpha of 0.05 will be set for significance. Data analysis will be performed using Microsoft Excel and SAS statistical software. These methods have been determined to meet federal exemption criteria by the Catholic Health Initiatives Institutional Review Board. **Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review current evidence regarding the use of intravenous tranexamic acid to prevent surgical bleeding.  
Discuss potential benefits of tranexamic acid use in orthopedic procedures.

### Self Assessment Questions:

Which of the following is a correct dosing strategy for intravenous tranexamic acid administration in orthopedic surgery?

- A: 1 gram intravenously prior to incision
- B: 1 gram intravenously prior to incision and 1 gram prior to closure
- C: 1 gram intravenously prior to incision and 2 grams prior to closure
- D: Only topical tranexamic acid has been studied in this population

What is a potential benefit of tranexamic acid use in orthopedic procedures?

- A: Decreased joint pain
- B: Decreased need for blood transfusion
- C: Decreased risk of deep vein thrombosis
- D: Both B and C

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-614L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPROVEMENT OF STAT MEDICATION TURNAROUND TIME AT A MULTI-HOSPITAL ACADEMIC MEDICAL CENTER

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**Purpose:** The purpose of this project is to increase the percentage of STAT medications administered within 30 minutes at UW Health.

**Methods:** A multidisciplinary steering committee was formed, including representation from physicians, pharmacy, nursing, quality, risk management, and informatics, to review current state and implement process changes to improve the STAT medication use process. A project charter was developed and approved by the committee. A survey was used to assess inpatient clinical staff perceptions of effectiveness and satisfaction with the current STAT medication process. Three multidisciplinary focus groups comprised of frontline staff from an adult intensive care unit (ICU), an adult internal medicine unit, and a pediatric ICU were formed to assess barriers to timely administration of STAT medications within each respective unit, identify waste, and recommend solutions for eliminating waste from the process. The primary outcomes were mean and median overall STAT medication turnaround time, defined as the time between prescriber order entry into the electronic health record (EHR) and documented medication administration in the EHR. Additionally, baseline mean and median turnaround times were calculated for each step in the STAT medication process, including pharmacist order verification, medication preparation, medication delivery, and medication administration. Blinded, direct observation of sterile product preparation and intravenous (IV) workflow system software were used to calculate medication preparation times. Pneumatic tube station transaction logs were used to calculate medication delivery times. Baseline measurements, survey results, and focus group findings and recommendations were presented to the steering committee. System-wide solutions were vetted and prioritized by the steering committee and plans were developed to implement selected solutions. The selected solutions were implemented and post-implementation data were collected. **Summary of results:** To be presented at the Great Lakes Resident Conference. **Conclusions:** To be presented at the Great Lakes Resident Conference.

### Learning Objectives:

List three discrepancies between staff perceptions and realities of the STAT medication process at UW Health  
Describe the most common barriers to timely administration of STAT medications at UW Health

### Self Assessment Questions:

Which of the following is true regarding the perception of the stat medication process at UW Health prior to implementing process changes?

- A: Staff believed the STAT turnaround time was 42 minutes but in reality it was 30 minutes
- B: Staff believed prescribers contacted the patient's nurse 100% of the time
- C: Staff believed patients were charged for individual medications from the pharmacy
- D: Staff believed order verification, preparation, and delivery were the longest steps in the process

Which of the following was the longest step in the STAT medication use process at UW Health prior to implementing process changes?

- A: Order verification by the pharmacist
- B: Sterile product preparation in central pharmacy
- C: Delivery via the pneumatic tube system
- D: Awareness of medication arrival and administration

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-867L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CODE SEPSIS: THE IMPACT OF TIME TO THERAPY ON CLINICAL OUTCOMES

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**Purpose:** Evaluate length of time elapsed between arrival, sepsis order set initiation and antibiotic administration in the emergency department of a community teaching hospital and its effect on mortality and secondary endpoints. **Background:** The 2012 Surviving Sepsis Guidelines presented evidence to support improved patient outcomes with a standard set of treatments, laboratory tests, and hemodynamic assessments. Treatment protocols are divided into three and six hour bundles; however, there is controversy on whether there is benefit to the specific timing of these therapies. Primary literature has shown a 7.6% increase in mortality for septic shock patients with each hour antibiotic therapy is delayed, however, a recent meta-analysis showed no significant difference in patient mortality when antibiotics were administered up to 3 hours after presenting to the emergency department. Despite this controversy, sepsis bundle achievement is now an additional quality measure evaluated by the Centers for Medicare and Medicaid Services (CMS) for hospital reimbursement. It is crucial for institutions to individually evaluate their sepsis protocols not only to meet criteria for CMS reimbursement but most importantly to improve the care of their patients. Regardless of the time constraints of the CMS bundles and in order to identify systematic areas of improvement, institutions should analyze three main spheres of sepsis treatment: septic patient identification, time to sepsis treatment initiations, and appropriateness of sepsis treatment. Implementation of improved sepsis protocols has the potential to promptly identify and treat septic patients. Ultimately, we would like to revise the current sepsis protocol to include a multidisciplinary sepsis code similar to that utilized for other medical emergencies. **Methods:** Our research team is conducting a retrospective chart review for patients who were given an ICD code associated with sepsis in the emergency department.

**Results:** Data and results will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the difference between sepsis, severe sepsis, and septic shock.  
Recognize the requirements within both the 3-hour and 6-hour sepsis bundles.

### Self Assessment Questions:

What is the defining feature for patients with septic shock?

- A: Hypotension refractory to a fluid bolus
- B: End organ dysfunction
- C: Temperature > 38°C
- D: HR > 110 bpm

Which of the following is a part of the core measure 6 hour bundle?

- A: Obtain blood cultures
- B: Start the patient on broad spectrum antibiotics
- C: Add vasopressors for a MAP ≤65
- D: Measure an initial lactate value

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-615L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF PHARMACY-DRIVEN DEXMEDETOMIDINE STEWARDSHIP AND APPROPRIATE USE GUIDELINES IN A COMMUNITY HOSPITAL SETTING

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Dexmedetomidine has become a widely utilized agent in the intensive care unit because it does not cause respiratory depression and is associated with less delirium than midazolam and propofol. However, recent studies have linked dexmedetomidine use with longer hospital lengths of stay and higher costs. Additionally, prolonged administration of dexmedetomidine may lead to an increase in adverse events. The purpose of this study is to validate the efficacy, safety, and cost effectiveness of pharmacy-driven institutional guidelines for the appropriate use of dexmedetomidine in the intensive care unit. This is a retrospective analysis of adult patients 18 years of age or older who received dexmedetomidine for sedation while on mechanical ventilation in the intensive care unit at a 433-bed community hospital from July 2013 to July 2015. Included patients will be divided into pre and post-dexmedetomidine institutional guideline enactment groups. Exclusion criteria include intraoperative dexmedetomidine use, patients receiving dexmedetomidine who are not mechanically ventilated, and dexmedetomidine use for fast-track cardiothoracic surgeries. The primary outcomes of the study are duration of mechanical ventilation and aggregate dexmedetomidine usage (mcg and days). Baseline demographics, duration of mechanical ventilation, aggregate dexmedetomidine usage, need for reintubation, need for add-on benzodiazepine therapy, dexmedetomidine acquisition cost, total hospital stay cost, and mortality will be collected through a review of electronic medical records. Patient identifiers will be removed from all data to protect confidentiality. Study outcomes will be compared before and after dexmedetomidine institutional guideline enactment with the Students t-test, Chi-square, and Fishers Exact test, depending on the type of data contained within each particular data set. Tests will be found significant with a p value of less than 0.05.

### Learning Objectives:

Discuss the benefits and limitations of dexmedetomidine use.

Explain the FDA-approved indications and off-label uses for dexmedetomidine.

### Self Assessment Questions:

Which of the following statements are correct? I. Dexmedetomidine is an alpha-2 adrenergic receptor antagonist. II. Dexmedetomidine was shown to be non-inferior to midazolam and propofol in maintaining

- A: I
- B: I, ii, iii
- C: Ii, iii
- D: I, ii, iii, iv

Which of the following statements are correct? I. Dexmedetomidine is indicated for the sedation of initially intubated and mechanically ventilated patients during treatment in an intensive care setting

- A: I, ii, iv
- B: I, ii, iii
- C: I, iii, iv
- D: I, ii, iii, iv

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-868L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IDENTIFICATION OF BEST PRACTICES OF TEAM MEETINGS AMONG PATIENT ALIGNED CARE TEAMS

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**Purpose:** The purpose of this project is to identify best practices of conducting weekly team meetings and daily huddles among members of Patient Aligned Care Teams (PACT) at a single Veterans Affairs (VA) hospital. These best practices may then be distributed to increase participation in and standardization of weekly PACT team meetings. PACT teams are comprised of primary care staff, including a primary care provider, nurse care manager, medical support assistant, licensed practical nurse, clinical pharmacist, social worker, registered dietician and mental health professional. **Methods:** A prospective survey will be disseminated to all primary care staff involved in PACT teams to gather baseline activities and feedback regarding team meetings and team huddles. Survey data will be compiled and used to pilot a standardized team meeting format among two PACT teams, prior to a complete roll-out. The primary outcome is to identify the most common characteristics that make team meetings successful at the Madison VA. Secondary outcomes include professions of people participating in team meetings, team meeting frequency and duration, satisfaction with team meetings, and percentage of PACT teams with regular team huddles and regular team meetings. **Results/Conclusion:** The results and conclusion are pending.

### Learning Objectives:

Describe best practices in conducting useful team meetings identified from high functioning teams at the Madison VA.

Identify the differences between team meetings and team huddles and the purposes of each.

### Self Assessment Questions:

A characteristic of a successful team meeting is

- A: Having known expectations of each team member's responsibilities
- B: Having a flexible day and time for team meetings to account for changes
- C: Having no specified meeting facilitator to ensure everyone feels included
- D: All of the above

How do team meetings and team huddles differ?

- A: Team huddles are focused on population management while meetings are focused on patient care
- B: Team huddles and team meetings are interchangeable terms.
- C: Team huddles discuss patient care for a given time period while team meetings are opportunities to finish discussions not completed during huddles
- D: Team meetings are opportunities to finish discussions not completed during huddles

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-869L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EMERGENCY DEPARTMENT PHARMACISTS MANAGEMENT OF THE CULTURE REVIEW PROCESS FOR DISCHARGED PATIENTS

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**Purpose:** Patients presenting to the Emergency Department with suspected infections often have cultures obtained. These cultures help providers appropriately tailor antimicrobial therapy to causative organisms. In many institutions, physicians or the physicians assistants provide post discharge follow-up of culture results. Prior to December 7 2015, our hospital followed this same procedure. As part of this project, the Pharmacy and Therapeutics Committee of UnityPoint Health-Meriter Hospital approved a collaborative practice agreement allowing pharmacists to manage the culture review process in the emergency department. This agreement allowed pharmacists to order new or alter previously prescribed antimicrobials based on pathogen susceptibility, patient specific dosing parameters, and clinical improvement. The aim of this project was to determine how a pharmacist led process compared to the pre-intervention method of culture follow-up. **Methods:** A retrospective chart review will be performed analyzing a three month period both prior to and following the implementation of the pharmacist-managed culture review process. The project will analyze rates of inappropriate prescribing, time to appropriate antibiotics, readmission rates, and duration of antibiotics. Inappropriate prescribing is defined as any of the following: incorrectly dosed antibiotics based on patient specific factors such as age, renal function, and weight; incorrect antibiotic selection based on culture results; or empiric antibiotics left unchanged that should have been altered based on pathogen susceptibilities. **Results and conclusions:** the project is ongoing. Full information will be shared at the conference.

### Learning Objectives:

List two benefits of a pharmacist managed culture review process that have been observed in previously published studies.

Describe the outcomes of the pre-intervention and the post-intervention culture review processes in this project.

### Self Assessment Questions:

According to previous publications which of the following is true regarding emergency department pharmacist involvement with the culture review process?

- A: Pharmacists reduced readmissions related to any cause
- B: Pharmacists increased rates of appropriate prescribing of antimicrobials
- C: Pharmacists reduced costs associated with culture review
- D: No significant differences have been found with pharmacist led culture review

Which of the following was a measured outcome being compared for the pre- and post-intervention groups for this project?

- A: Patient specific factors such as age, renal function, and weight
- B: Frequency of antimicrobial resistance encountered
- C: Empiric selection of antimicrobials for suspected infections
- D: Rates of inappropriate prescribing based on pathogen susceptibility

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-870L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## FEASIBILITY OF AN EARLY DISCHARGE PROTOCOL IN PATIENTS WITH NEW VENOUS THROMBOEMBOLISM IN AN EMERGENCY DEPARTMENT

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**Purpose:** Each year, as many as 900,000 patients are diagnosed with venous thromboembolism (VTE). Many of these patients are admitted for an inpatient stay while they could have been safely discharged home depending on other concomitant factors. Early discharge of these patients from the emergency department (ED) would allow for prevention of an inpatient hospital stay, avoidance of potential nosocomial infections, and reduced costs. The purpose of this study is to retrospectively determine the potential reduction in the number of inpatient stay days associated with admissions due to new VTE using a validated assessment tool in the ED of Bronson Methodist Hospital (BMH). **Methods:** This study is a retrospective chart review analyzing up to 400 patients who were admitted through the ED at BMH between October 2013 and October 2015 with a diagnosis of a new deep vein thrombosis (DVT) or pulmonary embolism (PE). Patients eligible for early discharge included adult patients 18 years of age or greater, presentation to the ED with a confirmed DVT and/or PE, and deemed to be at low risk of clinical deterioration based upon previously established criteria. The primary outcome is to assess the number of inpatient days associated with a new diagnosis of VTE which could have been avoided. Secondary outcomes include hospital length of stay, type of intravenous and oral anticoagulation initiated, adverse effects from anticoagulation, total patient costs which could have been avoided based on aggregate numbers, and VTE readmission rate. **Results/Conclusion:** Data collection and analysis are currently in progress. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify patients with a new VTE who can be safely discharged from the ED using established criteria.

List advantages of early discharge from the ED.

### Self Assessment Questions:

Assuming a patient fits all other criteria appropriately, which patient with a newly diagnosed VTE may be discharged from the ED?

- A: New DVT while on appropriate anticoagulation therapy
- B: Hemodynamically stable
- C: Baseline INR 1.9
- D: Active malignancy with POMPE-C score of 7%

What is a potential advantage of discharge from the ED of a patient with a new diagnosis of VTE?

- A: Increased costs
- B: Decreased nosocomial infections
- C: Decreased morbidity
- D: Decreased mortality

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-616L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## VALIDATION OF AN ELECTRONIC VTE RISK CALCULATOR IN PREPARATION FOR TRANSITION TO A VENDOR RELEASED ELECTRONIC VTE RISK CALCULATOR

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**Purpose:** Hospitalization for an acute medical illness increases the risk for venous thromboembolism (VTE). Electronic VTE risk calculators can help enhance VTE prophylaxis rates at hospitals. This community teaching health system developed an electronic VTE risk calculator in 2009. When VTE risk is identified, an electronic alert displays to the prescriber regarding VTE risk and consideration of ordering VTE prophylaxis. The VTE risk calculator at this institution is based on the institutions own programming code. An upgrade to the electronic medical record offers vendor released code for VTE prophylaxis that is largely based on this institutions own code. The purpose of this project is to validate the institutions own code with the vendor released code to ensure that the institutions code is behaving as intended before switching to the vendor released code programming. **Methods:** A taskforce was formed comprised of inpatient pharmacists, information technology specialists, and hospital physicians. The vendor released code for the VTE risk calculator was validated to correct identified issues with the programming code. When possible, each VTE risk rule was validated against thirty patients who were flagged and thirty patients who were not flagged for VTE prophylaxis to determine the consistency of the electronic VTE risk calculator. In addition, a re-review of the literature was conducted to determine if updates were needed to the electronic VTE risk calculator. All proposed changes to the VTE scoring rules were discussed at the taskforce meetings. Results and conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the importance of electronic VTE risk calculators in the hospital setting

Describe the validation process for switching over to a vendor released electronic VTE risk calculator

### Self Assessment Questions:

Which of the following is considered a major risk factor for VTE in medical patients?

- A: Hormonal drug therapy
- B: Bmi  $\geq$  30
- C: Acute exacerbation of chronic obstructive pulmonary disease
- D: Immobility

Electronic VTE risk calculators use which type of assessment to identify patients at high risk for VTE?

- A: Point scales (Risk Assessment Models)
- B: Diagnoses driven assessment
- C: Contraindication driven assessment
- D: Provider based clinical assessment

Q1 Answer: C Q2 Answer: A

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Activity Type: Knowledge-based Contact Hours: 0.5

## CHARACTERIZING CLOSTRIDIUM DIFFICILE INFECTION RATES, RISK FACTORS, AND OUTCOMES IN HEMATOPOIETIC STEM CELL TRANSPLANT RECIPIENTS

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**Background:** Approximately 19,000 patients underwent hematopoietic stem cell transplant (HSCT) in 2013. One of the most significant risks to patients after HSCT is infection, which has been shown to account for up to 19% of deaths in allogeneic stem cell transplant recipients and 7% of deaths in autologous stem cell transplant recipients. Despite interventions to prevent infection in this patient population, this complication is often still encountered. The most common hospital-acquired infections seen in HSCT patients are bloodstream infections, pneumonias, and infectious diarrhea. Infectious diarrhea due to *Clostridium difficile* (*C. diff*) is seen commonly in HSCT patients and the incidence has been increasing 1.1% per year between 2000 to 2009. Additionally, *C. diff* infections are primarily seen in those patients undergoing allogeneic stem-cell transplant. Patients undergoing HSCT inherently carry multiple risk factors for developing *C. diff* infection, including exposure to broad spectrum antimicrobials, cancer chemotherapy, altered gut mucosa, and prolonged hospitalization. Multiple studies have been conducted to attempt to identify additional independent risk factors associated with *C. diff* infection. The variability in results from available data suggest that the risk factors and outcomes associated with HSCT patients may vary between sites and populations. The primary objective of this research is to characterize the incidence of *C. diff* infection in HSCT patients at The University of Illinois Hospital & Health Sciences System (UIH). Additionally, secondary objectives include identifying risk factors for *C. diff* infection in these patients and evaluating transplant-related morbidity and mortality outcomes in those who develop *C. diff* infection. **Methods:** This is a descriptive, retrospective cohort study approved by the University of Illinois Institutional Review Board. Patients ages 18 years and older who underwent HSCT at UIH between January 1, 2005 and July 1, 2015 will be included in a chart review. **Results:** Data collection and statistical analysis are ongoing.

### Learning Objectives:

Identify risk factors associated with the development of clostridium difficile infections

Define various grades of infectious colitis

### Self Assessment Questions:

Which of the following is a modifiable risk factor for the development of Clostridium difficile infection?

- A: Broad-spectrum antibiotic use
- B: Extensive length of hospitalization
- C: Older Age (>60 years old)
- D: Allogeneic stem cell transplant recipient

In order to have grade 3 infectious colitis, as per the Common Terminology Criteria for Adverse Events (CTCAE), the patient must:

- A: Have moderate abdominal pain and frequent bowel movements
- B: Require IV antibiotic, antifungal, or antiviral intervention
- C: Require urgent surgical intervention
- D: Be clinically asymptomatic

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-617L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DESIGN AND IMPLEMENTATION OF A PHARMACY-LED POST-FALL MEDICATION CONSULTATION SERVICE

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**Purpose:** The Centers for Medicare and Medicaid Services has identified inpatient falls as a hospital-acquired condition and will not reimburse for subsequent costs. Falls are the most frequent inpatient adverse event and can result in injuries. At our institutions, post-fall huddles have been initiated to reassess factors and focus on prevention. The objective of this research is to examine medication-related factors influencing falls at our institutions and design a pharmacy consultation service to aid in the formation of appropriate medication recommendations. **Methods:** This study was classified as quality improvement and deemed as exempt by the Institutional Review Board. Occurrence reports were examined for all inpatients who experienced a fall from April 1-September 30, 2015. The electronic medical record was accessed to obtain the following information: age, sex, Schmid Fall Risk Assessment Score, individual score for each category, time of fall, hospital, hospital floor, which fall-risk increasing drugs (FRIDs) were administered, total number of medications, number of FRIDs prior to and after the fall, and any changes in FRIDs. For patients greater than 65 years of age, the Beers criteria were utilized to assess the number of potentially inappropriate medications (PIMs). All data was recorded without patient identifiers and maintained confidentially. To guide the design of the pharmacy consultation service, a literature review was completed, and the Medication Fall Risk Score was selected as the basis of the service. Implementation of this service started February 1, 2016 after the education of pharmacy staff and coordination with nursing leadership. The following information will be collected for each fall: age, pharmacist assessment of medication role in the fall, number of recommendations made, type of recommendation, class of medication involved, and recommendation acceptance rate. **Results and Conclusions:** Data collection and analysis are ongoing. Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List 3 medication classes that can increase fall risk  
Identify patient factors that should be assessed after a patient has fallen

### Self Assessment Questions:

All of the following medication classes increase fall risk, EXCEPT:

- A Antipsychotics
- B: Benzodiazepines
- C: Anticonvulsants
- D: Antibiotics

Which of the following is true when assessing a patient who has fallen?

- A A patient's vital signs are needed only if they complained of feeling
- B Falls that occur in patients with limited mobility require only minim
- C When a patient falls, their mentation and medication therapy shou
- D Assessment of falls at home is the same as for falls that occur in a

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-954L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF BASELINE CHARACTERISTICS BETWEEN VETERANS CHOOSING TO ENROLL VERSUS DECLINE AN EXTENDED INR INTERVAL PROTOCOL

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**Purpose:** Currently the Madison VA Anticoagulation Clinic, a pharmacist managed clinic, extends International Normalized Ratio (INR) follow-up to no more than six weeks. An ongoing study at the Madison VA is examining the feasibility, acceptance, and safety of a protocol that extends INR intervals up to 12 weeks. During the enrollment period, a pool of patients was identified as meeting the inclusion and exclusion criteria. Within the group of patients offered enrollment in the study protocol, a portion of the patients chose to enroll. The primary objective of this study is to determine if there is a relationship between the participants who chose to enroll versus decline the study and their baseline characteristics. Specifically, this will assist in determining if there is a difference in the patient population offered the extended interval and the group that was ultimately enrolled in the study. If extended enrollment is continued through clinic policy after study completion, this evaluation will help determine if the study population accurately reflects the potential candidates in the clinic setting. **Methods:** A retrospective chart review of patients at a single anticoagulation clinic was completed for patients who were offered an opportunity to enroll in a study that would extend INR intervals up to 12 weeks. The patients that chose to enroll in the study were compared to the patients that declined enrollment. Data collected included demographics, indications for warfarin, HASBLED, and CHA2DS2VASc scores. Fishers Exact test was used for categorical data and Mann Whitney-U test was used for ordinal and nominal data. This study and evaluation was approved by the Madison VA Institutional Review Board.

**Results and Conclusions:** To be presented at the Great Lakes Pharmac Resident Conference

### Learning Objectives:

List potential patient characteristics that would be risk factors for bleeding events in anticoagulation management.  
Recognize the limitations selection bias can have in generalizing research to practice.

### Self Assessment Questions:

Which of these is a risk factor identified in the HAS-BLED score for bleeding events?

- A Young age
- B: Systolic blood pressure above 160
- C: Serum creatinine above  $\geq 140$  mmol/L (1.58 mg/dL)
- D: Concomitant acetaminophen use

What type of bias is a systematic error caused by differences in the participants that chose to enroll in studies and those that choose to not enroll?

- A Volunteer bias
- B Reporting bias
- C Performance bias
- D Detection bias

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-618L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**INFLUENCE OF TYROSINE KINASE INHIBITORS ON RENAL FUNCTION AND EVALUATION OF CURRENT MONITORING PROCEDURES AT THE CINCINNATI VETERANS AFFAIRS MEDICAL CENTER (CVAMC)**

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**Purpose:** Patients with chronic myeloid leukemia (CML) and gastrointestinal stromal tumors (GIST) are treated with tyrosine kinase inhibitors (TKI), namely imatinib, nilotinib, and dasatinib. Newer studies have suggested that TKI therapy may be linked to the development of an acute kidney injury (AKI) and even chronic kidney disease (CKD). Recently physicians and pharmacists at the Cincinnati VAMC have noticed a trend in declining renal function among patients receiving TKIs leading to the development of this review. The objective of this review is to evaluate if current monitoring procedures at the Cincinnati VAMC are appropriate. **Methods:** This is a retrospective chart review. The health systems electronic medical record will be used to identify male and female patients receiving TKI therapy  $\geq 1$  year with a diagnosis of CML or GIST. The following data will be collected: age, gender, baseline and subsequent serum creatinine, baseline and subsequent estimated glomerular filtration rate (eGFR), comorbid conditions contributing to kidney dysfunction, and receipt of nephrotoxic agents. All data will be recorded without patient identifiers and maintained confidentially. The average change in renal function per year of TKI therapy and average number of days between lab draws will then be calculated. It will then be determined if current monitoring practices are in accordance with manufacturer and Veterans Affairs Pharmacy Benefits Management (VA PBM) guidance for monitoring of renal function in patients receiving TKIs and if appropriate therapeutic adjustments were made.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Review recently published data evaluating the influence of tyrosine kinase inhibitors on renal function.

Discuss current recommendations for monitoring of renal function in patients receiving therapy with tyrosine kinase inhibitors.

**Self Assessment Questions:**

1. A 2015 study published by Yilmaz et al. reported \_\_\_% of patients developed acute kidney injury and \_\_\_% of patients developed chronic kidney disease while receiving therapy with a tyrosine kinase in

- A: 25 and 15
- B: 4 and 14
- C: 12 and 25
- D: 15 and 4

2. As of December 2014, the Veterans Affairs Pharmacy Benefits Management recommends patients receiving therapy with imatinib do have a basic metabolic panel drawn:

- A: At baseline
- B: Every 6 months
- C: Every month
- D: A and C

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-619L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**IMPLEMENTING A STANDARDIZED PROCEDURE TO REASSESS THE APPROPRIATENESS OF ANTIMICROBIALS PRESCRIBED 48 HOURS AFTER INITIATION**

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**Purpose:** A national antibiotic stewardship effort is important to decrease the mortality rate attributed to multidrug resistance. It is well established that organisms are becoming increasingly resistant to antimicrobials. Many people die each year as a result of infections caused by resistant organisms. It is vital to ensure the appropriate use of our current antimicrobial resources considering the limited number of new antimicrobial agents in development. An essential element of antimicrobial stewardship within an institution is a defined procedure in which practitioners must document reassessment of antimicrobial appropriateness 48 hours after initiation. The primary objective of this project is to implement a standardized procedure to reassess the appropriateness of antimicrobials prescribed 48 hours after initiation. The secondary objectives are to compare the documentation rates of reassessment of broad spectrum antimicrobials 48 hours after initiation, appropriateness of broad spectrum antimicrobials, and pharmacist interventions before and after procedure implementation. **Methods:**

This quality improvement project was deemed exempt from review by the Institutional Review Board. A retrospective chart review was conducted to gather baseline data, which included patients greater than 18 years of age who were initiated on broad spectrum antimicrobials including piperacillin/tazobactam, fluoroquinolones, carbapenems, and vancomycin. The data gathered included indication, antimicrobial allergies, initial antimicrobial regimen ordered, time cultures were ordered, time preliminary results were reported, time to antimicrobial de-escalation, and appropriateness of therapy. Exclusion criteria included patients younger than 18 years old and those transferred from outside facilities or taking intravenous antimicrobials prior to admission. A form antimicrobial surveillance procedure was designed and piloted. Post intervention data was compared to pre-implementation data to assess the primary and secondary objectives. **Results and Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference

**Learning Objectives:**

Recall the recommendations from the CDC about what is recommended for antibiotic appropriateness

Identify the importance of antimicrobial stewardship in the setting of national impact

**Self Assessment Questions:**

What does the CDC recommend for antibiotic appropriateness reassessment?

- A: When antibiotics are first prescribed
- B: After 72 hours
- C: After 48 hours
- D: After 24 hours

Approximately how many MDRO infection related deaths could be prevented if a national stewardship effort were implemented?

- A: 37,000 deaths
- B: 100,000 deaths
- C: 250,000 deaths
- D: Antimicrobial stewardship will have little impact

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-872L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## OUTCOMES OF INPATIENT TREATMENT FOR URINARY TRACT INFECTIONS WITH BETA-LACTAM OR FLUOROQUINOLONE ANTIBIOTICS

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**Purpose:** Current practice guidelines from the Infectious Diseases Society of America for urinary tract infections (UTI) address outpatient treatment of uncomplicated infections in females and catheter-associated UTI. Recommendations are lacking for inpatient UTI treatment, however. Inappropriate empiric therapy may delay clinical response and increase length of stay (LOS), while overly broad treatment may cause adverse events to the patient. A recent study demonstrated that improving empiric therapy in UTI can decrease LOS by 1.4 days. *Escherichia coli* (EC) is the most common causative organism of UTI, but *Pseudomonas aeruginosa* (PA) is the most resistant. The aim of this study was to evaluate how empiric therapy impacts LOS in UTI caused by PA and EC. **Methods:** An IRB approved retrospective cohort study is being conducted on inpatients admitted from January 1, 2010 through September 30, 2015. Patients with PA and EC urine cultures were identified from the microbiology laboratory and included if they received empiric treatment with either a beta-lactam (BL) or fluoroquinolone (FQ). Exclusion criteria include patients less than 18 years old or with non-urinary bacterial infections. The primary outcome will be LOS compared between empiric therapy with BL and FQ. Secondary outcomes include differences in mortality, adverse events, rates of *Clostridium difficile* infection, and appropriateness of empiric therapy based on susceptibility results. Subgroup analysis will be performed to determine differences in primary and secondary outcomes between patients who received empiric BL and FQ for each organism. Analysis will be performed using STATA. Non-normally distributed means will be logarithmically transformed.

**Results and Conclusion:** To be presented at Great Lakes Pharmacy Residency Conference

### Learning Objectives:

List several antimicrobials that have activity against *Pseudomonas aeruginosa*.

Describe how inappropriate empiric therapy can negatively impact patient care.

### Self Assessment Questions:

Which of the following antimicrobials has activity against *Pseudomonas aeruginosa*?

- A: Ampicillin / sulbactam
- B: Ceftriaxone
- C: Ertapenem
- D: Levofloxacin

Historically, inappropriate empiric therapy has led to which of these patient outcomes?

- A: Decreased length of stay
- B: Decreased mortality
- C: Increased length of stay
- D: Increased patient satisfaction

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-620L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REDUCING DUAL ANTIPSYCHOTIC THERAPY UPON PATIENT DISCHARGE

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**Purpose:** The purpose of this study is to reduce the frequency of patients being discharged from the Memorial Epworth Center acute psychiatric unit on dual antipsychotic therapy without dose optimization. **Methods:** This study is a combined retrospective and prospective analysis that will include patients discharged from the acute psychiatric unit. A four-month retrospective analysis of antipsychotic prescribing habits will be utilized as baseline data. Prospectively, the number of patients prescribed antipsychotics, specifically without dose optimization, will be collected and emailed to the prescribing physicians on a weekly basis for the first two months of the study. During the subsequent two months, the pharmacist will additionally contact physicians via phone to suggest dose optimization. As appropriate, the pharmacist will offer additional evidence-based recommendations. The primary outcome is the overall percent reduction in the number of patients discharged on dual antipsychotic therapy without dose optimization. Secondary outcomes include the total number of patients discharged on two or more antipsychotics, prescription cost impact for patients, percent reduction in the number of patients using anticholinergic agents to correct for extrapyramidal symptoms (EPS), and the number and type of pharmacist recommendations. **Preliminary Results:** One hundred eighty-four patients were included in the baseline data. Thirty-seven patients (20.1%) were discharged with two or more antipsychotics, of which ten patients (5.4%) did not have dose optimization. Eleven patients (6.0%) were taking an anticholinergic agent to correct for EPS upon admission, while 16 patients (8.7%) were prescribed an anticholinergic agent upon discharge. **Preliminary Conclusion:** Baseline data shows that ten of the thirty-seven patients (27%) who were discharged on two or more antipsychotics from the acute psychiatric unit do not have dose optimization. Additionally, patients were more likely to be taking an anticholinergic agent upon discharge from the acute psychiatric unit than admission.

### Learning Objectives:

Describe appropriate reasons for patients to be prescribed dual antipsychotic therapy.

Identify optimized doses of antipsychotics.

### Self Assessment Questions:

Based on the Joint Commission quality measures, which is an appropriate reason for a patient to be prescribed dual antipsychotic therapy?

- A: Reduction of cost
- B: Reduction of adverse effects
- C: Two failed trials of monotherapy
- D: Augmentation of clozapine therapy

Which of the following antipsychotics would be considered dose optimized?

- A: Clozapine 25 mg/day
- B: Lurasidone 160 mg/day
- C: Aripiprazole 10 mg/day
- D: Haloperidol decanoate 100 mg/month

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-621L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**INCIDENCE OF MAJOR BLEED AND CARDIOVASCULAR EVENTS IN DIALYSIS PATIENTS WITH NEWLY DIAGNOSED ATRIAL FIBRILLATION TREATED WITH WARFARIN, ASPIRIN, OR NEITHER AGENT, AND THE CORRELATION WITH CHADS2-VASC**

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**Purpose:** The use of warfarin for stroke prevention in end-stage renal disease (ESRD) patients with atrial fibrillation (AF) is a controversial topic as there is not much data to support its efficacy and safety in the population receiving dialysis. The objective of this study is to establish how CHADS2-VASc and HAS-BLED scores can be applied to predict the incidence of major bleeding and cardiovascular events in this population, and whether this information can be used to determine which patients should be treated with warfarin, aspirin, or no therapy. **Methods:** This study is a retrospective chart review, which will utilize data available through the electronic medical records (EMR) in the nationwide Trinity Health System. IRB approval will be obtained and all procedures will be conducted in accordance with HIPAA laws to maintain patient confidentiality. The target population includes adult ESRD patients receiving hemodialysis or peritoneal dialysis with newly diagnosed AF. Data collected will include: hospital, age, gender, FIN/MRN, cardiology consult, type of dialysis (hemodialysis, peritoneal dialysis), stroke prophylaxis agent (warfarin, aspirin, or none), length of time to first event (including a GI bleed, cerebrovascular accident, stroke, MI, or death), HAS-BLED risk factors, and CHADS2-VASc risk factors. Participants will be separated into three groups based on the use of warfarin, aspirin, or no drug therapy for stroke prophylaxis in the setting of atrial fibrillation. The length of time to first event and event rate will then be compared between the three groups and stratified based on the CHADS2-VASc and HAS-BLED scores for each patient. Data obtained will be used to determine appropriate stroke prophylaxis treatment in this population based on their risk factors. **Results:** Results Pending.

**Learning Objectives:**

Review the common causes for elevated bleeding risk in the ESRD population.  
Discuss which treatment options are appropriate for an ESRD patient with newly diagnosed atrial fibrillation.

**Self Assessment Questions:**

Decreased thromboxane A2 production, a decreased RBC lifespan, and uremia contribute to an \_\_\_\_\_ in the ESRD population.

- A Decreased risk of bleeding.
- B: Increased risk of bleeding.
- C: Initially increases bleeding risk, then decreases bleeding risk.
- D: No effect on bleeding risk.

Studies suggest that ESRD patients with newly diagnosed atrial fibrillation should be treated with \_\_\_\_\_.

- A Warfarin
- B Aspirin
- C Warfarin + Aspirin
- D Current studies have produced variable results. Treatment recom

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-622L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**IMPACT OF INTEGRATING A PHARMACIST IN A LEVEL THREE PATIENT-CENTERED MEDICAL HOME**

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**Purpose:** The patient-centered medical home (PCMH) is a care model that facilitates comprehensive and coordinated care through continuous, interdisciplinary services that actively involve patients and their caregivers. The purpose of this study is to describe the impact of integrating a pharmacist into a level three PCMH. **Methods:** A retrospective chart review will be performed on patients seen by the clinical pharmacist in the Norton Community Medical Associates Pleasure Ridge Park practice site that serves as a level three PCMH. Each patient seen by the clinical pharmacist has a comprehensive medication review performed. The pharmacist communicates with the providers in the clinic to optimize patients pharmacotherapy regimens. Medication-related issues are identified and documented in the patients electronic medical record. During the chart review for this study, the number and type of interventions will be assessed and categorized into the following groups: appropriateness, effectiveness, safety and adherence. Also, the number of recommendations accepted by the provider will be assessed. Patient satisfaction surveys completed using Survey Monkey at the time of their visit with the pharmacist will also be reviewed. **Results/Conclusion:** Data collection is currently in progress. Results and conclusion will be presented at 2016 Great Lake: Pharmacy Resident Conference.

**Learning Objectives:**

Describe roles pharmacists can have in a patient centered medical home  
Recognize the importance of integrating pharmacists in patient centered medical homes

**Self Assessment Questions:**

Which of the following activities would a pharmacist perform in a patient centered medical home?

- A Comprehensive medication reviews
- B: Diagnosing upper respiratory infections
- C: Promoting safe, cost-effective medication use
- D: A and B

Which of the following are benefits of including pharmacists in a patient-centered medical home?

- A Enhancing reimbursement rates for physicians
- B Improving medication management by providing comprehensive c
- C Increasing use of physician electronic prescribing
- D Using patient experience/performance data for quality improvemer

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-623L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ALTEPLASE DOSING FOR ACUTE ISCHEMIC STROKE

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**Purpose:** Discrepancies occur in dosing recombinant tissue plasminogen activator (rtPA) for acute ischemic stroke due to inconsistencies in obtaining an accurate confirmed patient weight for calculating weight-based dosing. Whether these dosing variations translate to patient outcomes remains unclear. The primary objective of this study is to determine the percentage of patients receiving rtPA for acute ischemic stroke having a greater than ten percent variance in dose due to a difference in estimated versus actual body weight. Secondary objectives include comparing the relationship between rtPA dose and safety as well as functional outcomes within patient subgroups defined by the milligram per kilogram dose received. **Methods:** A retrospective, observational chart review study will be conducted at Community Health Network in Indianapolis, Indiana. Patients with orders for IV rtPA for the primary indication of acute ischemic stroke at three hospitals within the network between January 1, 2013 and August 31, 2015 will be included in the study. Exclusion criteria include pregnancy, prisoners, and patients less than 18 years of age or greater than 89 years of age. Four patient subgroups defined by milligram per kilogram dose received will be used to compare information. Collected data will include: patient demographics, estimated body weight, actual body weight, rtPA dose (total mg dose received and total calculated mg/kg dose), symptom onset to treatment time, length of stay, level of care required at discharge, evidence of intracranial hemorrhage within first 36 hours after treatment, and review of National Institutes of Health Stroke Scale Score upon admission, at 2 hours and at 24 hours after receiving rtPA as well as at discharge. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List 3 potential barriers to obtaining a patient's actual body weight prior to dosing rtPA in the acute ischemic stroke setting.

Identify potential consequences of not obtaining a patient's actual body weight prior to administering rtPA in the acute stroke setting.

### Self Assessment Questions:

For the indication of acute ischemic stroke, what is the standard dose of rtPA?

- A: 0.9 mg/kg
- B: 0.09 mg/kg
- C: 0.1 mg/kg
- D: 0.01 mg/kg

What is the maximum recommended dose of rtPA for patients with acute ischemic stroke?

- A: 100 mg
- B: 90 mg
- C: 9 mg
- D: No maximum dose

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-624L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## MINIMIZING THE USE OF PATIENT-SUPPLIED MEDICATIONS FOR ACROSS A LARGE HEALTH-SYSTEM

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**Background:** Our health-system facilities provide medications to minimize the potential medication safety risks to patients. Exceptions have been allowed for use of patient-supply due to under certain circumstances. Specifically, due to limited financial reimbursement by some payers for medications deemed "self-administrable", patients admitted into outpatient settings have been advised to use their home supply of medications. Half of our health-systems patient-supplied medication use was those patients admitted into outpatient settings.

**Objectives :** To implement system-wide policy to minimize use of patient-supplied medications for patients admitted into outpatient settings. **Methods:** The project focused on change management across a large health-system. Initial steps taken involved: meeting with and gaining approval from key stakeholders and updating system policies to no longer allow the use of patient-supplied medications by patients admitted into outpatient settings. Workflow processes and the electronic health record were changed to facilitate adherence to the policy change. Successful adoption of the new practice hinged on caregivers understanding of the background and reasons, and ability to communicate this to patients. Materials and communication were disseminated to caregivers across the system to ensure wide-spread adoption of the changes. A system-wide launch of the new policy was simultaneously implemented across all hospitals, followed by immediate and scheduled follow-up to ensure compliance. **Results:** In the first three weeks of implementation, relative to a similar time span of the previous year, the number of patients in outpatient settings across the system using patient-supplied medications decreased by 85%, contributing to a 57% decrease for all patients, regardless of bed status. Additionally, the number of administrations of patient-supplied medications decreased by 95% for those in outpatient settings, and 82% for patients in all settings. **Conclusions :** The use of patient-supplied medications was minimized through implementation of new policy and effective change management across a large health system.

### Learning Objectives:

Identify medication safety risks associated with the use of patient-supplied medications.

Identify potential barriers to using hospital-supplied medications for observation patients

### Self Assessment Questions:

Which of the following are potential risks associated with the use of patient-supplied medications?

- A: Inability to interface with barcode medication administration
- B: Compromised pharmaceutical quality
- C: Poor adherence to documentation and charting.
- D: All of the above

Which of the following are potential barriers to using hospital-supplied medications for observation patients?

- A: Poor electronic medical records build to document
- B: Hospital inventory of patients medications.
- C: Patients being held responsible for costs associated with self-adm
- D: Federal regulations prohibiting use of hospital-supplied medication

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-955L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## INCORPORATING ANTIBIOTIC STEWARDSHIP INTO HEALTH CARE PROVIDER PRESCRIBING

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**Purpose:** To create, implement, and assess a clinical decision support system to improve adherence rates to antibiotic prescribing guidelines for four respiratory infections. A secondary objective is to assess current provider perceived satisfaction with the implemented support system.

**Methods:** Using national guideline standards, a clinical decision support system will be created for physicians to use when prescribing for four respiratory infections and implemented into the electronic medical record. Prior to utilizing the clinical decision support system, providers will receive individual education on the use of the system and evidence based antibiotic recommendations. A pre and post assessment of antibiotic prescribing habits will be compared to determine the efficacy of the implemented clinical decision support system on improving the appropriateness of antibiotic prescribing for the four respiratory infections within the clinic. Electronic medical records of patients who were diagnosed with one of four respiratory infections by a clinic provider, identified by diagnosis code, will be retrospectively reviewed to assess appropriateness of antibiotic prescribing according to the respiratory infection guidelines. Patients eligible for the review include those aged 18 years or older, diagnosed by a clinic provider with otitis media, bronchitis, pharyngitis, or sinusitis, and seen from November 2014 to February 2015 for the pre assessment, or November 2015 to February 2016 for the post assessment. Additionally, current health care provider opinions and satisfaction of the clinical decision support system will be collected. **Results / Conclusions:** Descriptive statistics of data collection will be compared in a pre and post assessment. Provider survey results will be totaled and provided in aggregate.

### Learning Objectives:

Recognize factors that may contribute to antibiotic prescribing habits in the primary care setting.

Identify possible consequences of a patient receiving an inappropriate antibiotic.

### Self Assessment Questions:

What factors may contribute to provider antibiotic prescribing habits?

- A Perceived patient expectation for an antibiotic
- B: Inadequate physician knowledge
- C: Time constraints
- D: Both A and B

What is a possible consequence of patients receiving inappropriate antibiotics?

- A Unnecessary exposure to adverse reactions
- B Decreased healthcare costs
- C Contribution to antibiotic resistance
- D Both A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-873L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF FALL RISK IN DEMENTIA PATIENTS ON AN ATYPICAL ANTIPSYCHOTIC IN THE VETERANS AFFAIR POPULATION

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**Purpose:** Antipsychotics (APs) are widely used as off-label treatment for behavioral symptoms in dementia patients. It is recognized that APs can increase the risk for falls in the elderly population. When used in dementia patients, this risk is further increased, since dementia itself is an independent risk factor for falls. A study on the use of APs in the Veterans Affairs (VA) Community Living Centers found that veterans residing in the dementia special care units were more likely to receive APs, more commonly atypical APs. The purpose of this study is to determine whether atypical APs increase fall risk in dementia patients. **Methods:** This study was approved by the Institutional Review Board. It is a retrospective cohort study comparing two groups in the VA population: dementia patients receiving atypical APs versus dementia patients not receiving atypical APs. The primary endpoint is the difference in the incidence of falls between the groups. The secondary endpoints are the differences in the incidence of falls between subtypes of dementia, different atypical APs, and different fall risk as defined by the Morse Scale. Primary endpoint will be analyzed using unpaired t-test, while secondary endpoints analyzed through descriptive analysis. The following data will be collected: age, gender, number of Fall Risk Increasing drugs, comorbid conditions that increase fall risk, dementia subtype, name of the atypical APs, fall risk as defined by Morse Scale, and the documented fall details. Each patients chart will be reviewed from admission and up to 6 months, patients discharge, or patients death, whichever is the earliest to determine if a documented fall has occurred. Determining fall risk in the dementia population receiving atypical APs can help prevent inappropriate prescribing of these agents for treatment of behavioral symptoms, potentially leading to decreased fall risk. **Results and Conclusion:** Results and conclusion to follow.

### Learning Objectives:

Recognize the difference in the incidence of falls between dementia patients on an atypical antipsychotic versus those who are not on an atypical antipsychotic.

Identify other risk factors that predispose dementia patients for falls.

### Self Assessment Questions:

Atypical antipsychotics are associated with which of the following that increases fall risk in the dementia population?

- A Sedation
- B: Bradycardia
- C: Gait Abnormalities
- D: A and C

Based on the study by Van Doorn et al, which of the following has a protective effect on fall risk in the dementia population?

- A Use of assistive devices
- B Previous fall
- C Use of a trunk restraint
- D Depression

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-956L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OPTIMIZING MEDICATION BATCHING SCHEDULES IN ORDER TO REDUCE MEDICATION WASTE IN A PEDIATRIC SETTING

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**Purpose:** As healthcare costs continue to rise, it is necessary that hospital pharmacies operate in an efficient manner to minimize wasted medication expenditures. An efficient workflow is especially necessary in a pediatric setting in which a majority of prepared medications are patient-specific doses and, therefore, have to be wasted if the medication is not used. This project was designed in order to develop an optimum medication batching process in an inpatient pediatric setting that would result in intravenous and oral medication waste reduction and associated cost savings. **Methods:** A pre and post intervention analysis will be conducted to determine the impact of the intervention. An optimum batching schedule will be determined based on the following preintervention data collection points: total number of medications being ordered, medication order times, medication discontinuation times, medication administration times, types of medications discontinued, reasons for discontinued medications. These data collection points will also be measured post implementation of the new batching schedule. Pharmacy technicians, pharmacists, and nurses will be educated on the new medication batch schedule and appropriate workflow. The informatics team will be involved in the implementation of the batching schedule and data collection. The primary outcome evaluated in the study is the percentage of medications from the batch being wasted pre and post intervention. Secondary outcomes evaluated will include any change in total cost of medications wasted and change in types of medications wasted. The cost of medications will be determined using EPIC software and information collected from purchasing officers. **Results and Conclusions:** Study results and conclusions are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe lean methodology processes and how they can be applied to pharmacy workflow

Identify factors specific to the inpatient pediatric setting that can contribute to increased medication waste

### Self Assessment Questions:

Which of the following is a disadvantage of "just-in-time" medication preparation?

- A: Just-in-time preparation can result in increased amounts of expired
- B: Just-in-time preparation can result in delays of getting a medication
- C: Just-in-time preparation often requires keeping high amounts of medication
- D: Just-in-time preparation can lead to an increased amount of medication

Approximately what percentage of dispensed medications from an inpatient pharmacy come back as returns and have to be wasted?

- A: 0% - 10%
- B: 10% - 20%
- C: 20% - 30%
- D: 30% - 40%

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-874L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPACT OF THE EMERGENCY DEPARTMENT SEPSIS SCREENING TOOL ON OUTCOMES IN PATIENTS WITH SEPSIS

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**Purpose:** Sepsis is an infection with a systemic inflammatory response syndrome (SIRS) that can evolve into severe sepsis causing organ damage or septic shock causing hypoperfusion. It is a common cause for hospitalization with more than 750,000 cases costing more than \$20 billion annually. The Surviving Sepsis Campaign provides a bundle to complete within 3 hours of recognizing a septic patient. These actions include measuring lactate level, obtaining blood cultures, and administering broad spectrum antibiotics and 30ml/kg crystalloids for hypotension or a lactate  $\geq$  4mmol/L. Recent literature has highlighted the importance of early identification and treatment. Sepsis screening tools have been created to help health care providers recognize sepsis early. The emergency department (ED) at Loyola University Medical Center implemented a sepsis screening tool in May 2013 which was updated and automated in December 2014. We hypothesize that using a sepsis screening tool in the ED increases compliance with the sepsis bundle leading to improved patient outcomes. **Methods:** This is a retrospective cohort study to determine if compliance with the 3 hour bundle has increased after implementing a sepsis screening tool. ICD-9 codes were used to identify ED patients age 18 or older diagnosed with severe sepsis or septic shock between August 2012 - May 2013 and January 2015 - September 2015. Baseline variables and bundle compliance data were pulled electronically using the ICD-9 codes and through chart review. Baseline variables will be analyzed using descriptive statistics. Continuous variables will be analyzed using a t-test. A Chi-Square or Fishers exact test, as appropriate, will be used for categorical data. A multivariate analysis will be used for independent variables and to determine if implementation of the sepsis screening tool increases bundle compliance.

### Learning Objectives:

Describe the sepsis screening tool used in Loyola's Emergency Department (ED)

Identify the elements involved in early sepsis recognition and the treatment options recommended by the Surviving Sepsis Campaign bundle

### Self Assessment Questions:

Which element of sepsis care can be improved by complying with the sepsis bundle?

- A: Administration of vasopressors in the first hour
- B: Conducting a urine analysis within 30 minutes
- C: Collecting blood cultures prior to administering antibiotics
- D: All of the above

Which of the following have shown to reduce mortality in septic patients?

- A: Administering steroids within the first hour
- B: Early identification and treatment of sepsis
- C: Empiric antifungal treatment for all patients
- D: All of the above

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-625L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## RATIONAL USE OF RASBURICASE FOR THE TREATMENT AND MANAGEMENT OF TUMOR LYSIS SYNDROME

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**Purpose:** Tumor Lysis Syndrome (TLS) is a potential life-threatening complication resulting from release of intra-tumoral cell contents including uric acid. After FDA approval of rasburicase, the treatment of hyperuricemia in TLS shifted from aggressive fluid resuscitation and xanthine oxidase inhibitors to this recombinant urate oxidase. However, there is a lack of high-level evidence identifying meaningful outcomes and the optimal place in therapy for rasburicase in TLS. The objective of this study is to evaluate and characterize outcomes resulting from the University of Michigan Health System TLS guideline that emphasizes supportive care, xanthine oxidase inhibitors, and lower doses of rasburicase. **Methods:** In this retrospective cohort chart review, we will compare less aggressive rasburicase dosing (3 mg rasburicase or no rasburicase) in accordance with the newly developed UMHS TLS guideline with traditional TLS management ( $\geq 6$  mg rasburicase) in 160 adult patients ( $\geq 18$  years of age) with acute myeloid leukemia, acute lymphoblastic leukemia, diffuse large B cell lymphoma, or Burkitts lymphoma, who have had a uric acid level of 9-15 mg/dl in the past 5 years. The primary efficacy outcome is the proportion of patients achieving a uric acid level  $<8$  mg/dL within 72 hours of their first elevated uric acid level. The principle safety outcomes to be analyzed include incidence of acute kidney injury defined by the RIFLE criteria, and the proportion of patients requiring hemodialysis within one week of admission. A one sided non-inferiority test will be used to demonstrate non-inferiority of the less aggressive rasburicase utilization strategy. The primary and secondary outcomes will be described as proportions, and analyzed using a chi-square test. Costs of medications between the two groups using average wholesale unit pricing will be analyzed using a paired t-test. **Results:** In progress **Conclusion:** In progress

### Learning Objectives:

Recognize the risk factors associated with the development of tumor lysis syndrome

Explain the rationale behind the newly developed TLS guideline at the University of Michigan Health System

### Self Assessment Questions:

Which of the following is a high risk factor associated with the development of tumor lysis syndrome?

- A Acute Myeloid Leukemia
- B: Preexisting Uric Acid  $>6$  mg/dL
- C: Urine pH  $>7$
- D: WBC  $<50$  K/mm<sup>3</sup>

The following outcome(s) have been proven with high dose rasburicase ( $\geq 6$  mg) use in tumor lysis syndrome.

- A Shorter length of hospital stay
- B Decreased mortality
- C Decreased incidence of acute kidney injury
- D Rapid decline in serum uric acid level

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-626L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF PHARMACIST-DRIVEN ELECTRONICALLY REPORTABLE VTE RISK ASSESSMENT TO IMPROVE CMS PERFORMANCE MEASURES

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Venous thromboembolism (VTE) is associated with increased morbidity, mortality, and cost. VTE risk assessment should occur on every hospitalized adult patient to prevent hospital acquired VTEs. There are six Centers for Medicare and Medicaid Services (CMS) performance measures related to VTE; VTE 1 and 2 were designed to ensure appropriate prophylaxis is administered to hospitalized patients.

Current health-system practice is for providers to assign risk by placing an order for high or low VTE risk. The corresponding prophylactic agent is ordered prior to signing admission orders. The providers VTE risk order drives performance measure reports. Upon admission, a pharmacist performs a separate VTE risk assessment using validated screening tools. Documentation of the pharmacist risk assessment does not occur in the electronic medical record (EMR). If provider and pharmacist risk screens differ, the pharmacist intervenes and recommends appropriate prophylaxis. Discrepancies occur when prophylactic agents are changed, but the original VTE risk order remains active. These discrepancies account for half of all misses on performance measure reports. Additionally, provider and pharmacist accuracy of assessing VTE risk is unknown. The purpose of the project is to improve VTE 1 and 2 performance measure scores. This will be accomplished by measuring the accuracy of the current VTE risk assessment process, implementing an electronic documentation tool for pharmacist VTE risk assessment, and transitioning to pharmacist driven performance measure reports. A chart review of adult hospitalized patients from 8/1/15-8/30/15 was completed to determine the accuracy of VTE risk screening. Results were presented to the anticoagulation committee to justify pharmacist driven reporting. A multidisciplinary work group developed the documentation tool. Information technology pharmacists built the tool within the EMR; pharmacists were educated prior to implementation. Pre and post data will be compared using a chi-square. Data collection is ongoing; results will be presented at Great Lakes Conference.

### Learning Objectives:

Recall which patient populations require a VTE risk assessment upon admission

Describe how pharmacists can impact performance measures related to VTE prophylaxis

### Self Assessment Questions:

On which of the following patients should a VTE risk assessment be performed?

- A 75 year old female admitted to the intensive care unit for urosepsis
- B: A 12 year old male admitted to the pediatric intensive care unit for
- C: A 40 year old female admitted under observation to the burn unit for
- D: A 55 year old male on an intravenous heparin drip admitted to the

Which of the following statements concerning VTE risk assessment is correct?

- A Pharmacists can perform an independent VTE risk assessment at
- B Pharmacists can be involved on committees and teams that assess
- C Tools can be built to facilitate pharmacist driven performance mea
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-627L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## BETA-LACTAM ALLERGY RECORD UPDATES AFTER AN ALLERGY SERVICE CONSULT: POTENTIAL STEWARDSHIP INTERVENTION

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**Purpose**The presence of allergies in the medical record may result in less efficient and more costly antibiotic use. Allergy services are often consulted when the optimal antibiotic is limited by a history of antibiotic allergy. While these consults are meant to aid antibiotic selection, the impact of allergy consultation is poorly studied. **Methods**Included patients were  $\geq 18$  years old with at least one beta-lactam allergy listed in the medical record of Northwestern Memorial Hospital, had an inpatient or outpatient allergy service consult, and were hospitalized between January-June 2009; outpatient allergy service consult had to be completed prior to hospitalization. Patient demographic, outcomes of allergy consult, and antibiotic use information were collected. **Preliminary Results**Forty patients were included and were predominantly female (n=24, 60%) and Caucasian (n=29, 73%), with mean age 57.6 years (SD 18), median length of hospital stay 14.5 days (IQR 5.5-23.5), and median days to allergy service consult 4.5 (IQR 3-10). Penicillin allergy was listed most commonly (n=37, 93%) whereas cephalosporin allergy (n=10, 25%) and carbapenem allergy (n=1, 2.5%) were less common. The allergy service recommended changes to the patients allergy record in 73% (n=29) of cases. Allergy service recommendations were followed 93% of the time and antibiotics were changed post-consult in 70% of cases. The allergy list was updated post-consult for 63% (n=25) of patients. **Conclusions**Consistent with prior studies, most patients with beta-lactam allergies were able to tolerate a related compound with allergy consultation. Despite documenting the safety of using beta-lactams in these patients, about 40% did not have documentation of allergy updated, placing these patients at risk for receiving less efficient and more costly antibiotics with subsequent infections. Future studies should focus on cost reduction and the development of a stewardship intervention following allergy consult.

### Learning Objectives:

Discuss the prevalence of inappropriate allergy records

Identify the stewardship risks of not maintaining allergy records

### Self Assessment Questions:

What is the published prevalence of self-reported antibiotic allergies?

- A 60%
- B: 5%
- C: 25%
- D: 80%

What is not a risk of having outdated antibiotic allergy records?

- A Potentially more costly antibiotic use
- B Limited access to unnecessary broad spectrum antibiotics
- C Exposure of potentially less effective antibiotic treatment
- D Greater access to broad spectrum antibiotics

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-628L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DERIVATION AND VALIDATION OF A PREDICTIVE SCORING SYSTEM TO IDENTIFY PATIENTS AT HIGH RISK OF INFECTION DUE TO EXTENDED-SPECTRUM--LACTAMASE-PRODUCING ENTEROBACTERIACEAE

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**Purpose:** The aim of the study is to identify and validate a bedside scoring system that will help in antibiotic selection, which should shorten the time to institution of appropriate therapy in patients who are at risk of being infected with extended-spectrum-beta-lactamase-producing Enterobacteriaceae. We aim to generate a system based on parameters that could be extracted while attending the patient and reviewing their medical charts. Once this scoring system is derived and validated, we plan to incorporate into our electronic medical record for use in clinical practice. **Methods:** Retrospective cohort study, case-control single-center study of hospitalized adult patients in the University of Illinois at Chicago Hospital and Health Sciences Systems clinical infections due to Enterobacteriaceae spp. from 2010-2015. Cases will consist of patients in which at least one ESBL-producing Enterobacteriaceae spp. organism was isolated from a culture taken during their hospitalization from 2010-2014. Surveillance cultures and patients who are colonized with ESBL-producing Enterobacteriaceae spp. will be excluded. Per study period, only the first isolate per patient will be included. Controls will consist of patients with non-ESBL-producing Enterobacteriaceae organisms isolated from cultures collected during the same time frame. Controls will be matched 1:1 to cases for time of culture collection (within 1 year) and patient location in hospital and type of residence prior to admission. The validation cohort will consist of hospitalized patients from January 1 2015 to July 31, 2015. We estimated that 500 subjects will be needed for our study (case=200; control=200; validation cohort=100). **Results:** Research in progress.

### Learning Objectives:

Identify the risk factors associated with extended-spectrum -lactamase producing Enterobacteriaceae (ESBL) infections in hospitalized patients  
Discuss the utility of bedside scoring system in identifying those at risk for ESBL infections

### Self Assessment Questions:

1. Which of the following is likely to be associated with increased risk of extended-spectrum -lactamase producing Enterobacteriaceae (ESBL) infections in hospitalized patients?

- A Recent hospitalization (<90 days)
- B: Male gender
- C: Age <40 years
- D: Recent travel

For patients with sepsis and septic shock, the strongest modifiable predictor of mortality is

- A The choice of antimicrobial therapy
- B The choice of vasopressors
- C Time to initiating appropriate antimicrobial therapy
- D The choice and volume of fluid resuscitation

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-629L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF AN INTEGRATED EHR CASE MANAGEMENT TOOL AS PART OF A HEALTH-SYSTEM SPECIALTY PHARMACY PROGRAM ON BLEEDING LOG COMPLETENESS, DOCUMENTATION AND PATIENT SATISFACTION FOR HEMOPHILIA PATIENTS

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**Purpose:** Studies evaluating documentation of bleeding episodes in patients with hemophilia have demonstrated inadequate data collection of bleeding events. Accurate, timely and accessible documentation of patient bleeding events could be used to maximize care by modifying dosing, showing patient adherence to treatment regimens, decreasing time to therapy when bleeding events occur, and decreasing excessive factor product supply for patients who have not had a recent bleed. The purpose of this study is to measure the impact of an integrated EHR case management tool utilized by a health-system specialty pharmacy on bleeding log documentation and completeness. In addition, patient satisfaction with the pharmacy-driven monitoring program will also be measured. **Methods:** This single-center, cohort study will compare bleeding logs completed by a health-system specialty pharmacy as part of a pharmacy-driven monitoring program to historical patient self-reported bleeding logs. Bleeding logs completed by the specialty pharmacy will be documented using a newly developed case management tool in the EHR; historical patient self-reported bleeding logs were scanned into the EHR by clinic staff. Bleeding logs in the two cohorts will be reviewed and compared for completeness of documentation. The comparison will be a percentage of completeness and documentation that will be estimated along with the associated 95% confidence intervals for patients completing their own bleeding log documentation versus using the health-system specialty pharmacy monitoring program. Additionally, a survey will be conducted before and after participation in the monitoring program to assess patient satisfaction with specialty pharmacy services. The 12-question survey was adapted from a validated tool. Descriptive statistics will be generated for each survey item for the pre and post time periods and expressed using frequencies and percentages. Wilcoxon Signed Rank tests will be utilized to compare differences in pre and post responses to patient satisfaction. **Results:** Final results and conclusions are pending.

### Learning Objectives:

Explain benefits of integrating specialty case management documentation into the electronic health record (EHR).

Identify the impact of health-system specialty pharmacy programs on continuity-of-care and patient satisfaction for hemophilia patients.

### Self Assessment Questions:

What is the primary benefit of health-system specialty pharmacy programs recording specialty case management documentation within an integrated EHR?

- A: Continuity-of-care
- B: Patient satisfaction
- C: Physician satisfaction
- D: Improved medication adherence outcomes

Health-system specialty pharmacy programs can partner with their hemophilia treatment center to potentially improve which of the following for hemophilia patients?

- A: Completeness of bleeding logs submitted by patients
- B: Documentation of bleeding logs in the EHR
- C: Patient satisfaction with pharmacy services in clinic
- D: All the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-630L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF TECHNICIAN BARCODE VERIFICATION AS AN ALTERNATIVE TO A PHARMACISTS VISUAL CHECK OF FIRST DOSES IN AN ACUTE CARE SETTING

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**Purpose:** Froedtert Hospital recently completed a two phase non-inferiority study, "Technician Barcode Verification as an Alternative to a Pharmacists Visual Check of First Doses in an Acute Care Setting". This study showed no significant difference in the accuracy of first dose verification when comparing the two methods. Our aim is to increase efficiency and safety through implementation and integration of Tech-Check-Tech (first doses) into central pharmacy workflow through utilization of barcode scanning technology. Secondary we aim to increase staff engagement, and provide opportunities for workforce reallocation to expand current services. **Methods:** The Wisconsin Board of Pharmacy granted a pilot variance allowing Froedtert Hospital to move forward with implementation of technician barcode scanning validation as an alternative to a pharmacist manual check of each technicians first doses. An implementation team is being led to validate pharmacy technicians through use of the Pharmacy Society of Wisconsin's Tech-Check-Tech Toolkit, to create an integrated technology platform equip with functionalities to assist in objective data collection, to fine-tune central pharmacy workflow to decrease first dose throughput time, and survey staff to better understand job satisfaction/engagement surrounding the process. **Results:** Two board submissions have represented successful validation of six technicians across a 24 hour time span. Each validated technician has achieved and maintained 99.8% accuracy of first dose dispensing processes. Ongoing validation is taking place with anticipated training of seven additional technicians. In addition, through implementation one pharmacist FTE has been reallocated to our new clinical service thereby increasing patient access to their pharmacist. **Conclusion:** Successful implementation of this workflow will set the stage for extrapolation of this process to other validation workflows throughout central pharmacy furthermore supporting integration of these services throughout the Froedtert & the Medical College of Wisconsin system.

### Learning Objectives:

Describe a cohesive implementation plan for successful first dose technician validation using the Pharmacy Society of Wisconsin's Tech-Check-Tech Toolkit.

Review potential benefits of leveraging barcode scanning technology within central operations.

### Self Assessment Questions:

Which of the following toolkits would be advantageous objective way to validate technicians prior to implementation of technician barcode verification as an alternative to a pharmacist's visual check

- A: Pharmacy Society of Wisconsin's Tech-Check-Tech Toolkit
- B: Technician Board Certification
- C: On the job training
- D: No training required

Which of the following is a benefit gained by leveraging skill mix and technology?

- A: Elevation of staff responsibility allowing practice at the top of license
- B: Increasing efficiencies in central operations by streamlining processes
- C: Ability to reallocate pharmacists' time to new and innovative responses
- D: All of the above

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-957L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PHARMACIST INTERVENTION ON 30-DAY ALL-CAUSE READMISSION RATE IN PATIENTS WITH CONGESTIVE HEART FAILURE IN AN INPATIENT SETTING

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**Purpose:** To evaluate the effectiveness of prior-to-discharge pharmacist interventions on the 30-day all-cause readmission rate in congestive heart failure (CHF) patients. **Method:** This pilot study was designed to assess medication management of CHF patients at Community Hospital in Munster, Indiana. Patients were categorized into two study groups. The intervention group was defined as CHF patients discharged from two selected inpatient units between October 5th and October 30th, 2015. The same number of CHF patients discharged from the rest of the hospital during the same time period was randomly selected into the control group. Pharmacist interventions included enforcement of evidence based medication management, preventing medication errors through medication reconciliation, and ensuring smooth transitions of medications records from inpatient to outpatient. The primary outcome was the 30-day all-cause readmission rate. Secondary outcomes were 30-day CHF readmission rate and evidence based beta-blocker usage.

**Results (Preliminary):** A total of 74 CHF patients were recruited in the intervention group. Fifteen (20%) patients in the control group and 14 (19%) patients in intervention group were readmitted within 30 days of discharge. Both groups had one patient readmitted for CHF exacerbation (7.1% and 6.7% for control and intervention group, respectively). The number of patients with reduced left ventricular ejection fraction (LVEF  $\leq$ 40%) was 26% (n=19) and 39% (n=29) for the control and intervention group, respectively. Among patients with LVEF  $\leq$ 40%, the rate of evidence based beta-blocker usage was 42% (n=8) in control group and 69% (n=20) in intervention group. **Conclusion:** The preliminary results have demonstrated the benefits of pharmacist interventions on readmission rate in CHF patients. A new workflow process will be developed based on this pilot study and applied to all units in the hospital.

### Learning Objectives:

Identify the risk factors for CHF readmission

Review the evidence-based management of congestive heart failure

### Self Assessment Questions:

Which of the following is a risk factor for CHF readmission?

- A: Being female
- B: Recent knee surgery
- C: Medication noncompliance
- D: Hyperlipidemia

Which of the following has a FDA indication for CHF management?

- A: Acebutolol
- B: Carvedilol
- C: Metoprolol tartrate
- D: Labetalol

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-631L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EXPANSION OF IV ANESTHESIA MEDICATIONS PREPARED USING ROBOTIC TECHNOLOGY AT AN ACADEMIC MEDICAL CENTER

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**Purpose:** Large academic medical centers require substantial quantities of sterile parenteral products. The product demand may exceed the workforce production capabilities leading to outsourced product acquisition. At our institution, there is the opportunity to insource production of parenteral products with an already established compounding robot. The purpose of this project is to increase the utilization of the in-house compounding robot while also comparing cost-effectiveness and waste accrual with pre-implementation and post-implementation of in-house compounding. **Methods:** This study is a prospective quality improvement project at a single medical center. The first step towards implementation of the project will be programming the characteristics of unprepared drug and the steps of syringe production into the compounding robot. Expected expanded products will include succinylcholine, phenylephrine, ephedrine, and vecuronium syringes used by the anesthesia service within the medical center. New workflows, lengthened operating intervals, and additional operator time will be required for successful implementation. Manufacturing times per unit, total daily runtime, and technical downtime will be noted. Cost and waste data will be compared between outsourcing and insourcing medications. **Results/Conclusion:** Collection of data is currently in process. Final results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Restate the process of expanding product preparation of compounding robots and the alterations in workflow required for implementation.

Identify the benefits and limitations associated with conversion of outsourcing to insourcing parenteral product production.

### Self Assessment Questions:

What is a common limitation with insourcing parenteral product preparation with compounding robotic technology?

- A: Higher likelihood of parenteral product contamination
- B: Shortened product expiration
- C: Technical issues leading to robot downtime
- D: Product potency issues

Which of the following is a true statement regarding implementing compounding robotic technology?

- A: Generally limited to nonsterile product compounding
- B: Has the ability to compound intravenous bags and syringes
- C: Programming compounding products is limited to a single manufacturer
- D: Used solely for chemotherapy preparation

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-875L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## DEVELOPMENT AND IMPLEMENTATION OF A COMPREHENSIVE PHARMACOGENOMIC EDUCATION PROGRAM FOR PHARMACISTS WITHIN A HEALTH SYSTEM

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**Purpose:** Clinical implementation of pharmacogenomics has been rapidly expanding ever since the completion of the human genome project in 2003. A published survey highlighted that pharmacists believe they should be knowledgeable about pharmacogenomics. However, it also identified that 63% of pharmacists did not feel comfortable applying pharmacogenomics results to drug therapy. This signifies a need for education. Currently, there is lack of published data on the best method to educate pharmacists about pharmacogenomics. The purpose of this project is to identify an effective, sustainable, and scalable method of educating pharmacists about pharmacogenomics. Once an effective method is identified, other healthcare providers within the health system can be educated by utilizing this method.  
**Methods:** This research project compares two education methods to identify which method is more effective for delivering pharmacogenomics education to health system based pharmacists. The two education methods were developed by an institutional working group using publically available resources. The methods that were chosen were on-demand powerpoint modules versus on-demand literature and article based education. All Illinois licensed pharmacists within the health system were invited to participate. The pharmacists were required to complete a pre-education survey containing demographic, perception based and knowledge based questions. Then they were stratified based on practice site and randomized to one of the on-demand educational methods. Immediately after completion of the educational modules, a post-education survey with the same perception and knowledge based questions was to be completed. Differences between these perception and knowledge based questions were analyzed to determine the more effective education method. This project was submitted to the institutional review board for approval. McNemar tests will be utilized to compare knowledge based question results from the surveys. Based on distribution, a paired t-test or signed rank test will be used to analyze the other questions.

### Learning Objectives:

Identify gene drug pairs with high level of evidence  
Identify which method is most effective at educating pharmacists on pharmacogenomics

### Self Assessment Questions:

Which of the following is a gene drug pair with a high level of evidence?

- A: CYP2D6/Codeine
- B: TPMT/Clopidogrel
- C: CYP2D6/Warfarin
- D: CYP2C9/Codeine

Which is a more effective method of educating pharmacists on pharmacogenomics?

- A: On-demand powerpoint presentation module
- B: On-demand literature/article education
- C: Both are equivalent
- D: Pharmacogenomics is impossible to teach

Q1 Answer: A      Q2 Answer: A

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## IMPACT OF A CARBAPENEM STEWARDSHIP AT A CHILDREN'S HOSPITAL ON ANTIBIOTIC SELECTION AND PATIENT OUTCOMES

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**Purpose:** Antibiotic resistance is an increasing public health concern in the US associated with increased healthcare costs and higher rates of mortality. Extended-spectrum -lactamase (ESBL)-producing Gram-negative organisms contribute to the increasing concern of appropriate infection control. Currently, carbapenems are the antibiotic class of choice to treat these infections. Group 2 carbapenems (e.g. imipenem, meropenem) are active against *Pseudomonas aeruginosa* while the group 1 carbapenem ertapenem is not, and overutilization of group 2 carbapenems is associated with carbapenem-resistant strains of *P. aeruginosa*. Previous research from adult institutions has described therapeutic outcomes of improved *P. aeruginosa* susceptibility to group 2 carbapenems when ertapenem is utilized preferentially for appropriate ESBL infections. In 2012, Children's Hospital of Michigan implemented a carbapenem stewardship initiative whereby ertapenem is used preferentially instead of meropenem for non-central nervous system ESBL infections in the absence of *P. aeruginosa*.  
**Methods:** This is a retrospective chart review of patients who had an ESBL infection and received a carbapenem between January 2005 to September 2015. Patients aged  $\geq 3$  months with a positive culture from any body site for ESBL-producing enterobacteriaceae and received a carbapenem for at least 48 hours were eligible for inclusion. Patients who were pregnant, being treated for a CNS infection, or who had concomitant *P. aeruginosa* or *Acinetobacter* spp. infections were excluded. This study will assess prescriber adherence to the carbapenem stewardship initiative, impact on hospital *P. aeruginosa* susceptibility to meropenem, and to compare patient outcomes between those who received ertapenem or meropenem.  
**Results and Conclusions:** Data collection and analysis is ongoing. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the pharmacology of carbapenem antibiotics  
Discuss the rationale for appropriate carbapenem utilization

### Self Assessment Questions:

Ertapenem is a group 1 carbapenem with no activity against:

- A: *Bacteroides fragilis*
- B: *Klebsiella pneumoniae*
- C: *Escherichia coli*
- D: *Pseudomonas aeruginosa*

Which is the most appropriate description of the mechanism of action of carbapenems?

- A: Inhibition of peptidoglycan synthesis in the cell wall
- B: Inhibition of ribosomes for protein synthesis
- C: Inhibition of DNA gyrase, preventing replication
- D: Inhibition of folic acid synthesis, which necessary for bacterial growth

Q1 Answer: D      Q2 Answer: A

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## ASSESSMENT OF CLINICAL PHARMACIST TRAINING IN APPLICATION OF SPIROMETRY IN AN INTERDISCIPLINARY CHRONIC OBSTRUCTIVE PULMONARY DISEASE SERVICE FOR VETERANS

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**Purpose:** Chronic Obstructive Pulmonary Disease (COPD) is the third-leading cause of death in America. Veterans are four times more likely to be diagnosed with COPD. According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, spirometry is required for diagnosis of COPD, while symptoms can direct management. However, patients are often diagnosed with COPD based solely on symptoms and smoking history. Providers can better target therapy when spirometry is not only performed once, but updated at least biennially. Clinical pharmacists at William S. Middleton Memorial Veterans Hospital (Madison VA) have prescriptive authority to directly manage chronic disease states and are well-equipped to manage COPD. A major barrier for clinical pharmacist involvement is lack of knowledge about spirometry and the application of its results to COPD medication management. This project aims to assess the knowledge, competency, and confidence of the clinical pharmacists involved in a COPD service after receiving spirometry training. Once trained, clinical pharmacists will be able to interpret spirometry measures and apply the results to COPD medication management. **Methods:** An one-hour training session was developed to explain how to interpret spirometry values and how to apply results utilizing the GOLD guidelines. The material was presented using a didactic presentation with patient cases and discussion. Attendees included clinical pharmacists, registered nurses, physicians, and respiratory therapists. Following the training, clinical pharmacists completed a multiple choice assessment of case-based questions to assess knowledge of spirometry, competency of interpreting its results, and competency of applying its results to COPD medication management. Clinical pharmacists also completed a survey assessing their confidence in interpreting spirometry results and their confidence in applying spirometry results to COPD medication management. **Results/Conclusions:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the potential benefits of applying spirometry as an additional tool to optimize COPD medication management.

Explain how spirometry measurements correlate to disease progression in COPD.

### Self Assessment Questions:

Spirometry is an important component of COPD management because:

- A Spirometry provides better reimbursement rates from insurance cc
- B: Spirometry allows providers to track COPD progression.
- C: Spirometry is necessary to diagnose a COPD exacerbation.
- D: Spirometry can identify pulmonary nodules, which could progress

A 76 year old COPD patients most recent spirometry results are as follows: FEV1 35% predicted, FVC 85% predicted, FEV1/FVC 42% predicted. This patient would most likely be classified as having:

- A Mild COPD
- B Moderate COPD
- C Severe COPD
- D Very Severe COPD

Q1 Answer: B Q2 Answer: C

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## STATIN PRESCRIBING AT A VA FACILITY FOLLOWING RELEASE OF VA/DOD DYSLIPIDEMIA GUIDELINES

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**PURPOSE:** Several dyslipidemia guidelines have been released in recent years, including the American College of Cardiology/American Heart Association, National Lipid Association, and the Veterans Affairs/Department of Defense (VA/DoD). Due to the availability of many guidelines as well as the lack of specific recommendations regarding statin use in the geriatric population, we conducted a retrospective Quality Assurance/Quality Improvement (QA/QI) study to evaluate if the current prescribing habits in geriatric patients at Edward Hines, Jr. VA Hospital are in accordance with the VA/DoD dyslipidemia guidelines. **METHODS:** This study was a retrospective chart review evaluating a cohort at two time points, September 2014 and December 2015. Patients were included if they were >75 years of age, had an active statin prescription throughout the study period, and were seen by a primary care provider, cardiology, endocrinology, clinical pharmacy specialist or enrolled in Home Based Primary Care between June 2015 and December 2015. A six month period (December 2014 to June 2015) was provided to allow providers to become familiarized with the VA/DoD dyslipidemia guidelines. Exclusion criteria included patients with heart failure (left ventricular ejection fraction < 35% or New York Heart Association Class >1), end stage renal disease on dialysis, life expectancy < 5 years as documented in patient records, or insufficient data available in chart for review. A random cohort of patients meeting the inclusion and exclusion criteria were followed prior to and after the implementation of the VA/DoD guidelines. Patient data was collected through review of the electronic computerized patient record system (CPRS). **RESULTS/CONCLUSION:** Results and conclusion to be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the risks and benefits associated with the use of statins in the elderly

Identify if prescribing of statins at Hines VA is in accordance with the VA/DoD dyslipidemia guidelines.

### Self Assessment Questions:

RL is a 72 year old male presenting to your clinic for DM management with his spouse of 40 years. He reports doing well but forgot to bring his blood glucose log. His wife reports he is misplacing thi

- A Impaired memory
- B: Hyperkalemia
- C: Hypertriglyceridemia
- D: Hypertension

Which of the following would be consider appropriate use of a moderate intensity statin based on the VA DoD Dyslipidemia Guidelines?

- A 48 year old male with CHF (EF<35% and NYHA Class 3)
- B 68 year old male with a ASCVD 10 year risk >18%
- C 74 year old male with ESRD requiring dialysis
- D 37 year old male with a ASCVD 10 year risk of 6% without diabete

Q1 Answer: A Q2 Answer: B

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## IMPACT OF TARGETED EFFORTS TO IMPROVE STAFF AWARENESS AND PERCEPTIONS RELATED TO MEDICATION SAFETY

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**Purpose:** The enhancement of safety culture has been correlated with improved patient safety indicators and reduced readmission rates. The Agency for Healthcare Research and Quality (AHRQ) has developed a validated survey tool for healthcare organizations to assess their patient safety culture. This survey has been utilized by Froedtert & the Medical College of Wisconsin to measure safety culture and identify opportunities for improvement. Results identified areas for improvement within the pharmacy department, including communication surrounding safety events and subsequent interventions implemented. Based on feedback received, this project aims to develop a medication safety scorecard along with targeted interventions and analyze their impact on safety culture within the pharmacy department at Froedtert Hospital. The primary objective of this study is to measure the changes in modified-AHRQ safety culture survey results following implementation. Secondary objectives include development of the scorecard and effects of a subset of pharmacists having further discussion of safety events within smaller team huddles. **Methods:** A modified-AHRQ survey was completed by Froedtert Hospital inpatient pharmacists and technicians to measure baseline safety culture and engagement. Targeted safety interventions include: a medication safety scorecard, safety topics within a weekly email update, and safety discussions during weekly staff meetings. In addition, pharmacists with a role on a medicine team will meet monthly for a team huddle, where more focused safety discussions will be conducted. This team meets regularly, and safety discussions will be evaluated within a more focused setting. Following this, a post-intervention survey will be completed to evaluate for improvements in culture. **Results & Conclusions:** Baseline survey results were collected, and interventions are ongoing. Pre-post data will be presented in addition to process for developing a medication safety scorecard.

### Learning Objectives:

Identify tools used to assess the culture of safety within an organization.  
Recognize metrics which may be used to evaluate safety across an organization.

### Self Assessment Questions:

Which of the following tools may be used to benchmark patient safety culture?

- A AHRQ Hospital Survey on Patient Safety Culture
- B Hospital Consumer Assessment of Healthcare Providers and Systems
- C Magnet site survey
- D Joint Commission accreditation survey

Which of the following measures may be valuable in a medication safety scorecard?

- A Pharmacist full-time equivalents (FTE)
- B Blood culture results
- C Automated dispensing cabinet stock-out rate
- D Nurse-to-patient ratio

Q1 Answer: A Q2 Answer: C

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Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF AN INSULIN INFUSION PROTOCOL FOR DIABETIC KETOACIDOSIS AT A RURAL, COMMUNITY TEACHING HOSPITAL

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**Purpose:** The mainstay of therapy in diabetic ketoacidosis (DKA) is regular insulin via continuous intravenous infusion. Insulin infusion protocols have been developed to decrease plasma glucose concentrations at a rate of 50-75 mg/dL/hr. Insulin infusion protocols allow the nursing staff to adjust the insulin infusion rate based on the results of finger stick blood sugars and/or the basic metabolic panel. The objective of this study is to evaluate the compliance rate of the insulin infusion protocol at this institution beginning with the initial dosing and each titration opportunity to determine the need for a change to the current infusion protocol. **Methods:** A retrospective chart review of patients admitted for abnormal glucose levels and initiated on the insulin infusion protocol for DKA between January 1, 2013 and August 31, 2015 will be performed. The electronic medical records (EMR) will be evaluated for each insulin titration opportunity to determine adherence to the protocol based on laboratory values obtained. The reviewer will document the insulin titration as compliant to the protocol or non-compliant to the protocol. Following analysis of the initial data collection, a proposal for protocol revisions may be developed if compliance improvement is shown to be needed.

**Results/Conclusions:** Data analysis and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Discuss the incidence and pathophysiology of DKA  
List the appropriate therapies for DKA management

### Self Assessment Questions:

Which of the following is the appropriate insulin therapy for the initial blood glucose in the management of DKA?

- A Subcutaneous regular insulin
- B Intravenous regular insulin
- C Intravenous insulin aspart
- D Subcutaneous insulin degludec

At what rate should the plasma glucose be decreased in the management of DKA?

- A 25-50 mg/dL/hr
- B 50-75 mg/dL/hr
- C 75-100 mg/dL/hr
- D >150 mg/dL/hr

Q1 Answer: B Q2 Answer: B

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## IMPLEMENTATION AND EVALUATION OF PHARMACIST DISCHARGE MEDICATION RECONCILIATION AND COUNSELING

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**Purpose:** Medication errors are a significant burden to patients with regard to morbidity and mortality, and errors are estimated to comprise a large portion of healthcare costs each year. Recently, transitions of care (TOC) have been examined by the Joint Commission as an area of focus to improve patient safety. The purpose of this study was to implement and evaluate the impact of a pharmacist discharge medication reconciliation and counseling program for patients at a community hospital upon hospital readmission rates and Hospital Consumer Assessment of Healthcare Providers and Systems Scores (primary objectives), as well as describe the number and types of interventions made by the pharmacist, the intervention acceptance rate, TOC pharmacist time spent performing discharge activities, identification of barriers to performing the intervention, and the percent of all patients discharged from the study units who received the intervention (secondary objectives). **Methods:** This study was approved by the Institutional Review Board at St. Marys Hospital in Madison, Wisconsin. Patients included in the study were those being discharged from the study units during the hours staffed by the TOC pharmacist and meeting criteria for a high-risk patient. The intervention consisted of medication reconciliation and counseling by the pharmacist at the time of discharge. Pre- and post-intervention data were retrospectively collected via electronic chart review for patients discharged from the study units from November 2015 through December 2015 (pre-intervention) and from February 2016 through March 2016 (post-intervention). The chi-square test was used to evaluate the statistical significance of categorical data collected pre- and post-intervention. Descriptive statistics were used for data associated with the secondary objectives. **Results (Preliminary):** Collection of data is ongoing. **Conclusions:** Conclusions will be made based on collected data.

### Learning Objectives:

Identify three barriers to implementation of discharge medication reconciliation and counseling within a community hospital  
Describe physician acceptance of pharmacist identified interventions.

### Self Assessment Questions:

1. Which of the following are potential barriers to implementation of pharmacist led discharge medication reconciliation and counseling?
- A Time
  - B: Lack of coordination
  - C: Failure to be notified of patient discharge
  - D: All of the above

What are potential benefits of discharge medication reconciliation and counseling?

- A Improved adherence
- B Reduced readmission rates
- C Increased patient satisfaction
- D All of the above

Q1 Answer: D Q2 Answer: D

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## DRUG REGIMEN INTENSIFICATION AS A POSSIBLE RISK FACTOR FOR INPATIENT FALLS

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**Purpose:** Benzodiazepines (BZDs) have been shown to place patients at a significant risk of falling in both community dwelling and hospitalized patients. Because of this risk, BZDs appear on both the Beers Criteria and the Screening Tool of Older Peoples Prescriptions (STOPP) list. While current literature demonstrates BZDs are associated with falls, it is unclear whether the risk of falling is greater in patients who are newly initiated on a BZD or experience an increase in dose. The purpose of this study is to determine if the initiation of or an increase in dose of a benzodiazepine is associated with an increased risk of falls compared to patients maintained on their home dose or who had their daily dose decreased. **Methods:** This is a retrospective study of inpatients between May 1st, 2014 and April 30th, 2015. Comparisons were made between benzodiazepine regimens at home prior to the admission and 48 hours prior to the index date. The date of fall served as the index date for patients who fell, and the median time-to-fall served as the index date for all other patients. Patients were included if they were  $\geq 45$  years of age, had a length of stay  $> 48$  hours, and received at least one dose of a benzodiazepine 48 hours prior to the index date. Patients were excluded if a fall occurred  $< 48$  hours from time of admission, if they were in the ICU 48 hours prior to the index date, or if they were admitted for a fall, for alcohol withdrawal, for serotonin syndrome, or for status epilepticus. **Results/Conclusions:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize medications that may place elderly patients at an increased risk of falling

Identify alternative strategies to treating adults on chronic benzodiazepines

### Self Assessment Questions:

Which of the following medication classes is not associated with an increased risk of falling?

- A Antipsychotics
- B: Benzodiazepines
- C: Fluoroquinolones
- D: Sedative Hypnotics

Which of the following is FALSE according to the 2015 Beers Criteria? An alternative for benzodiazepines used to treat \_\_\_\_\_ in patients with a history of falls includes \_\_\_\_\_.

- A Anxiety; SNRIs
- B Anxiety; Buspirone
- C Insomnia; Trazodone
- D Insomnia; Cognitive Behavioral Therapy

Q1 Answer: C Q2 Answer: C

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## IS INDUCTION IMMUNOSUPPRESSION NEEDED FOR LOW RISK, LIVING DONOR KIDNEY RECIPIENTS?

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**Purpose:** Allograft rejection remains a prominent concern in the management of living donor kidney recipients. While induction immunosuppression is utilized to mitigate the risk of acute rejection, these agents are associated with significant adverse effects such as infection and malignancy. Therefore, the intensity of induction immunosuppression is judiciously guided by patient-specific risk factors for acute rejection. However, guidelines outlining the optimal use of induction immunosuppression are often institution specific and vary considerably. Furthermore, little data exist evaluating the rates of acute rejection among living, related donor kidney transplant recipients who do not receive induction immunosuppression. We sought to evaluate the clinical outcomes among living donor kidney transplant recipients who did not receive induction immunosuppression per our institutional protocol and compare them to other living donor kidney recipients who did receive induction immunosuppression. **Methods:** This is a retrospective cohort comparing the outcomes of living donor kidney transplant recipients receiving induction immunosuppression with either basiliximab or thymoglobulin to those who did not receive induction therapy. The study included adult patients who received a kidney transplant from a living donor at Henry Ford Hospital from January 2004 to September 2015. Potential participants were excluded if they had received a previous transplant, received monoclonal antibodies, or did not maintain follow up at Henry Ford Hospital. Primary outcome of the study was biopsy-proven acute rejection (BPAR) at 3, 6, and 12 months post-transplant. Secondary outcomes included rates of infection and malignancy, patient survival, graft survival, delayed graft function, and hospital re-admission. Descriptive statistics will be used to analyze baseline variables. Chi squared or Fishers exact tests and Students t test or Wilcox rank sum will be used to analyze nominal and continuous data, respectively. **Results and Conclusion:** Research is in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the purpose of induction immunosuppression.  
Describe the potential benefits of avoiding induction immunosuppressor in appropriate patients.

### Self Assessment Questions:

Which of the following is a purpose of induction immunosuppression?

- A: Decrease the risk of malignancy.
- B: Decrease the risk of acute allograft rejection.
- C: Decrease the risk of chronic allograft rejection.
- D: Decrease the risk of graft vs. host disease.

Avoiding induction immunosuppression in appropriate low risk patients may decrease the likelihood of which of the following adverse effects?

- A: Opportunistic infections
- B: Leukocytosis
- C: Malignancy
- D: A and C

Q1 Answer: B      Q2 Answer: D

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## DEVELOPMENT AND IMPLEMENTATION OF A STRESS ULCER PROPHYLAXIS PROTOCOL TO DECREASE THE RATES OF CLOSTRIDIUM DIFFICILE INFECTION IN A COMMUNITY HOSPITAL

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**Purpose:** Clostridium difficile infections (CDI) are a major concern in healthcare due to an increase in morbidity and risk of mortality. Although CDC research found a 10% decrease in CDI in the United States from 2011 to 2013, the number of cases in 2013 was still estimated to be greater than 400,000. Considering each CDI case significantly increases hospital costs, healthcare facilities continue to search for methods to decrease CDI rates. The reduction of CDI would lead to decreased hospital length of stay, decreased hospital costs, and increased patient safety. Numerous studies have confirmed the association between the use of proton pump inhibitors (PPIs) and the development of CDI. Based on this association, there is strong evidence to suggest that targeting over-prescription of PPIs will reduce the number of CDI cases. The purpose of this project is to decrease the number of nosocomial CDI cases by intervening to reduce PPI use. **Methods:** A single-center retrospective chart review was conducted to evaluate patients who developed nosocomial CDI from July 2014 to July 2015 to determine possible contributing factors to infection. Data collection revealed a strong association between PPI use and development of CDI. This evidence was used to develop a stress ulcer prophylaxis protocol to allow pharmacists to discontinue inappropriate PPIs. Other noted commonalities were used to prioritize higher risk patients whose medical charts were reviewed to determine the indication for active PPIs. If no indication existed, the pharmacist was able to discontinue the medication or discuss alternative options with the prescriber. The primary outcome of this study is the number of nosocomial CDI cases post-intervention. Secondary outcomes include the number of intervention made, including discontinuation of PPIs and discussion with prescribers. **Results:** Results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify patients at high risk of developing Clostridium difficile infection  
Discuss appropriate indications for stress ulcer prophylaxis

### Self Assessment Questions:

Which of the following describes a patient at highest risk for developing Clostridium difficile infection?

- A: New onset deep vein thrombosis
- B: Gastroesophageal reflux disease being treated with famotidine
- C: Gastroesophageal reflux disease being treated with omeprazole
- D: Nursing home resident

Which is an appropriate use of stress ulcer prophylaxis/proton pump inhibitor use?

- A: Mechanical ventilation for the past 3 days
- B: Past history of gastrointestinal bleed
- C: Use of ibuprofen less than once a week for headaches
- D: History of H. pylori infection that was effectively treated

Q1 Answer: C      Q2 Answer: A

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## FACTORS ASSOCIATED WITH PROPOFOL-RELATED HYPERTRIGLYCERIDEMIA IN CRITICALLY ILL PATIENTS: THE PHAT STUDY

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**Purpose:** Propofol is a sedative hypnotic commonly used in the intensive care unit (ICU). Its use has been independently-associated with the development of hypertriglyceridemia in critically ill patients which may lead to severe adverse effects such as pancreatitis or propofol-related infusion syndrome (PRIS). Identification of risk factors associated with propofol-related hypertriglyceridemia may decrease the likelihood of serious adverse events. This study is designed to compare patient and disease state characteristics between critically ill patients with moderate or severe hypertriglyceridemia and those with normal serum triglyceride concentrations while receiving continuous infusion propofol. **Methods:** This single center, retrospective chart review includes adult, critically ill, mechanically ventilated patients that received continuous infusion propofol for at least 24 hours with at least one serum triglyceride evaluated during the infusion. Pregnant women, prisoners, and patients receiving active pharmacotherapy for hypertriglyceridemia were excluded. The highest serum triglyceride value was included for assessment. Patients were stratified into three groups based on serum triglyceride value: normal (<150mg/dL), moderately elevated (150-399 mg/dL), and severely elevated (≥400mg/dL) for comparison purposes. Secondary objectives included comparisons of patient and disease state characteristics with changes in serum triglyceride from baseline, evaluations of associations among each cohort with patient outcomes (e.g., mechanical ventilation days; ICU length of stay [LOS]; hospital LOS; incidence of pancreatitis, PRIS; all-cause ICU and hospital mortality), and evaluation of outcomes among patients identified as having moderate or severely elevated serum triglycerides who had propofol discontinued within 24 hours of peak serum triglyceride with therapy continuation. Groups based on absolute change in serum triglyceride were identified a priori and include no change (<50 mg/dL), mild (50-199 mg/dL), moderate (200-399 mg/dL), and severe (≥400 mg/dL). Univariate and multivariate logistic regression analyses were performed to identify factors associated with and independent predictors for elevated serum triglycerides.

### Learning Objectives:

Review the role of propofol in sedation of critically ill patients  
Describe potential side effects associated with propofol continuous infusion

### Self Assessment Questions:

The ideal sedative has which of the following characteristics?

- A Increase in ICU delirium
- B: Dose-dependent response
- C: Unreliable pharmacokinetics
- D: High cost

Which of the following is a cardinal feature of propofol related infusion syndrome?

- A Metabolic acidosis
- B Hypokalemia
- C Muscular Rigidity
- D Metabolic alkalosis

Q1 Answer: B Q2 Answer: A

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## STUDY OF TOLVAPTAN IN ADULT PATIENTS WITH REFRACTORY SYNDROME OF INAPPROPRIATE ANTI-DIURETIC HORMONE (SIADH) SECONDARY TO TRAUMATIC BRAIN INJURY (TBI) OR NON-TRAUMATIC INTRACRANIAL HEMORRHAGE (NT-TBI)

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**Purpose:** The primary objective of this study is to determine the change in sodium of tolvaptan for the correction of hyponatremia in adult patients with refractory syndrome of inappropriate anti-diuretic hormone (SIADH) secondary to traumatic brain injury (TBI) or non-traumatic intracranial hemorrhage (NT-ICH). A secondary objective is to determine the appropriate dosing of tolvaptan for the transition off of continuous hypertonic saline infusions in the aforementioned patient populations. **Methods:** This is a prospective, randomized, open-label, single-site study at Advocate Christ Medical Center submitted to the Institutional Review Board involving adult patients currently receiving sodium chloride 3% infusion at 15 milliliters or more per hour for at least 24 hours with a serum sodium less than or equal to 135 mEq/L. All patients will receive 15 mg of tolvaptan within the first 6 hours of enrollment and the sodium chloride 3% infusion will be titrated off per the study protocol. Subsequent sodium levels will be monitored every six hours for the first 72 hours of the study and then every 24 hours thereafter for 7 days. No more than four doses (60 mg total) of tolvaptan will be administered. The primary endpoint is to determine if the proposed protocol for administration of tolvaptan allows for the safe and effective transition from hypertonic saline and correction of the serum sodium level in TBI and NT-ICH with SIADH. **Results:** Research is currently in the data collection phase. Results will be presented at the Great Lakes Conference. **Conclusions:** Conclusions of this study will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the medical management of SIADH secondary to a traumatic brain injury in the critically ill population.  
Recognize the role of tolvaptan in SIADH secondary to traumatic brain injury.

### Self Assessment Questions:

On which receptor does tolvaptan exert its antagonistic effects?

- A Glucocorticoid
- B: Aldosterone
- C: Alpha-1 adrenergic
- D: Muscarinic

Which of the following would be considered an appropriate correction of serum sodium levels?

- A 10-12 mmol/L in 24 hours
- B At least 30 mmol/L in 24 hours
- C 15-20 mmol/L in 12 hours
- D There is no appropriate correction of serum sodium levels

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-637L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## PREDICTORS OF MAJOR BLEEDING IN POST-OPERATIVE CARDIAC SURGERY PATIENTS PREVIOUSLY ON AN ANTIPLATELET

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**Purpose:** Post-operative bleeding is common in post-cardiac surgery and is most likely due to multiple factors. Risk factors for post-operative bleeding include advanced age > 70 years, preoperative anemia, body size, length of time on cardiopulmonary bypass, need for emergent surgery and recent antiplatelet use. Patients who present with an acute coronary syndrome and are loaded with or were previously on antiplatelet often require cardiac surgery; the need for emergent surgery and the inability to hold an antiplatelet agent for an appropriate period, places patients at an increased risk of bleeding. There is currently a lack of information identifying peri-operative risk factors for bleeding in patients previously on an antiplatelet and requiring emergent surgery. Therefore, the purpose of this study is to identify additional risk factors for bleeding in patients previously on an antiplatelet. **Methods:** This is a retrospective, cohort study conducted at Rush University Medical Center. Patients age  $\geq$  18 years, undergoing cardiac surgery (i.e. valve surgery, coronary artery bypass grafting (CABG), CABG + valve surgery and/or dissection repair) with a bleeding event post-operatively were included in this study. Patients incarcerated, pregnant, Jehovahs Witness, receiving an antifibrinolytic prior to surgery, with pre-existing, acquired, or congenital coagulopathy at baseline [defined as platelet count < 100 000 mm<sup>-3</sup>, activated partial thromboplastin time (aPTT) > 0.45 s, prothrombin time (PT) > 15 s, fibrinogen < 100 mg/dl<sup>2</sup>], or liver enzymes greater than two times the upper limit of normal were excluded from the study. The primary outcome is to define risk factors for major and non-major bleeding post-cardiac surgery in patients previously on an antiplatelet. Secondary outcomes will evaluate ICU length of stay, hospital length of stay, and 28-day all-cause mortality. **Results:** Data collection currently in progress **Conclusion:** Results to be presented at Great Lakes Pharmacy Residency Conference 2016.

### Learning Objectives:

Review risk factors contributing to post-operative bleeding in patients undergoing cardiac surgery.

Identify strategies to reduce the risk of post-operative bleeding in patients undergoing cardiac surgery and previously on an antiplatelet agent.

### Self Assessment Questions:

Which of the following is a known risk factor for bleeding post-cardiac surgery?

- A: Cardiopulmonary bypass time
- B: Obesity
- C: Fever
- D: Age < 70

2. Which agent is recommended to be held for 7 days prior to surgery per the 2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery?

- A: Ticagrelor
- B: Prasugrel
- C: Clopidogrel
- D: Aspirin

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-960L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF THE COST REDUCTION POTENTIAL OF PHARMACIST-DRIVEN UTILIZATION OF ORITAVANCIN IN A COMMUNITY HOSPITAL EMERGENCY DEPARTMENT

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**Purpose:** Oritavancin is a novel antibiotic approved for treatment of acute bacterial skin and skin structure infections (ABSSSI). However, its significant cost has severely limited its utility. With its single dose administration profile, the emergency department (ED) is an area where this cost may be offset. By identifying patients with ABSSSI who would otherwise be admitted to the hospital for intravenous antibiotics and administering oritavancin, there is significant potential for reducing admissions and healthcare costs. **Methods:** Data will be collected for the previous year identifying patients with the primary diagnosis of ABSSSI. Using a set of inclusion and exclusion criteria based upon the SOLO I & II trials that formed the basis for the Food and Drug Administration approval of oritavancin, a subset of ABSSSI patients will be identified who could have been treated with oritavancin. Retrospective data will be gathered and used to calculate several cost related metrics for these patients. Preliminary data has been used to support the implementation of a program to utilize oritavancin in the emergency department while further data collection continues. Patients who would otherwise be candidates for admission and treatment with intravenous antibiotics will be evaluated by pharmacy staff to determine eligibility for treatment with oritavancin. Eligible patients will receive an infusion of oritavancin and will then be discharged home with appropriate medical follow-up. **Results (Preliminary):** Analysis of 6 months of retrospective data identified 17 patients who met the inclusion and exclusion criteria, with an average cost of hospitalization was \$4878.67. The cost of a dose of oritavancin is \$2725.50, significantly less than the cost of hospitalization. Furthermore, an analysis of 3rd party payments has revealed significant financial loss in this population.

### Learning Objectives:

Identify patients in the emergency department who are appropriate candidates for treatment with oritavancin.

Recognize the potential for cost reduction and the prevention of hospital admissions with the appropriate use of oritavancin in the emergency department.

### Self Assessment Questions:

Which of the following is a property of oritavancin that makes it a useful in the emergency department?

- A: A short half life
- B: Broad spectrum antimicrobial coverage
- C: A single dose administration profile
- D: FDA labelling for a large number of infections

Which of the following are potential benefits of utilizing oritavancin in the emergency department for the treatment of skin and skin structure infections?

- A: Reduction in hospital admissions
- B: Complete elimination of the need to prescribe oral antibiotics
- C: Reduction in the number of patients presenting with skin and skin
- D: Elimination of the need to secure proper follow up

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-638L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPLEMENTATION OF BARCODE VERIFICATION FOR STERILE PRODUCT COMPOUNDING

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**Purpose:** The purpose of this project is to implement a sterile product preparation barcode scanning process in the clean room and evaluate the impact in the pharmacy department. The Institute for Safe Medication Practices Guidelines for SAFE Preparation of Sterile Compounds recommends using intravenous (IV) workflow software when compounding sterile products. In order to meet this best practice recommendation, a barcode verification tool for patient-specific orders that was readily available within the electronic medical record (EMR) was implemented in September 2014 for pharmacy technician use. To further expand the use of barcode scanning technology, an electronic documentation system on the intranet will be implemented for technicians to use for batch product barcode verification. **Methods:** A barcode verification process for patient-specific sterile product compounding was implemented at a community teaching hospital. This process involves the pharmacy technicians barcode scanning products prior to compounding. The technology implementation was analyzed by tracking scanning compliance, errors caught by barcode verification process, and cost-associated with errors. This resulted in the identification of a need for technicians to scan products prior to batch compounding. To meet this need, an electronic form available on the intranet for pharmacy technicians is in the process of implementation. This form was developed by creating tables using Microsoft Structured Query Language and generating a web form available on the hospital intranet using Microsoft Visual Studio. Pharmacy technicians scan products prior to compounding to verify that products are accurate and record the number of items they will batch. Microsoft Structured Query Language will be utilized to collect data and Microsoft Excel will be used to analyze data. **Results:** Not Applicable **Conclusion:** Not Applicable

### Learning Objectives:

Describe a method to create a sterile product preparation barcode scanning verification tool

Discuss the Institute for Safe Medication Practices best practice for IV room compounding technology

### Self Assessment Questions:

Which of the following should be considered when creating a sterile product preparation scanning tool?

- A The maintenance required to keep the drug database up to date
- B The ability to alert end users when the incorrect products are scanned
- C The location of the scanning tool in relation to the normal IV room
- D All of the above

Which of the following does the Institute for Safe Medication Practices SAFE Preparations of Sterile Compounds guideline recommend?

- A Elimination of pharmacist verification of compounded products when possible
- B Use of an IV room workflow software when possible
- C Use of automated IV compounding devices is preferred to IV room
- D All of the above

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-961L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A PAIN, SEDATION, AND DELIRIUM PROTOCOL AND A SPONTANEOUS AWAKENING AND BREATHING TRIAL PROTOCOL WITH PROVIDER EDUCATION: A CLINICAL IMPROVEMENT PROJECT

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**Purpose:** Poor management of pain, sedation, and delirium of mechanically-ventilated adult intensive care unit (ICU) patients is associated with negative patient outcomes. Optimal management of pain and agitation begins with reliable identification. The 2013 American College of Critical Care Medicine (ACCM) guidelines have provided evidence-based strategies for the management of mechanically-ventilated adult ICU patients and preferred non-verbal assessments for pain, agitation, and delirium. Wheaton Franciscan - St. Joseph is an urban teaching hospital with a 24-bed mixed ICU. To standardize and optimize the practices at St. Joseph, a pharmacy-led interdisciplinary initiative to create a pain, sedation, and delirium protocol and a spontaneous awakening and breathing trial protocol were devised. Additionally, provider education to facilitate the adoption of these protocols and the routine use of the critical care pain observation tool (CPOT) and Confusion assessment method for the ICU (CAM-ICU) is ongoing. **Methods:** This project is considered process improvement and has been granted exemption by the Institutional Review Board. An interdisciplinary team of nurses, respiratory-therapists, physicians, and pharmacists has collaborated on the development of a pain, agitation, and delirium protocol and a spontaneous awakening and breathing trial protocol. The protocols incorporate the recommendations of the 2013 ACCM guidelines, landmark trials, and provider preferences. Additionally, an educational series and educational materials will be provided to facilitate the adoption and adherence of the new protocols and routine use of CPOT and CAM-ICU. Following the implementation of the protocols, ventilator days, ICU length of stay, and hospital length of stay will be recorded and compared to pre-implementation data. Periodic benchmark data measuring protocol adherence and patient outcomes will be collected and assessed. Barriers to protocol adherence will be recorded and examined. **Results & Conclusion:** Protocol implementation and education is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Describe the rationale for an analgesia-first approach in the sedation of mechanically-ventilated adult ICU patients

List shown benefits of spontaneous awakening and breathing trials

### Self Assessment Questions:

Which of the following provides rationale for an analgesia-first approach to sedation?

- A Most mechanically ventilated patients in an ICU will experience pain
- B Untreated pain can impair the recovery process
- C Pain has been reported to be a primary cause of agitation
- D All of the above

What of the following were found to be benefits of combined spontaneous awakening and breathing trials in the study conducted by Girard, et al?

- A Increased ventilator-free days
- B Decreased ICU length of stay
- C Decreased hospital length of stay
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-639L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## CHARACTERIZATION OF FREE PHENYTOIN CONCENTRATIONS IN END STAGE RENAL DISEASE USING THE MODIFIED WINTER-TOZER EQUATION

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The purpose of this study is to determine the accuracy and precision of the modified Winter-Tozer (W-T) equation in predicting free phenytoin concentration in patients with end-stage renal disease on hemodialysis. Phenytoin is a mainstay treatment choice for epilepsy and requires therapeutic drug monitoring. The W-T equation has been shown to be reliable in predicting free phenytoin levels from measured total phenytoin and albumin in normal, healthy patients. In patients with end-stage renal disease (ESRD), phenytoin-albumin binding is significantly altered and thus affects interpretation of total serum levels. Therefore, a modified W-T equation was proposed for this patient population. This study will be submitted to the Institutional Review Board for approval. It is a retrospective chart review of patients admitted to the University of Illinois Hospital & Health Sciences System from January 1, 2005 to August 31, 2015. Of the patients meeting inclusion criteria, the calculated free phenytoin level based on the modified W-T equation will be compared to the actual free phenytoin level drawn from that patient. Patients will be included in this study if they are 18 years of age or older, have ESRD and on hemodialysis, have concurrent free and total phenytoin levels drawn, and have a serum albumin concentration drawn within 24 hours. Patients will be excluded if they are less than 18 years of age, have an unquantifiable phenytoin level, or if they are on concurrent valproic acid therapy. The following data will be collected: age, gender, race, weight, height, requirement of ICU admission, time since last dialysis session, serum creatinine, BUN, albumin, free and total phenytoin concentrations. Comparison between calculated and actual phenytoin concentrations will be assessed using median absolute error (MAE), mean absolute error, and root mean square error (RMSE). Results are currently pending.

### Learning Objectives:

Identify the factors in End Stage Renal Disease (ESRD) that may alter free fraction of phenytoin.

List the components utilized in the modified Winter-Tozer equation.

### Self Assessment Questions:

All of the following may explain the increased free fraction of phenytoin in patients with ESRD except:

- A Hypoalbuminemia
- B Competitive binding of uremic toxins to albumin
- C Structurally altered albumin
- D Increased metabolism

In addition to the total phenytoin, which of the following is required to utilize the modified Winter-Tozer equation?

- A SCr
- B Bun
- C Albumin
- D Weight

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-640L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPROVING HOSPITAL-WIDE EMPLOYEE RECOGNITION OF DRUG DIVERSION PATTERNS AS A WAY TO IMPROVE SAFETY OF PATIENTS AND STAFF

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Title: Improving hospital-wide employee recognition of drug diversion patterns as a way to improve safety of patients and staff. Purpose: Improve staff knowledge around the definition and act of drug diversion in order to better detect those responsible for contributing to patient harm through the diversion of prescription medications. Methods: An electronic survey was developed to determine employee familiarity with drug diversion patterns and assess overall knowledge of the processes and policies in place regarding how to report suspected diversion. After the first survey was completed, scores were quantitatively evaluated. Afterwards, another online educational module was specifically developed for both clinical and non-clinical employees to ensure terminology could be understood and thus applicable to an individual's daily tasks. A post-module test was then administered with new questions, as well as the same questions from the first survey, and scores compared to ensure mastery of new key concepts related to drug diversion and how it impacts patient safety. Finally, Nurse Managers were contacted to discuss and determine a useful monthly print-out of narcotic use specific to nurse, drug name and quantity, and dispensing cabinet location. Preliminary conclusions: We predict that the results of the first survey will be poor, specifically in relation to baseline knowledge of drug diversion and the policies and procedures currently implemented to ensure the safety of Columbus Regional Health employees and patients. After education, we predict that all employees will feel better prepared to recognize drug diversion patterns and report any suspicion to appropriate authority.

### Learning Objectives:

Define drug diversion and identify gaps in drug diversion knowledge and reporting using a survey and/or educational tool.

Arrange a monthly report system for nurse managers in order to better locate potential drug diverters before patient harm occurs.

### Self Assessment Questions:

According to the National Association of Drug Diversion, drug diversion may be defined as

- A "Any criminal act involving a prescription drug."
- B: "The transfer of a controlled substance from a lawful to an unlawful."
- C: "Any act or diverting that removes a prescription drug from its intended path."
- D: "Any use of a prescription medication outside of its intended path."

A well-built drug diversion report is most useful

- A when openly shared with all staff so that each employee can help
- B for detecting those responsible for contributing to patient harm through
- C when used to account for lost narcotics and for applicable reimbursement
- D for tracking of patient narcotic use in order to allow for safer dosing

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-962L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF ACUTE CARE HYPOGLYCEMIC EVENTS AND IMPACT OF NURSING EDUCATION

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**Purpose:** As a health system, we have opted to evaluate and implement protocols aimed to improve methods of patient care as well as patient outcomes. The purpose of this retrospective chart review is to determine the underlying causes of hypoglycemic events on our medical floors and implement changes to decrease the incidence of these events. It is our goal that these changes will improve the quality of care provided within Saint Joseph Regional Medical Center as well as patient outcomes.

**Methods:** This study is a retrospective chart review of current insulin therapy provided within Saint Joseph Regional Medical Center. Patients on the Medical Units (MED East and MED South) who have been placed on insulin therapy between the months of March 2015 and July 2015 and with documentation of at least one incidence of hypoglycemia (Blood Glucose <70mg/dL) will be evaluated. Study will examine a variety of potential areas that can affect blood glucose levels including classification of diabetes, gender, use of basal-bolus program, and a variety of others that will be discussed in lecture. Data collected will be analyzed to identify patterns leading to hypoglycemia. A survey will then be sent to nurses on the medical floors to ascertain consistency with findings and the possible need for educational tools to decrease incidence of hypoglycemic events within the Saint Joseph Regional Medical Center. **Results/Conclusion:** Data collection and analysis is currently in process. Will present results and conclusion at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

State appropriate indications for insulin therapy

Describe risk factors for hypoglycemia

### Self Assessment Questions:

Indication(s) for use of insulin therapy in the acute care setting include:

- A Hypokalemia
- B: Diabetes Mellitus
- C: Diabetic Ketoacidosis
- D: Both B and C

What are some patient factor(s) that can put a patient at risk for a hypoglycemic event?

- A Reduced oral intake
- B New NPO status
- C Stopping oral antidiabetic agents
- D Both A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-963L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARATIVE RATES OF NEPHROTOXICITY BETWEEN COLISTIMETHATE SODIUM AND POLYMYXIN B THERAPY

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**Purpose:** The polymyxins, including colistimethate sodium (CMS) and polymyxin B (PB) are a class of polypeptide antibiotics initially discovered in the 1940s that were abandoned due to their ability to cause significant nephrotoxicity. With the emergence of multidrug-resistant (MDR) Gram-negative organisms and the associated therapeutic challenges, there has been an increased use of polymyxins. However, nephrotoxicity associated with the use of polymyxins remains a concern. Reported rates of acute kidney injury (AKI) in recent studies have ranged from 31-55% for CMS and 23-60% for PB. Direct comparisons of nephrotoxicity rates between CMS and PB are limited and have demonstrated inconsistent results. In this study, we aimed to evaluate the comparative nephrotoxicity rates of CMS and PB.

**Methods:** This was a retrospective study of adult inpatients who received CMS or PB for  $\geq 48$  hours from January 1, 2012 to September 30, 2015. Patients were excluded if they had end stage renal disease (ESRD) or renal replacement therapy (RRT) prior to CMS or PB initiation, or were incarcerated. The primary objective was to compare nephrotoxicity rates using the RIFLE and AKIN criteria among patients who received CMS and PB. Secondary outcomes included time to onset of AKI, risk factors for AKI, clinical and microbiological cure, hospital and infection-related length of stay, and attributable, in-hospital and 30-day mortality. Pertinent data collected included age, sex, Charlson comorbidity index, APACHE II score, total daily dose and duration of CMS or PB, microbiologic data, concomitant antibiotics, nephrotoxic medications and IV contrast, serum creatinine, urine output, Infectious Diseases (ID) consult, time to ID consult, and discharge disposition. **Results & Conclusions:** Data collection and analysis is currently underway.

### Learning Objectives:

Describe the role of colistin/polymyxin B in the treatment of Multi-Drug Resistant (MDR) Gram negative infections

Identify the adverse effects of colistin/polymyxin B

### Self Assessment Questions:

Which of the following infections would warrant the use of colistin/polymyxin B?

- A Cryptococcal meningitis
- B: Candidemia
- C: MDR Pseudomonas aeruginosa pneumonia
- D: Clostridium difficile infection

What is a significant adverse effect of colistin/polymyxin B, limiting its use in practice?

- A Nephrotoxicity
- B Hepatotoxicity
- C Thrombocytopenia
- D None of the above

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-641L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE EFFECT OF POST-DISCHARGE PHARMACIST FOLLOW-UP ON VENOUS THROMBOEMBOLISM RELATED 30-DAY READMISSION RATE FOR PATIENTS UNDERGOING ELECTIVE TOTAL HIP OR TOTAL KNEE REPLACEMENT SURGERY

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**Purpose:** Venous thromboembolism (VTE) is a common cause of morbidity and mortality among patients undergoing elective total hip or total knee replacement (THR/TKR) surgery. Due to the high incidence of developing VTEs after surgery, perioperative anticoagulation is recommended. Previous studies demonstrated that pharmacist follow-up post discharge has decreased 30-day readmission in certain patient populations. The objective of this study is to assess whether pharmacist follow-up post-discharge in THR/TKR patients decreases 30-day VTE-related readmission rates. **Methods:** The study is a controlled, prospective, single-center, interventional study and will take place from December 1, 2015 to March 15, 2016. Patients included in this study will be at least 18 years of age, have a need for elective THR/TKR surgery, and have attended the mandatory educational camp prior to surgery offered at Presence Saint Joseph Medical Center. Prior to discharge, all patients will receive anticoagulation education by a pharmacist, which will include an educational handout regarding the specific anticoagulation agent they will be receiving post-operatively. Patients will be randomized into two groups: those that will receive a follow-up phone call on days 3-4 post-operatively and those that will not receive a follow-up phone call. After discharge, an effort will be made by a pharmacist to contact the patient regarding follow-up in the following areas: questions regarding side effects and self-reported adherence. The primary endpoint is 30-day VTE-related-readmission. The amount of time spent and the number of interventions made will be documented. Patient perception and satisfaction with pharmacist follow-up will be assessed by a post-intervention survey. Any patient data needed to assess the recurrence of VTEs will be collected from the electronic medical record and will be maintained without patient identifiers. **Results/Conclusion:** Collection of information is currently in progress. Final results and conclusions will be presented at the Great Lakes Conference.

### Learning Objectives:

Identify whether pharmacist follow-up post-discharge in total hip or total knee replacement (THR/TKR) surgery patients, decreases 30-day venous thromboembolism (VTE)-related readmission rates.

Recognize that pharmacists are important members of the healthcare team that can educate patients on their medications and disease states to ease their transition of care.

### Self Assessment Questions:

What is a benefit of pharmacist driven follow-up phone calls post discharge?

- A Re-enforcement of the education given at the time of discharge.
- B To give the feeling that the patient is still being cared for.
- C To assess the patients understanding of the importance of adhering
- D To find out how much the patient remembered from their post-operative

Which of the following is a reason to educate patients about their medications?

- A A patient could monitor and adjust his or her own medications.
- B A patient could learn about their disease state and the importance
- C A patient could teach a doctor how to manage their disease states
- D A patient could teach others with a similar disease state about how

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-880L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OUTCOMES ASSOCIATED WITH AN OUTPATIENT ANTIMICROBIAL THERAPY PROGRAM

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**Purpose:** Outpatient Antimicrobial Therapy (OPAT) has been shown to have similar clinical outcomes to therapy completed in the inpatient setting with an overall clinical success rate above 85%. However, there are also complications associated with OPAT including early termination (22%) and adverse drug reactions (25%). Approximately 25% of patients discharged with OPAT are readmitted and approximately 70% of those readmissions are directly related to OPAT. Several factors, including patient selection, medication selection, monitoring, and communication have been identified as possible areas of weakness in OPAT programs that lead to readmission and adverse events. The first step in initiating process improvement and progression is discovery, analysis, and correction of these deficits. The primary purpose of this study is to identify risk factors associated with therapy-related readmissions in patients who were discharged from the University of Cincinnati Medical Center (UCMC) and received at least 7 days of intravenous antimicrobials. Other objectives will be to determine adverse event rates and to describe costs/savings associated with OPAT. **Methods:** This is a retrospective single center study which will evaluate patients that have been diagnosed with an infectious process and subsequently discharged with intravenous antibiotics for at least one week. Patients who were readmitted within 90 days of discharge on OPAT will be compared to patients without readmission. Multivariate logistic regression will be completed to identify factors associated with readmission including antibiotics used, duration of therapy, and monitoring recommendations. Significant variables identified on univariate analysis will be included in the multivariate logistic regression. Utilization of up to 200 patients will allow for approximately 20 variables to be analyzed. **Results and Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss background, clinical significance, and financial impact of Outpatient Antimicrobial Therapy

Identify OPAT-related readmission rates, complications, and reasons for readmission

### Self Assessment Questions:

Which of the following statements are true regarding OPAT-related readmission rates?

- A A database is available in the United States to assist in readmission
- B The average global readmission rate for OPAT therapy is around 10%
- C The average global readmission rate for OPAT therapy is around 25%
- D Most readmissions are due to line-related complications

Which of the following is true regarding the impact of pharmacist monitoring on OPAT-related readmission rates?

- A Pharmacist monitoring seems to decrease readmission rates
- B Pharmacist monitoring seems to have no effect on readmission rates
- C Pharmacist monitoring seems to increase readmission rates
- D There is no data for pharmacist monitoring in OPAT therapy

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-881L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**DETERMINING FACTORS ASSOCIATED WITH THROMBOSIS AND BLEEDING IN PATIENTS RESTARTING CHRONIC ANTICOAGULATION AFTER INTRACEREBRAL HEMORRHAGE**

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**Purpose:** Therapeutic anticoagulation is directly associated with developing intracerebral hemorrhage (ICH). It is estimated that the risk of developing ICH in patients on warfarin therapy is ~2-3%. Target specific oral anticoagulants (TSOACs) have a similar incidence of ICH. After ICH, there is both an increased risk of bleeding and thrombosis, and anticoagulation therapy can be held or reversed if clinically indicated. Currently there is no accepted standard in restarting chronic anticoagulation. The aim of this study is to evaluate practice patterns at the University of Illinois Hospital & Health Sciences System (UIHHSS) with respect to restarting anticoagulation after ICH, as well as identifying the incidence of complications associated with restarting or holding anticoagulation therapy (bleeding, thrombosis). **Methods:** A retrospective chart review was conducted utilizing Cerner Power Charts to identify patients who were admitted to the UIHHSS neuro-surgical ICL (NSICU) with a diagnosis of ICH between January 1st 2012 through December 31st 2014 based on ICD 9 code for ICH, SDH, or SAH. Patients were included if they were ≥ 18 years old, new diagnosis of ICH, SAH or SDH, on chronic oral anticoagulation therapy prior to ICH, diagnostic imaging indicating ICH, and patients on warfarin an INR > 1.1. Patients will then fall into one of three categories: one group with anticoagulation restarted within 0-14 days, the second within 14-90 days and the third group which had anticoagulation discontinued after ICH. Primary objectives include identifying patients who have restarted anticoagulation after ICH and determining the incidence of bleeding and thrombotic events after ICH. Secondary objectives include determining co-morbid conditions and factors associated with thrombosis or major bleeding when restarting anticoagulation. **Results and Conclusions:** Data collection and analysis is ongoing, with approximately 109 patients to be evaluated. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Define the practice of restarting chronic anticoagulation therapy after ICH  
Identify co-morbid conditions and risk factors associated with developing thrombosis and major bleeding after restarting anticoagulation in ICH patients

**Self Assessment Questions:**

Which of the following are complications related to newly diagnosed ICH?

- A: Thrombosis
- B: Hemorrhage
- C: Unfavorable neurological outcome
- D: All of the above

The current recommendations for restarting chronic anticoagulation after ICH are...

- A: 1-2 weeks
- B: Do not restart
- C: Undetermined
- D: 60-90 days

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-642L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**INCORPORATING THE USE OF ELEARNING SOFTWARE INTO A HEALTH SYSTEMS PHARMACY DEPARTMENT**

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**Purpose:** Across the Aurora Health Care system there is a large group of adult learners including pharmacists, pharmacy residents, and pharmacy students. The Adobe Captivate software, an electronic learning tool, was purchased by the pharmacy department but the most effective way to use it had not yet been determined. The objective of this project is to standardize how a pharmacy department utilizes eLearning software for training programs with a focus on streamlining the orientation process for Advanced Pharmacy Practice Experience (APPE) students. **Methods:** Inpatient pharmacist lead APPE student orientation at sites throughout the Aurora Health Care system every six weeks at a minimum. Creating educational materials for this orientation group became the focus of this project due to the large amount of pharmacist time spent educating APPE students. Additionally, certain areas of education for students overlap with training for pharmacists and pharmacy residents. Current orientation materials were transformed into Adobe Captivate videos. A reference guide was also created to catalogue the topics covered, link to the YouTube video and time requirement of each video. Students were emailed one week prior to their in-person orientation date with instructions and access to the educational materials. One week following orientation a survey was distributed to gather feedback regarding the orientation process and materials provided. Feedback was used to improve the educational videos. A user guide and templates for creation of future eLearning materials will be created and education will be provided to other sites within the system. **Results/Conclusions:** The majority of the planned educational materials have been created and distributed. Data collected from student surveys suggests positive feedback regarding access to materials and module content. Further results will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify the rationale behind the use of eLearning software within a pharmacy department.

Recognize the benefits of Adobe Captivate eLearning software with regards to creating educational materials.

**Self Assessment Questions:**

Which of the following is an appropriate reason for incorporating eLearning software into a pharmacy department?

- A: To address the need for standardized delivery of education across
- B: To eliminate the need for in-person education
- C: To increase the amount of pharmacist time needed for delivery of
- D: All of the above

Which of the following is the benefit of using Adobe Captivate eLearning software for creating educational materials?

- A: Requires very minimal time to create videos
- B: Transforms standard PowerPoint® presentations into educational
- C: Software license is inexpensive
- D: All of the above

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-882L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## BEYOND THE PGY-1 COMMUNITY PHARMACY RESIDENCY: CHARACTERIZING CAREER PATHWAYS OF RESIDENCY GRADUATES

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**Purpose**The primary measure of this survey tool was to characterize positions obtained upon graduation from these programs and to determine if post-residency employment options reflect the APhA-ASHP Community Pharmacy Practice Residency (CPRP) accreditation standards. **Methods**Utilizing the Accreditation Standard for Postgraduate Year One (PGY-1) Pharmacy: Community Care Residency Programs, the survey items for this project were developed based on the goals and objectives set forth by the advisory document that accompany these standards. Eligible participants for this survey are graduates of accredited PGY-1 CPRPs. The sampling frame was identified by contacting residency program directors. Since accredited programs must register for the National Matching Service Inc., a complete list of accredited CPRPs was obtained from the online residency directory provided by ASHP. Once the sampling frame was identified, all potential respondents were contacted by email. Within each email, an explanation of the aims of the study as well as the survey itself was provided. After three contact attempts to potential respondents, a final email will be delivered to inform each non-respondent that the study is coming to a close. Data will be analyzed using descriptive statistics and all analyses were conducted using SPSS (Statistical Package for the Social Sciences) v. 22. The project was approved by the Purdue University Investigational Review Board. **Results**This research is currently in progress. To date, approximately 40% of residency program directors have responded to notify the researchers of the potential participants of the survey. Over 175 potential survey respondents have been identified to date. The survey is expected to launch in late February 2016.

**Conclusions**Data from this study will be used, in part, to support and continue the development of quality community pharmacy residency programs.

### Learning Objectives:

Outline the occupational competencies developed during community pharmacy residency programs

Relate residency graduates professional aptitude to post-residency employment positions

### Self Assessment Questions:

For PGY-1 Community Pharmacy Residency Programs, the accreditation standards are prepared jointly by the American Pharmacists Association (APhA) and

- A Accreditation Council for Pharmacy Education (ACPE)
- B: American Society of Health-Systems Pharmacists (ASHP)
- C: National Community Pharmacists Association (NCPA)
- D: Joint Commission on the Accreditation of Healthcare Organization

Which of the following statements are correct

- A Most graduates of CPRP's are highly skilled in managed care activities
- B Upon completion of a CPRP, 85% of graduates pursue an ambulatory care position
- C All community pharmacy residencies are funded by grants that include a federal component
- D Community pharmacy residencies enhance competencies that support the delivery of patient-centered care

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-883L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## VITAMIN D SUPPLEMENTATION MONITORING IN PATIENTS TAKING ANTI-EPILEPTIC DRUGS AT A VETERANS AFFAIRS HOSPITAL

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**Purpose:**Chronic use of anti-epileptic drugs (AEDs) is often a necessity for individuals with seizure disorders. However, use of AEDs is associated with an increased risk of osteoporosis. One of the primary mechanisms behind this increased risk of osteoporosis is increased metabolism of vitamin D to inactive metabolites as a result of enzyme-inducing AEDs. The primary aim of this chart review is to assess monitoring frequency of vitamin D levels in patients receiving concurrent AEDs and vitamin D supplementation at the William S. Middleton Memorial Veterans Hospital. Secondary aims include determining differences, if any, between those on inducing- versus non-inducing AEDs in monitoring frequency or percentage reaching vitamin D sufficiency. **Methods:**A single-center, retrospective chart review will be performed identifying patients who have filled prescriptions in the past three years for specific AEDs concomitantly with vitamin D supplementation. The primary outcome is the percentage of patients with a follow-up vitamin D level within 2-12 months of initiation or change in dose of supplementation. A secondary outcome will be a comparison of the follow-up rates of those who received enzyme-inducing AEDs versus those who received non-inducing AEDs. The other secondary outcome will be the total number of patients in each group of AEDs reaching a serum 25(OH)-vitamin D concentration of  $\geq 30$  ng/mL (sufficient vitamin D). Certain agents that are primarily used for indications not related to seizure disorders i.e., clonazepam, diazepam, gabapentin, and pregabalin will not be included in the analysis. Patients on both an inducing- and non-inducing AED will be included in the category of enzyme inducers. For patients with multiple episodes of using an AED with vitamin D supplementation, only the first such episode will be included. **Results:**Results are pending.

### Learning Objectives:

Identify antiepileptic drugs that may increase the metabolism of vitamin D.

Describe the mechanism of action of increased vitamin D metabolism

### Self Assessment Questions:

Which antiepileptic medication is likely to decrease serum 25(OH)-vitamin D?

- A Lamotrigine
- B: Carbamazepine
- C: Levetiracetam
- D: Topiramate

Induction of which system may increase the inactivation of vitamin D?

- A Cyp2r1
- B Oatp1b1
- C Cyp3a4
- D Mrp3

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-643L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ENHANCING LEARNER METACOGNITION IN A PROFESSIONAL PHARMACY ELECTIVE

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**Objective:** To investigate learners ability to better predict exam performance and improve self-awareness and metacognition in a professional pharmacy elective. **Methods.** Strategic faculty and peer feedback, as well as self-assessments, were implemented throughout the fall 2015 semester. Students provided feedback on guest lecturer performance and identified areas for improvement. Throughout the course of the semester, they completed 3 case-based oral exams and self-scored each exam along with providing peer evaluations, self-assessments, and an action plan for improvement after each exam. Scores assigned by faculty were compared to students self-administered and feedback was provided on peer evaluations, self-assessments, and action plans for improvement. **Results.** Fifteen students were enrolled in elective course during the fall 2015 semester. The students completed 9 lecturer evaluations, 3 exam self-reflections and action plans, and 6 exam peer evaluations. Over the course of the semester, students demonstrated improvement in specificity and constructiveness of their peer and self-evaluations, as well as action plans for improvement. **Conclusion.** Metacognitive skills are important to instill in life-long independent learners and can be enhanced through the implementation of strategic feedback and assessment. Additional results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define metacognition and recognize its importance in developing independent, lifelong learners

Describe strategies to promote or enhance metacognition in pharmacy students

### Self Assessment Questions:

Metacognition can be defined as the following:

- A Knowledge of one's own cognition
- B: Critical awareness of thinking, learning, and doing
- C: Thinking about thinking
- D: All of the above

Which of the following are strategies that have been implicated to enhance learner metacognition?

- A Flipped classroom
- B Problem-based learning
- C Feedback
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-884L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF VARIOUS MANAGEMENT STRATEGIES OF LOW-LEVEL VIREMIA (LLV) ON VIROLOGIC OUTCOMES IN HIV-POSITIVE PATIENTS

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**Purpose:** The consequences of LLV are not well understood, and the studies currently available looking at LLV and its association with virologic failure are limited. Previous studies have reported an increased risk of virologic failure in patients with persistent LLV. However, based on the assumption that there is a low risk for developing resistance during LLV, current guidelines recommend assessing causes of viremia such as non-adherence and drug-drug interactions, and maintaining the patients current ART regimen. Some studies have been published indicating a change or intensification of ART does not affect virologic success and speculate that LLV is likely due to a release from stable reservoirs in the absence of resistance mutations. However, due to the utilization of ultrasensitive HIV-1 RNA assays in these studies, it is difficult to apply this information to patients with LLV detected by standard methods. In addition, these studies have not examined the impact of extensive adherence counseling with a clinical pharmacist. Therefore, optimal management of these patients has not been determined. **Methods:** A retrospective cohort study was completed examining success of interventions at time of LLV and the subsequent effects on virologic outcomes in patients who were treated at the Indiana University Health LifeCare Clinic during the period of October 1, 2004 through September 30, 2014. The primary outcome was proportion of patients that achieved intervention success, defined as achieving an undetectable viral load at first follow-up appointment (at least 3 months) after the original intervention. The secondary outcomes were proportion of patients that progressed to virologic failure or developed new resistance mutations. The primary and secondary outcomes will be analyzed utilizing the Chi-square test. **Results/Conclusion:** Data collection is pending and results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the importance of virologic suppression with regards to HIV management and disease progression.

Explain the current Department of Health and Human Services (DHHS) guideline recommendation for management of low-level viremia (LLV).

### Self Assessment Questions:

Which of the following are potential consequences of virologic failure?

- A Viral evolution and the development of ART drug-resistance
- B: Increased risk of HIV transmission
- C: Progression of HIV to AIDS or death
- D: All of the above

Which of the following interventions are recommended in the current DHHS guidelines for the management of LLV?

- A Initiate new ART regimen at time of LLV
- B Maintain patient's current ART
- C Assess HIV RNA levels at least every 6 months
- D Perform genotypic testing

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-644L02-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSING THE NATIONAL LANDSCAPE OF EMERGENCY MEDICINE PHARMACEUTICAL SERVICES

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**Purpose:** Within the last decade, the percentage of hospitals with pharmacists staffing in the emergency department (ED) has increased from 3.5% to 16.9%. This growth is most likely attributed to data demonstrating a reduction in medication errors and cost avoidance through pharmacist intervention. As a result, in 2011 the American Society of Health-Systems Pharmacists (ASHP) published guidelines to define best practice in the ED and recommend goals for providing services. It is, however, recognized that the role of the emergency medicine (EM) pharmacist varies depending upon the institution. With such rapid growth and variability in one specialty, it is necessary to evaluate how pharmacy services are prioritized in the ED and what qualifications are necessary to become an EM pharmacist. Therefore, the purpose of this survey was to assess the national landscape of emergency pharmaceutical services. **Methods:** An electronic survey was developed and distributed to pharmacists who self-identified as ED pharmacists. Potential participants were members of at least one of the following organizations including the American College of Clinical Pharmacy (ACCP) Emergency Medicine PRN registry or American Society of Health-system Pharmacists (ASHP). The survey was distributed via REDCap and available for 6 weeks. Survey questions addressed ED pharmacist training and experience, in addition to characteristics of the institution and the emergency medicine post-graduate year 2 (PGY2) residency, if present. The primary objective of this study was to assess how self-identified ED pharmacists prioritized tasks as either "essential", "potential", or "advanced" functions of their job. Secondary objectives included comparing the characteristics of EM pharmaceutical services to institution-specific demographics and identifying qualifications of an EM pharmacist. **Results and Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the role of emergency medicine pharmacists as defined by the ASHP guidelines.  
Identify outcomes associated with pharmacist intervention in the emergency department.

### Self Assessment Questions:

Which of the following does ASHP list as essential roles of an EM pharmacist?

- A: Care of boarded patients, medication therapy monitoring, resuscitation
- B: Medication histories & reconciliation, medication information, resuscitation
- C: Documentation, medication histories & reconciliation, medication information
- D: Medication order review, medication procurement & preparation, documentation

Which of the following is a published outcome of pharmacist presence in the ED?

- A: Improved physician learning
- B: Reduction in medication errors
- C: Increased emergency medicine research
- D: Increased patient satisfaction

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-885L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPROVING THE PROCESS OF PRESCRIBING, PATIENT EDUCATION, FOLLOW-UP, AND RATE OF READMISSION RELATED TO THE DIRECT ORAL ANTICOAGULANTS (DOACS) IN THE EMERGENCY DEPARTMENT

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**Purpose:** With the introduction of the direct oral anticoagulants (DOACs) over the past few years, treatment of venous thromboembolism (VTE) is shifting from the inpatient setting to the outpatient setting for relatively healthy individuals. Each DOAC has a different dosing regimen with adjustments needed for drug interactions, patient weight, and renal function which complicates prescribing of these medications for Emergency Department (ED) providers. In addition, the DOACs can be costly, and financial barriers may result in non-compliance and readmission. The purpose of this project is to evaluate and identify opportunities for improvement with the current discharge process when initiating a DOAC in the ED for the outpatient treatment of new onset VTE. **Methods:** Initially, a retrospective chart review was conducted to identify gaps in care with the current discharge process. The chart review included patients discharged with a prescription for dabigatran, rivaroxaban, or apixaban from the ED for the treatment of new onset VTE from January 1, 2014- May 31, 2015. Patients baseline characteristics, discharge prescription information, documentation of patient education, written medication information populated into the after visit summary (AVS), case-management involvement, and 30 day all-cause readmission rates were collected. Based on gaps identified in the chart review, a step-by-step process was developed and implemented to coordinate the respective roles of prescribers, case-managers, and nursing in the discharge process of a DOAC initiation for the treatment of VTE. Medication education was developed to standardize patient education across healthcare professionals. The primary objective is to evaluate the difference in prescription accuracy and verbal patient education after the implementation of a standard process for discharge. Secondary outcomes will measure documented outpatient follow-up and written education in the AVS, documented case-management intervention, as well as change in 30 day all-cause readmissions. **Results/Conclusions:** will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review advantages and disadvantages of the direct oral anticoagulants  
Identify appropriate anticoagulation regimens for the treatment of new onset venous thromboembolism in patients discharged from the emergency department

### Self Assessment Questions:

Which of the following is an advantage of the direct oral anticoagulants over warfarin?

- A: Lower risk for major bleeds
- B: Predictable pharmacokinetics and pharmacodynamics
- C: Reversal agents are available for all of the oral anticoagulants
- D: A and B

Which of the following medication(s) require lead in therapy with parenteral anticoagulation for 5 to 10 days?

- A: Dabigatran
- B: Rivaroxaban
- C: Edoxaban
- D: A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-645L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF HYPERGLYCEMIA CORRECTIONAL SLIDING SCALE INSULIN IN NON-CRITICALLY ILL PATIENTS BEFORE AND AFTER STANDARDIZED SUBCUTANEOUS INSULIN ORDER SET UPDATES

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**Purpose:** Uncontrolled hyperglycemia in hospitalized patients, with or without previously diagnosed diabetes, is associated with an increased risk of adverse outcomes and prolonged length of hospital stay. At the University of Chicago Medicine, a medication use evaluation of correctional sliding scale insulin identified patients dietary status as a barrier to insulin administration and thus appropriate glycemic management. In September 2015, an update to the correctional sliding scale insulin order set was implemented to change the frequency from "three times a day with meals" to "three times a day", still scheduled around meal times. The primary objective of this study is to determine the impact of streamlining the frequency instructions of the correctional sliding scale insulin order set on glycemic control. **Methods:** During a one week span pre and post order set update, patients with correctional sliding scale insulin orders will be included and randomly selected until there are 500 blood glucose readings for each group. The following exclusion criteria for patient selection will be implemented:  $\leq 18$  years old, pregnant, ICU patients, and patients admitted to a surgical service. The primary endpoint is percentage of time blood glucose values were a goal before and after the order set change was implemented. The secondary endpoints will be to analyze the proportion of times and reasons why correctional insulin sliding scale was not administered when indicated, the percentage of times patients developed hypoglycemia following correction factor insulin and categorizing severity of hypoglycemia. Primary outcome statistical analysis will be performed using Chi-Square test. **Results/Conclusions:** Data collection and analysis are in process and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify variables that may contribute to altered blood glucose levels in hospitalized patients  
Recognize barriers to appropriate correctional sliding scale insulin administration

### Self Assessment Questions:

Which of the following factors may lead to hypoglycemic and/or hyperglycemic levels in hospitalized patients?

- A Acute illness
- B: Inconsistent caloric intake
- C: Changes in prior to admission medication regimens
- D: All of the above

Based upon blood glucose and dietary status, which of the following patients should receive a dose of correctional sliding scale insulin?

- A 50 mg/dl, regular diet
- B 100 mg/dl, NPO
- C 200 mg/dl, NPO
- D None of the above

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-646L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSMENT OF PHARMACISTS INTERVENTIONS TO REDUCE FINANCIAL BARRIERS THAT CONTRIBUTE TO NON-ADHERENCE TO ORAL ONCOLYTIC THERAPY

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**Purpose:** To assess the types of interventions performed by pharmacists to reduce therapy costs and the impact to oral oncolytic therapy non-adherence. **Methods:** The median price for new cancer medications approved in the past 5 years now exceeds \$10,000 per month. The rate at which patients do not fill new prescriptions has been defined as "primary non-adherence" and is of concern with cancer patients as timely initiation of therapy is critical for successful treatment. This study is a retrospective review of a community pharmacy dispensing and patient management records of pharmacists interventions to reduce financial barriers that prevent participants from starting oral oncology therapy. Study participants include adults 18 years of age or older with a prescription for one of the following oral oncolytics: axitinib, palbociclib, crizotinib, bosutinib, sorafenib, and regorafenib from January 1, 2015 to October 26, 2015. Participants will be divided into groups based on their primary payment method for their medications. Descriptive statistics will be used to assess patient demographics, out of pocket costs (OOPC), the number of participants requiring financial assistance, identifying types and frequency of financial assistance interventions, average OOPC during entire fill history, and number of participants who discontinued therapy due to cost. Institutional review board approval for the study was received on October 26, 2015. **Results:** N/A (research in progress) **Implications/Conclusions:** N/A (research in progress)

### Learning Objectives:

Discuss how community pharmacists are able to assist patients at greatest risk for primary non-adherence gain access to their oral oncology specialty medications

Describe various financial assistance programs available to patients on specialty oral oncology medications that help with medication costs

### Self Assessment Questions:

Pharmacists can assist patients on high-cost specialty medications in all of the following ways except:

- A Assisting in completion of prior authorizations
- B: Searching and enrolling patients in co-pay assistance programs
- C: Triaging patients with no insurance to manufacturer medication assistance
- D: All of the above

Which financial assistance program(s) are available to Medicare Part D patients who are unable to afford their co-pay?

- A Co-pay cards
- B Patient Assistance Foundations
- C Manufacturer medication assistance programs
- D A and B

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-647L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OPTIMIZATION OF RENAL SPARING IMMUNOSUPPRESSION TO PREVENT PERSISTENT ACUTE RENAL FAILURE IN LIVER TRANSPLANT PATIENTS

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**Purpose:** Renal dysfunction is a recognized complication of orthotopic liver transplantation (OLT). The renal sparing immunosuppression strategy, employing delayed tacrolimus initiation with an interleukin-2 receptor blocker, has demonstrated potential benefits to prevent need for hemodialysis and better renal function at 6-12 months post-OLT. However, it is unknown which patient population would benefit most from the renal sparing immunosuppression. This study aims to identify a patient population whose risk of progression to chronic renal failure can be reduced by the use of renal sparing immunosuppression. **Methods:**

This is a retrospective cohort study with 200 adult patients who underwent deceased donor OLT between January 1st, 2010 and December 31st, 2014 at University of Michigan Health System (UMHS) and subsequently received immunosuppression per UMHS guideline (tacrolimus-based maintenance therapy with or without basiliximab induction). Pre-OLT parameters, serum creatinine at baseline and year and the type of immunosuppression (standard vs. renal sparing) will be identified for each patient through chart review. Renal Risk Index (RRI) is a validated scoring tool to stratify risk of chronic renal failure post-OLT. We will divide patients into 3 risk groups based on calculated RRI Low, Mod, and High. The cutoff for each risk group will be determined based on score distribution. Using the RIFLE criteria L (Loss) and E (ESRD), patients who progressed to chronic renal failure at 1 year post-OLT will be identified. A logistic regression model will include the use of renal sparing regimen and RRI risk group as independent variables and renal function at 1 year post-OLT as the dependent variable. Interaction between the use of renal sparing regimen and RRI risk group will be tested to determine an RRI range where the renal sparing regimen benefits most. **Results:** In progress **Conclusions:** In progress

### Learning Objectives:

Recognize renal failure as a prevalent problem in post-liver transplant patients

Discuss the role of renal sparing immunosuppression to reduce renal complications after transplant

### Self Assessment Questions:

What of the following factors can contribute to renal failure post-liver transplant?

- A Pre-existing chronic kidney disease due to comorbidities and disease
- B: Ischemic event during transplant surgery
- C: Post-transplant immunosuppression
- D: All of the above

What is the main benefit of renal sparing immunosuppression?

- A Preserve short-term and long-term renal function
- B Prevent acute rejection
- C Prevent opportunistic infection
- D Prevent chronic rejection

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-648L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THROMBUS RISK REDUCTION IN ANTIPHOSPHOLIPID SYNDROME PATIENTS MONITORED BY FACTOR II ACTIVITY ASSAY

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**Purpose:** Patients with antiphospholipid syndrome are at an increased risk for clot development. The antibodies developed with this syndrome interfere with thromboplastins used for anticoagulation monitoring resulting in prolonged clotting times, which can falsely elevate international normalized ratio (INR). The objective of this study is to determine if the monitoring of a factor II activity assay will decrease a patients thrombus risk or increase their bleeding risk. **Methods:** This study was granted exempt status by the St. Elizabeth Institutional Review Board. A retrospective chart review using the electronic medical record system was used to help identify patients with any of the following diagnosis codes: antiphospholipid antibody positive, anticardiolipin antibody positive, or lupus anticoagulant with hemorrhagic disorder. Patients greater than 18 years of age who were followed at one of our St. Elizabeth Healthcare anticoagulation clinics were included. Patients were excluded if they were pregnant or developed cancer during the monitoring period. Any bleeding or clotting event within 6 weeks after surgery was deemed provoked and not recorded. Thrombus events were recorded if clinical evidence of deep vein thrombosis or pulmonary embolism was present. Major bleeding events were defined as: fatal bleeding, symptomatic bleeding in a critical area or organ, such as intracranial, intraspinal, intraocular, retroperitoneal, intra-articular or pericardial, or intramuscular with compartment syndrome, hemoglobin drop > 5 g/dL or transfusion requiring > 2 units of whole blood or red blood cells. Minor bleeding events were defined as bleeds reported but not requiring any additional testing, referrals, or visits. Data collected on all patients, if available, included: demographics (age, sex, ethnicity), diagnosis, INR, thrombus events, and bleeding events. Factor II activity assays were only reviewed in the monitored group. **Results/Conclusion:** Data collection is currently in process. Final results will be analyzed and presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss current ACC Chest guideline recommendations for INR goal range in patients with antiphospholipid syndrome

Review appropriate monitoring options for antiphospholipid syndrome patients

### Self Assessment Questions:

What is the recommend INR goal range for antiphospholipid syndrome patients according to the ACC Chest Guidelines?

- A 1.5-2.5
- B: 2.0-3.0
- C: 2.5-3.5
- D: 3.0-4.0

Which of the following monitoring tests are unaffected by the antibodies that develop in antiphospholipid syndrome patients?

- A Prothrombin Time (PT)
- B Chromogenic Factor X (CFX)
- C Factor II Activity Assay (FIIAA)
- D B and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-649L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECT OF RABBIT ANTITHYMOCYTE GLOBULIN AND DELAYED, REDUCED-INTENSITY TACROLIMUS ON RENAL FUNCTION IN LIVER TRANSPLANT RECIPIENTS

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**Purpose:** Patient survival, graft survival and allograft rejection are major concerns when managing transplant recipients. The calcineurin inhibitors (CNI), tacrolimus and cyclosporine, are two immunosuppressant agents used long-term to help prevent these concerns. While they may be effective in reducing rejection rates and improving survival, they do carry a well-known risk of nephrotoxicity. Studies have reported chronic renal failure incidence rates between 12-67% of liver transplant recipients. Delaying CNI initiation can potentially minimize the degree of renal dysfunction post-liver transplant (LT), but may lead to an increased risk for early acute rejection and graft failure. A potential solution for this may be to use an induction agent, such as rabbit antithymocyte globulin (rATG). rATG has been shown to improve early allograft function, and decrease occurrence of delayed graft function and decreased hospital stay. Because it has been used safely and effectively in renal transplant recipients, it is possible that it may have similar benefit in LT recipients allowing for the delayed initiation of CNI and potentially improving long-term renal function. **Methods:** This is a retrospective, single-center chart review of liver-transplant recipients with renal dysfunction pre- or post-LT. Treatment group received rATG and delayed, reduced-intensity tacrolimus. The control group received standard-intensity tacrolimus initiation alone. The primary endpoint is the change in serum creatinine and creatinine clearance in each group compared to baseline. Secondary endpoints include the rate of patient survival, graft survival, biopsy-proven acute rejection at 6 and 12 months post-LT. Additional endpoints include the rate of adverse effects (hepatitis C recurrence, incidence of cytomegalovirus infection, incidence of post-transplant lymphoproliferative disease/malignancy, and rate of re-hospitalization due to infection) amongst the two groups. **Results and Conclusion:** Data collection and analysis are ongoing and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the mechanism behind calcineurin inhibitor induced nephrotoxicity  
Discuss evidence supporting the use of thymoglobulin in liver transplant recipients

### Self Assessment Questions:

What is the mechanism behind acute calcineurin nephrotoxicity?

- A: Afferent arteriolar vasoconstriction
- B: Interstitial fibrosis
- C: Structural change leading to hypoperfusion
- D: Efferent arteriolar vasoconstriction

Thymoglobulin, in liver transplant recipients, has been shown in existing literature to

- A: worsen renal function compared to patients receiving standard the
- B: decrease urine output
- C: have improved renal function compared to patients receiving standard
- D: increase the occurrence of delayed graft function

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-650L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## THE IMPACT OF IRON DEXTRAN ON HEALTHCARE UTILIZATION IN PATIENTS WITH HEART FAILURE

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**Purpose:** Iron deficiency is associated with increased morbidity, hospitalization, and mortality in heart failure patients with preserved ejection fraction (HFpEF) and reduced ejection fraction (HFrEF). Recent studies, such as CONFIRM HF and FAIR HF, have shown benefit in functional capacity and clinical status (NYHA classification and 6MWD) after correction of iron deficiency in ambulatory patients with HFpEF and HFrEF. Currently there are no data regarding the impact of iron dextran in hospitalized heart failure and subsequent health care utilization. This study will evaluate the impact of iron dextran in hospitalized patients with a past medical history of heart failure. **Methods:** The Institutional Review Board at Henry Ford Hospital approved this single center, retrospective, propensity-score-matched cohort study. Adult patients with HFrEF or HFpEF, who were discharged from a Henry Ford Health System hospital from December 2013 to September 2015, and who had at least one visit with a Henry Ford Health System provider within six months after their index discharge date, were included. Comparator groups included patients who received treatment doses of iron dextran as compared with no iron dextran after iron studies during the index encounter. Variables for the propensity model were the presence anemia, chronic kidney disease stage, sex, and age. The primary composite end point will be the number of unplanned encounters within six months after the index discharge date, including hospitalizations, emergency room visits, observation visits, and unplanned clinic encounters. Secondary end points will include the primary composite end point within 30 days after index discharge date, the primary composite end point limited to heart failure exacerbations, and changes in creatinine clearance, ejection fraction, and hemoglobin. **Results/Conclusions:** Will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Explain the mechanism by which IV iron dextran improves outcomes in patients with heart failure.

Describe the benefits of IV iron therapy in heart failure patients.

### Self Assessment Questions:

IV iron dextran is thought to improve functional status and clinical status as a result of:

- A: Improvements in oxygen transport as a result of improved mitochondria
- B: Improvements in oxygen transport as a result of elevated in hemoglobin
- C: Correction of anemia
- D: Current evidence do not provide a clear mechanism of benefit.

Which of the following is correct?

- A: Anemia is present in about 20% of heart failure patients
- B: Iron deficiency is not associated with increased morbidity, hospitalization
- C: Correction of iron deficiency with IV iron is not associated with improved outcomes
- D: Correction of iron deficiency with IV iron is not associated with worsened outcomes

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-651L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## TICAGRELOR VERSUS CLOPIDOGREL FOR PLATELET INHIBITION IN PATIENTS UNDERGOING NEUROVASCULAR STENTING

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**Purpose:** The optimal choice of antiplatelet medication to prevent neurological stent thrombosis is currently unclear. This study seeks to evaluate the effectiveness of ticagrelor compared to clopidogrel in the setting of neurovascular stenting procedures. **Methods:** In this retrospective single center study, patients with ICD-9 codes indicating a neurological stent assisted procedure were identified. Patients  $\geq$  18 years old who received ticagrelor (T) or clopidogrel (C) prior to any neurological stent assisted procedure between the time period of Sept. 2012 - Sept. 2015 with at least one measured platelet function assay were included. Patients were excluded if they received the same antiplatelet medication before admission. The primary endpoint was time until platelet inhibition based on a P2Y12 platelet function assay. Secondary endpoints included cost-effectiveness, composite adverse events, ICU length of stay (LOS), and hospital LOS. **Results:** Thirty-four patients (12 T, 22 C) were included in the study. The median time until platelet inhibition was similar in both groups, respectively (1.9 vs 2.2 days,  $p=0.95$ ). The mean antiplatelet medication cost was higher in the ticagrelor group (\$44.25 vs \$7.94). However, the median ICU LOS was significantly shorter in the ticagrelor group (3 vs 4.5 days,  $p=0.049$ ), leading to potential overall hospital cost savings. Median hospital LOS was similar between groups (5 vs 6.5 days;  $p=0.87$ ). The composite adverse event outcome was similar between groups (16.7% v. 22.7%).

**Conclusions:** In this study, ticagrelor was safe and effective compared to clopidogrel in the setting of neurovascular stent assisted procedures. Shorter ICU LOS with ticagrelor may lead to reduced overall hospital costs and complications of ICU stay.

### Learning Objectives:

Identify the pharmacokinetic and pharmacodynamic differences between clopidogrel and ticagrelor.

Recognize and understand the literature supporting antiplatelet use in neurovascular stent assisted procedures.

### Self Assessment Questions:

Which of the following statements is correct?

- A Clopidogrel has a faster onset of action and more predictable kinetics
- B Ticagrelor does not require hepatic metabolism to active metabolites
- C Clopidogrel is effective in nearly 95% of patients
- D Several studies evaluating the effects of ticagrelor in neurovascular stenting procedures

Which of the following statements regarding the literature on antiplatelet use in neurovascular stent assisted procedures is true?

- A There are a number of randomized, double blind, multicenter trials
- B Ticagrelor has been proven superior to clopidogrel in the setting of neurovascular stenting procedures
- C Strong data comparing clopidogrel and ticagrelor is lacking, however
- D Analysis of the PLATO trial shows that ticagrelor is associated with a higher rate of major adverse cardiovascular events

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-652L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF THE NEW PREGNANCY LABELING RULE ON CLINICAL DECISION SUPPORT

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**Purpose:** The purpose of this study is to assess the clinical and safety impact of an updated teratogenic medication alert based on the changes recently implemented by the Federal Drug Administration (FDA) with the Pregnancy Lactation and Labeling Rule (PLLR). **Methods:** Currently at IU Health, pregnancy categories X and D have historically been used as alert logic for prescribers and pharmacy when a potentially teratogenic medication order is placed on a patient with a documented pregnancy. In future state, all medications categorized by IU Health's drug information repository (DIR) as "Major Female Pregnancy Risk" will fire an alert, increasing the number of alertable medications from 171 to 1144. This list of medications will be updated monthly with the DIR package. To decrease unnecessary firing, "AND NOT" logic will be applied to an obstetric approved list of common medications used in labor and delivery units and another list of miscellaneous medications will not fire on any units. The number of alerts that actually fire with our current alert compared to the number of medications that would potentially fire with our proposed alert will be collected from January - March 2016. Data will be collected through the electronic health record (EHR) analytic systems. **Results/Conclusions:** An initial review comparing current versus future state logic for all patients seen at IU Health facilities over a month suggests a total decrease in the number of medication alerts. This will result in a more meaningful alert to the providers. (Data collection and analysis are ongoing and will be presented at the Great Lakes Pharmacy Resident Conference.)

### Learning Objectives:

Describe the current FDA pregnancy categories and how they can potentially confuse clinicians

Explain new pregnancy labeling requirements and how they help clinicians make more informed decisions

### Self Assessment Questions:

The Pregnancy Lactation and Labeling Rule (PLLR) is doing what with pregnancy categories?

- A Removing pregnancy categories
- B Creating pregnancy subcategories
- C Adding more pregnancy categories
- D Changing to a numbering category system

Which of the following is NOT included in the new pregnancy labeling?

- A Data Section
- B Risk Summary Section
- C Pregnancy Registry Section
- D Pregnancy Category Section

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-964L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **A COMPARISON OF APPLYING BEERS CRITERIA ASSESSMENT TO THE STOPP CRITERIA ASSESSMENT IN PATIENTS AT HIGH RISK FOR INPATIENT FALLS IN A LARGE, COMMUNITY BASED HOSPITAL**

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**Purpose:** Falls are a leading cause of both fatal and nonfatal injuries in people age greater than and equal to 65 years. Medication use has been identified as a contributing factor for increased fall risk in the elderly. Two validated criteria-based tools exist which detect potentially inappropriate medications (PIMs): the Beers Criteria for Potentially Inappropriate Medication Use in Older Adults and Screening Tool of Older Persons Potentially Inappropriate Prescriptions (STOPP) Criteria. The purpose of this study is to evaluate clinical pharmacists impact on inpatient fall rates utilizing the Beers criteria as compared to the STOPP criteria.**Methods:** This is a prospective study within a large community hospital evaluating the impact of pharmacist interventions employing either STOPP or Beers criteria on two demographically similar inpatient medical floors over a four month period. Patients meeting eligibility requirements will be age  $\geq$  65 years, active order for a Beers or STOPP medication and nursing deemed as high fall risk. Patients must have received at least one dose of the identified medication. Pharmacists satisfaction with using an assessment tool will be evaluated compared to baseline. Patient and drug identification will be made using web based clinical surveillance and decision support software. The number of PIMs will be analyzed daily. The primary outcome is to detect if a difference exists between either the Beers or STOPP criteria in decreasing inpatient fall rates. Secondary outcomes include comparing the number of pharmacist interventions related to PIMs, PIM reduction with either tool along with its impact on pharmacist satisfaction.**Results:** Within the first month of study initiation, 249 patients were screened with a total of 167 meeting study criteria (80 Beers and 87 STOPP). Fourteen interventions were documented for Beers and 15 interventions for STOPP with an acceptance rate of 79% and 87%, respectively.**Conclusions:** Pending

### **Learning Objectives:**

Discuss the differences between the Beers' and STOPP criteria  
Define how an inpatient fall impacts hospital cost.

### **Self Assessment Questions:**

Which validated tool can be used to detect potentially inappropriate medications (PIMs) in older adults?

- A The ARMOR tool
- B: Mini-Mental state examinatio (MMSE)
- C: Morse Fall Scale
- D: Screening Tool of Older Persons' Potentially Inappropriate Prescri

According to The Joint Commission inpatient falls can extend the patients length of stay on average how long?

- A 1.5 days
- B 6.3 days
- C 5.8 days
- D 2.4 days

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-965L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## **OPTIMAL DURATION OF PERI-OPERATIVE PROHYLAXIS FOR ENT CLEAN-CONTAMINATED PROCEDURES**

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**Background:** Surgical site infection (SSI) is a common post-operative complication and the leading cause of nosocomial infections. The Centers for Disease Control and Prevention (CDC) estimates that, approximately, 500,000 SSIs occurs annually in the United States. National guidelines recommend the use of ampicillin-sulbactam, cefazolin + metronidazole, cefuroxime + metronidazole or clindamycin for ENT clean-contaminated procedures. However, there is limited data to guide optimal duration of antibiotic prophylaxis for these procedures and widespread variations in practices have been described in the literature. In the setting of increasing antibiotic resistance and complications from antibiotics overuse, it is relevant to determine an optimal duration of post-operative prophylactic antibiotics. The primary objective of this study is to determine infection rates within 30 days after surgery among patients who received  $\leq$  24 hours versus  $>$  24 hours of antibiotic prophylaxis for ENT clean contaminated procedures. The secondary objectives are to identify risk factors for infections among patients who underwent ENT clean contaminated procedures as well as to identify C.difficile infection rates. **Methods:** Single-centered, retrospective, observational study comparing post-operative infectious complications in patients who received antibiotic prophylaxis for  $\leq$  24 hours versus extended duration ( $>$  24 hours post-operative). Study population includes adults of at least 18 years of age who underwent clean-contaminated ENT procedures at University of Chicago Medicine between July 1st, 2012 and June 30th, 2015. Data collected will include patient demographics, comorbid conditions, antibiotic allergies, procedural type and date, antibiotic administrated and timing, microbiology and laboratory data for 30 days post-operative.

**Results/Conclusion:** Data collection and analysis is in progress and the results will be presented at Great Lakes Pharmacy Resident Conference

### **Learning Objectives:**

Discuss the duration of antibiotic prophylaxis used for clean-contaminated ENT procedures  
Identify potential disadvantages of prolonged antibiotics use

### **Self Assessment Questions:**

What is the generally recommended duration of antibiotic prophylaxis in clean-contaminated procedures?

- A 12 hours
- B: 24 hours
- C: 48 hours
- D: Indefinitely

Which of the following is a disadvantage of prolonged antibiotic use?

- A Increased rates of antibiotic resistance
- B Increased risk of C. difficile infection
- C Increased cost
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-886L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSMENT OF ENOXAPARIN DOSING STRATEGIES FOR PERI-OPERATIVE BRIDGING IN PATIENTS UNDERGOING MAJOR SURGERY

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**Purpose:** Peri-operative management of patients on warfarin is a frequently encountered clinical problem. Typically, patients on warfarin must interrupt therapy to minimize peri-operative bleeding, and patients at high risk for thromboembolism are bridged with therapeutic low-molecular-weight heparin. The 2012 CHEST guidelines define therapeutic-dose heparin bridging as enoxaparin 1 mg/kg twice daily or 1.5 mg/kg daily, but evidence is limited as to which regimen produces better outcomes for patients undergoing major surgery. At the Roudebush VA Medical Center (VAMC), patients on warfarin scheduled to undergo a major surgery are provided bridging instructions by a pharmacist at the Anticoagulation Clinic. The purpose of this study is to assess the safety of bridging with modified (1.5 mg/kg/day) compared to standard (1 mg/kg twice daily) enoxaparin dosing in the peri-operative setting for patients undergoing major surgery at the Roudebush VAMC.

**Methods:** This is a retrospective, parallel study that included patients who underwent major surgery at the Roudebush VAMC and received peri-procedural bridging with therapeutic enoxaparin from the Anticoagulation Clinic between January 1, 2008, and July 28, 2015. Exclusion criteria included any patient who underwent a minor surgery or did not receive peri-procedural bridging with therapeutic enoxaparin dosing. Primary outcomes included major bleeding and/or thromboembolism during the 30-day postoperative period. Secondary outcomes included clinically relevant non-major bleeding and minor bleeding during the 30-day postoperative period. **Results:** A total of 3338 encounters from 1121 patients were identified, of which 85 patients met inclusion criteria. Patients who received 1.5 mg/kg enoxaparin daily had the following outcomes: 16% major bleed, 0% thromboembolism, 16% clinically relevant non-major bleed, and 13% minor bleed. Patients who received 1 mg/kg enoxaparin twice daily had the following outcomes: 15% major bleed, 0% thromboembolism, 26% clinically relevant non-major bleed, and 21% minor bleed. **Conclusion:** Conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss currently available evidence regarding guideline recommendations and outcomes in patients undergoing major surgery who received standard versus modified enoxaparin bridging dosing regimens.

Identify the value of utilizing an institution-specific enoxaparin bridging protocol for patients undergoing major surgery.

### Self Assessment Questions:

Per 2012 CHEST guidelines, what is the preferred therapeutic enoxaparin dosing regimen in patients being bridged with warfarin therapy?

- A: Enoxaparin 1 mg/kg twice daily
- B: Enoxaparin 2 mg/kg once daily
- C: Enoxaparin 1.5 mg/kg once daily
- D: A and C

Which of the following statements is correct regarding the Roudebush Anticoagulation Clinic policy for enoxaparin bridging in patients undergoing major surgery?

- A: Pharmacists must prescribe enoxaparin 1.5 mg/kg daily unless the
- B: Pharmacists must prescribe enoxaparin 1 mg/kg twice daily regard
- C: There is currently no accepted enoxaparin dosing regimen per poli
- D: Patients undergoing major surgery are not referred to the Anticoag

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-653L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## REAL-WORLD EFFECTIVENESS OF AN EIGHT-WEEK COURSE OF FIXED-DOSE LEDIPASVIR AND SOFOSBUVIR THERAPY FOR THE TREATMENT OF HEPATITIS C IN A SPECIALTY PHARMACY SETTING

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**Purpose:** Pharmacists within a specialty pharmacy are well-positioned to identify patients with chronic hepatitis C virus (HCV) who may qualify for a shorter duration of fixed-dose ledipasvir and sofosbuvir therapy based on the FDA-approved prescribing information. This study aims to provide data on the real-world effectiveness of an eight-week therapy course. Secondary objectives will identify variables that may contribute to therapy failure and evaluate prescribers acceptance of a pharmacy recommendation. The results of this study will be used to evaluate and improve upon the pharmacy's current interventional processes.

**Methods:** This study is designed as a retrospective observational analysis of patients who filled a prescription for fixed-dose ledipasvir and sofosbuvir at a specialty pharmacy between Oct. 10, 2014 and May 15, 2015. Eligible patients will be 18 years of age or older with a diagnosis of chronic HCV genotype 1 infection. Included in the study will be patients who are treatment-naïve with no evidence of cirrhosis, and have a baseline HCV RNA of less than 6 million. At a minimum, baseline characteristics will include sex, age, cirrhosis status, previous treatment status and baseline viral load. Response to therapy will be considered successful if the patient achieves sustained virologic response (SVR), defined as an undetectable viral load at 12 or more weeks after completion of therapy, as indicated by the prescriber. Communication and outreach to prescribers will be done via facsimile or telephone to obtain missing information. The primary endpoint will be the proportion of patients who achieve SVR. Potential risk factors for failure of therapy will be identified by univariate and subsequent multivariate analysis. Assessment of prescribers reasoning for 12 weeks of therapy will be completed by manual review of a patient's file, with possible outreach to prescribers. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify patients with chronic Hepatitis C Virus (HCV) who may qualify for a shorter duration of fixed-dose ledipasvir and sofosbuvir therapy based on the FDA-recommended criteria.

Indicate when an HCV RNA should be drawn to determine therapy success or failure.

### Self Assessment Questions:

Which of the following patients could be evaluated for eight-week therapy with fixed-dose ledipasvir and sofosbuvir?

- A: A 55-year-old male with a 10-year history of HCV, F1 portal fibrosis
- B: A 25-year-old male with HCV genotype 4 who is treatment-naïve
- C: A 40-year-old female with HCV genotype 1a who is treatment-naïve
- D: A 38-year-old male with HCV genotype 1b, who has F4 cirrhosis

When should the HCV RNA be rechecked to determine the success of therapy?

- A: Four weeks after the start of therapy.
- B: At the end of therapy.
- C: Eight weeks after the last dose of therapy.
- D: Twelve weeks after the last dose of therapy.

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-654L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**OUTCOMES FROM IMPLEMENTATION OF RAPID IDENTIFICATION TEST FOR DETECTION OF GRAM-POSITIVE AND GRAM-NEGATIVE BACTERIA INTO A PHARMACIST-DIRECTED ANTIMICROBIAL STEWARDSHIP PROTOCOL FOR PEDIATRIC PATIENTS**

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**Purpose:** The rapid identification of microorganisms is paramount for targeted antibiotic treatment for serious bloodstream infections (BSI). The automated nanoparticle probe microarray-based nucleic acid test is an assay for Gram-Positive Blood Culture (BC-GP) and Gram-Negative Blood Culture (BC-GN) that identifies bacterial targets and resistance markers in 2.5 hours from positive blood cultures. These molecular technologies have significantly reduced the time to optimal antibiotics in adults, but data is lacking for pediatric population. The purpose of this study is to evaluate outcomes of a rapid microarray assay for bacterial identification in combination with a pharmacist-directed antimicrobial stewardship protocol in pediatric patients in a tertiary-care hospital after implementing an educational intervention. **Methods:** A multi-center, pre-post intervention, quasi-experimental study is currently being conducted in all pediatric patients with positive blood cultures that were tested with automated microarray BC-GP and/or BC-GN assay at Lutheran Hospital since the implementation on April 30, 2015. A clinical pharmacist was informed of the microarray assay results and effective antibiotics were recommended based on targeted treatment chart. **Pediatric population included:** neonatal intensive care unit (NICU), pediatric intensive care unit (PICU), and general pediatric floor. The intervention consisted of written and verbal education to NICU/PICU doctors, nurses, and all pharmacists. The educational intervention was performed after a year of implementing rapid assays in pediatrics with the adult targeted treatment chart. **Outcomes** were assessed for pediatric patients with positive blood cultures tested with rapid BC-GP and/or BC-GN assay compared with time to final culture results. The primary outcomes were number of patients on optimal antibiotic therapy at time of final culture results and mean difference from time to rapid microarray assay results compared to time to final culture results. **Results/Conclusions:** Data collection in process. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Identify the impact a pharmacist-directed antimicrobial stewardship program utilizing rapid diagnostics can have in pediatrics.  
Describe the difference between pediatrics and adults when assessing rapid diagnostic results in a tertiary hospital.

**Self Assessment Questions:**

2. Which of the following is an essential antimicrobial stewardship intervention when implementing a rapid diagnostic test?

- A: Formulary restriction
- B: Prospective audit and feedback of results
- C: Reducing incidence of adverse events
- D: Increasing cost as result of antimicrobial medication changes

1. Which of the following patient populations have an increased risk for coagulase negative staphylococcus species resulting in blood cultures and requiring treatment?

- A: Pediatrics
- B: Adults
- C: Nicu
- D: Picu

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-655L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**EVALUATION OF ADHERENCE AND PERSISTENCE WITH PSYCHOTROPIC MEDICATIONS IN THE PREVENTION AND RECOVERY CENTER FOR EARLY PSYCHOSIS (PARC), ESKENAZI HEALTH, INDIANAPOLIS, IN**

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**Purpose:** Patients with psychotic illness can cycle between periods of recovery and acute episodes. Effective early treatment with antipsychotics decreases the risk of relapse which can lead to better patient outcomes and improved likelihood of long-term remission. Adherence to oral antipsychotics can be challenging for patients, which may limit the ability of that patient to achieve a period of time without relapse. The development of long-acting injectable (LAI) antipsychotics has provided patients with a treatment option that may improve adherence to drug therapy and effectiveness of treatment. This study will provide new data comparing oral and LAI antipsychotics with regard to medication adherence and persistence, in individuals with early psychosis. **Methods:** Medical records of PARC patients with a diagnosis of schizophrenia, schizophreniform, schizoaffective disorder, or psychosis not otherwise specified, from July 2013 through August 2014, were retrospectively analyzed for one year following diagnosis. Pertinent data relative to drug therapy, refill history, and medication administration was collected. Medication adherence, persistence, and use of acute care services were recorded. **Preliminary Results:** The preliminary analysis includes 26 patients, 5 of which were on LAI therapy, 15 on oral therapy, and 6 on both oral and LAI at separate times throughout the year follow-up. Results show 98.34% PDC, 0.2 gaps in therapy, and 0 acute care visits for LAIs, an average of 25% PDC, 1.4 gaps in therapy, and 0.27 acute care visit per patient for oral agents, and an average of 77.8% PDC, 1 gap in therapy, and 0.83 acute care visits per patient for those on both formulations during the one year follow-up. **Conclusions:** LAIs have been associated with the best outcomes with regard to adherence, persistence, and use of acute care services.

**Learning Objectives:**

Identify the need for medication adherence for the prevention of relapse in patients with early psychosis  
Report the results of this study including medication adherence, persistence, and rate of use of acute care for patients prescribed any oral or long-acting injectable antipsychotic

**Self Assessment Questions:**

Which of the following are barriers to adherence with oral medications?

- A: Forgetfulness/confusion
- B: Cost
- C: Lack of insight to disease
- D: A and C

Why is adherence to antipsychotic medications so important?

- A: To avoid side effects of the medication
- B: Prevention of relapse
- C: Prevention of deterioration in functioning and social withdrawal as:
- D: B and C

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-656L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPLEMENTATION OF A PHARMACY PAIN MANAGEMENT SERVICE TO IMPROVE PATIENT SAFETY AND OVERALL PAIN OUTCOMES

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Our institutions Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores for patients perceptions of pain control and perceptions of staff support in controlling pain continue to be lower than our desired goals. Additionally, opioids are among the highest reported drug classes to cause adverse drug reactions at our institution. Based on these opportunities for improvement, the purpose of our study is to describe the implementation of a pharmacy pain management service and to evaluate the impact of this service on patient safety and overall improvement in pain outcomes. A newly formed pharmacy pain management team completed a gap analysis to identify potential safety issues related to opioid use. The two safety areas targeted included staff education and revision of order sets. Both physicians and pharmacists were provided pain education, including renal dosing of certain opioids, while nursing staff now have opioid conversion charts displayed on all of the automated dispensing cabinets and recommendations for alternatives to opioid administration for patients with pain. For quality improvement, pharmacists are targeting uncontrolled pain in an effort to improve pain outcomes. This has required development of pain modules to prepare pharmacists to confidently make recommendations for improvements in therapy. A pilot is currently underway on the orthopedic floor of our institution, which consistently struggles with meeting pain control HCAHPS scores. Patient identifiers were built in our electronic health record system that will help pharmacists detect patients with either uncontrolled pain or those receiving high risk opioids, such as morphine, hydromorphone, fentanyl, methadone and meperidine. A pharmacist then reviewed the patients chart and made interventions as necessary. Patients receiving patient controlled analgesia (PCA) were also targeted in an attempt to improve faster transition to oral medications and prepare them for discharge. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the services provided by a pharmacy pain management service.  
Identify medications that are classified as high-risk opioids.

### Self Assessment Questions:

Describe the services provided by a pharmacy pain management service.

- A Review patient charts, focusing on safety and efficacy of high-risk
- B: Prescribe oral pain medications to those with uncontrolled pain.
- C: Administer pain medications, if needed.
- D: Work with physicians closely to try and wean addicts off their pain

Identify the following medication that is classified as a high-risk opioid.

- A Tramadol
- B Hydrocodone/Acetaminophen
- C Meperidine
- D Acetaminophen

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-887L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF EMPIRIC ANTIFUNGAL THERAPY PRACTICES IN PATIENTS WITH GASTROINTESTINAL PERFORATIONS

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Purpose: Initiating empiric antifungal therapy is a current strategy to prevent invasive candidiasis in patients with gastrointestinal perforations. The Infectious Diseases Society of America (IDSA) recommends that empiric antifungal therapy should be considered in patients based on risk factors for invasive candidiasis, surrogate markers for invasive candidiasis, and culture data. Therefore, the objectives of this study were to determine the proportion of patients with proven invasive candidiasis among patients who did and did not receive empiric antifungal therapy for gastrointestinal perforations and to assess whether empiric antifungal therapy was used appropriately based on patient risk factors for invasive candidiasis. Methods: A single-center, retrospective review of all adult patients admitted with a diagnosis of esophageal, gastric, small bowel, and colonic perforations was performed over a one year period. All included patients were evaluated for the incidence of proven invasive candidiasis, defined as a blood and/or intra-abdominal culture that yielded *Candida* species or the presence of yeast obtained from normally sterile intra-abdominal specimens. The use of empiric antifungal therapy and presence of high risk factors was also assessed in each patient. High risk factors for invasive candidiasis include: postsurgical patients with either recurrent gastrointestinal perforation or anastomotic leaks, necrotizing pancreatitis, perforation of gastric ulcer while on acid suppression therapy or secondary to malignancy, transplantation, immunosuppressive therapy for neoplasm, inflammatory disease, or central venous catheter present on admission. Use of empiric antifungal therapy was deemed appropriate if patients met at least one risk factor for invasive candidiasis and empiric antifungal therapy was initiated.

Results and Conclusion: Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify patient risk factors for invasive candidiasis and assess if the use of empiric antifungal therapy is appropriate  
Discuss future implications in practice for empiric antifungal therapy in gastrointestinal perforations based on study outcomes

### Self Assessment Questions:

The following are patient risk factors for invasive candidiasis EXCEPT:

- A Gastric ulcer perforation while on acid suppression therapy
- B: Transplantation
- C: Cholecystitis
- D: Necrotizing pancreatitis

What is the mortality rate of patients who have invasive candidiasis risk factors and clinical signs of septic shock?

- A Nearly 100%
- B Nearly 75%
- C Nearly 50%
- D Nearly 25%

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-657L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A PHARMACIST-MANAGED PENICILLIN SKIN TESTING SERVICE AT A COMMUNITY TEACHING HOSPITAL

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**Purpose:** Antimicrobial stewardship programs must develop strategies for curbing the use of alternative antibiotics whenever possible. The goal of this study was to describe how a pharmacist-managed penicillin skin testing (PST) service could be implemented to optimize antimicrobial therapy. **Methods:** The core members trained to conduct a penicillin skin test were an infectious diseases (ID) physician, ID pharmacist, PGY-2 ID pharmacy resident, and four PGY-1 pharmacy practice residents. Patients were identified through infectious disease physician consult and antimicrobial stewardship team rounds. Patients greater than 18 years old were considered for skin testing if they had a history of a type 1 (or unknown) allergic reaction to penicillin that occurred greater than 5 years ago and a beta-lactam antibiotic was indicated. Patients were excluded for the following reasons: pregnancy non-type 1 allergic reaction, recent use of anti-histamines, and severe immunosuppression. The primary objective was to reduce the use of alternative antimicrobials such as carbapenems, vancomycin, and fluoroquinolones. Secondary objectives included tolerability of the PST and beta-lactam therapy. **Results:** Of 11 patients that underwent skin testing, 10 were negative and 1 was inconclusive (no response to positive histamine control). No severe reactions occurred during the skin test or beta-lactam challenge. Nine patients (out of 10 that completed skin testing) were transitioned to a preferred beta-lactam antibiotic. The most common antibiotics prior to PST were carbapenems (n=5), vancomycin (n=4), and fluoroquinolones (n=2). The number of days of alternative antibiotics avoided ranged from 7 to 180, with a mean of 36.9 days and median of 14 days. **Conclusion:** A pharmacist-managed penicillin skin testing service is a viable tool for an antimicrobial stewardship program in a community hospital setting. Further randomized controlled trials are needed to assess patient outcomes and cost-effectiveness.

### Learning Objectives:

Explain the need for a thorough allergy assessment and penicillin skin testing service in the acute care setting.

Identify potential challenges in implementing a pharmacist-managed penicillin skin testing program

### Self Assessment Questions:

Which of the following has been correlated with reported penicillin allergies?

- A: Increased risk of VRE, MRSA, and C. diff
- B: Decreased health care costs
- C: Decreased length of stay
- D: Optimal antibiotic selection

Which of the following the greatest challenge when implementing a pharmacist-managed penicillin skin testing (PST) program?

- A: Number of penicillin allergic patients in the community
- B: Adequate personnel to develop and maintain the program
- C: Nursing support
- D: Pharmacy administration support

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-658L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF MEROPENEM USE IN A PEDIATRIC HOSPITAL: A RETROSPECTIVE CHART REVIEW

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**Purpose:** Meropenem is a beta-lactam carbapenem antibiotic used in the treatment of severe, multi-drug resistant infections in pediatric patients. The objective of this study is to evaluate patient-specific meropenem data for baseline utilization and characteristics of use in a pediatric hospital. **Methods:** Pediatric patients between the ages of 0 and 17 years who received meropenem in one fiscal year (October 2012 - September 2013) were identified, and data related to the administration of meropenem was reviewed. Patient data included patient age, gender, height, and weight; meropenem dose, duration, and indication; temperature and white blood cell count at meropenem initiation; culture and sensitivity results; information regarding concurrent antibiotics; meropenem-related adverse effects; prescribing service; patient location within the hospital; and length of stay. Data was analyzed using descriptive statistics. **Results:** A total of 95 courses of meropenem were initiated in one fiscal year. Meropenem was initiated most frequently in the Pediatric Intensive Care Unit, which accounted for 34.7% of the courses. The Neonatal Intensive Care unit had a similar frequency with 31.5% of the courses, followed by the Pediatric Intermediate Care Unit (23.2%) and the General Pediatrics Unit (0.09%). Blood cultures positive for organisms within meropenem spectrum of activity were associated with 27 courses (28%). Only 1 of these organisms was resistant to meropenem, while 4 organisms were resistant to cefepime. The most frequent duration of meropenem therapy was 2 days (13.7% of courses). **Conclusion:** Meropenem is being appropriately reserved for the most critically ill patients in the Neonatal and Pediatric Intensive Care units. The duration of treatment most frequently observed in this study suggests timely de-escalation of antimicrobial therapy. At this time, resistance to meropenem is rare among this pediatric population. To prevent the development of resistance, formal restriction criteria may be necessary.

### Learning Objectives:

Recognize meropenem antibiotic classification and spectrum of activity

Identify meropenem place in therapy for the treatment of infections in a pediatric population

### Self Assessment Questions:

Meropenem falls into which antibiotic class?

- A: Beta-lactam
- B: Aminoglycoside
- C: Fluoroquinolone
- D: Macrolide

Which of the following is a FDA approved indication for the use of meropenem in pediatric patients?

- A: Healthcare-associated pneumonia
- B: Bacterial Meningitis
- C: Febrile neutropenia
- D: Catheter-related bloodstream infection

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-659L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**COMPARISON OF GRADE IV NEUTROPENIA WITH PEGFILGRASTIM ADMINISTERED BY TWO DELIVERY METHODS: ON-BODY INJECTOR AND MANUAL INJECTION WITH A PREFILLED SYRINGE**

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Purpose: Pegfilgrastim is a colony-stimulating factor which promotes white blood cell production. It is administered subcutaneously at least twenty-four hours after chemotherapy completion to prevent chemotherapy-induced neutropenia. An alternative delivery method is necessary since many factors can contribute to patients being unable to return the following day. Pegfilgrastim on-body injector (OBI) was approved in March 2015. Previous studies have assessed pharmacokinetics; frequency of adverse effects and efficacy equivalence between the two devices has never been studied. At Akron General Medical Center (AGMC), it has been observed that some patients have experienced low absolute neutrophil counts (ANC) following pegfilgrastim administration with the OBI. Methods: The study was a retrospective chart review comparing patients who received the OBI to the traditional pegfilgrastim injection as part of their chemotherapy regimens. Patients at AGMC who received a dose of pegfilgrastim either by manual injection or OBI between August 1, 2010 and November 30, 2015 were included. Exclusion criteria was patients under the age of eighteen and pregnant women. The primary outcome was the incidence of grade IV neutropenia (neutrophils < 500 mm<sup>3</sup>) in patients receiving the traditional pegfilgrastim injection versus the OBI pegfilgrastim. Secondary outcomes included hospitalizations for febrile neutropenia, dose delays, dose reductions, device failures, as well as the number of patients who switched back to the manual injection after using the OBI. Based on the incidence of grade IV neutropenia between the two groups, it was determined if the OBI could be utilized in place of the manual injection on a permanent basis. By analyzing the trends, it was concluded that there should be certain criteria for use of the OBI for chemotherapy patients. A sub-analysis based on chemotherapy regimen occurred to determine if results differ based on treatment types. Results/Conclusions: Results and conclusions will be presented at the Great Lakes Residency Conference.

**Learning Objectives:**

Review the National Comprehensive Cancer Networks recommendations for the use of colony-stimulating factors.  
Describe the potential impact of the pegfilgrastim on-body injector on chemotherapy treatment.

**Self Assessment Questions:**

Which of the following, based on the National Comprehensive Cancer Networks recommendations, should be considered when determining if a patient requires prophylactic treatment with a colony-stimulati

- A: Chemotherapy cycle number
- B: Chemotherapy regimen
- C: Platelet count
- D: REMS program status

What is the incidence of febrile neutropenia (FN) in patients receiving a chemotherapy regimen defined as high risk for causing FN?

- A: > 40%
- B: > 30%
- C: > 20%
- D: > 10%

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-660L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**DEVELOPMENT OF A DASHBOARD TO ASSESS COMPLIANCE OF ORDER VERIFICATION TO INSTITUTIONAL DERIVED MEDICATION-RELATED GUIDELINES AND POLICIES**

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Statement of the purpose: Prospective order verification is a core component of a pharmacist's role in the detection and correction of medication errors. Productivity monitoring systems currently used do not consider the quality or accuracy of order verification on a team or individual level. The pharmacy departments metric for productivity related to order verification is based solely on order volume. The data provided by these monitoring systems may show what appear to be a significant performance differences between two pharmacists or services, when in fact the quality of orders verified according to accepted standards defined by practice guidelines, hospital policies, and procedures are not captured. Benchmarking based solely on data without context may result in a misinterpretation of performance. The inability to capture this data makes it difficult to identify pharmacist performance-improvement opportunities compared with that of peers. The primary objective of the study is to develop a quality dashboard for order verification and measure the impact on performance of pharmacists following individualized feedback. Statement of methods used: This study will be carried out in two phases. Phase one is to develop a quality dashboard to measure order verification performance. Phase two is to evaluate the implementation of the dashboard and its impact on the quality and accuracy of order verification. Pharmacists were selected to participate in phase two of the study based on predefined inclusion criteria. During phase two, individualized performance feedback was provided to the pharmacists on trends identified by the dashboard along with best practices and strategies to improve compliance. Summary of (preliminary) results to support conclusion: Five high volume orders were selected with recommendations defined by institution guidelines for renal-dosing and weight-based dosing to build the quality dashboard: Unasyn, Cipro, Zosyn, Zovirax, LovenoX. Conclusions reached: Study in process.

**Learning Objectives:**

Discuss the role of benchmarking to assess performance  
Describe the purpose of a quality performance metric to assess order verification

**Self Assessment Questions:**

Which of the following is a reason for using internal benchmarking systems?

- A: To measure performance trends over time
- B: To identify industry best practice
- C: To measure the performance of a pharmacy department against a
- D: To compare U.S. hospitals' strategies to reduce healthcare costs

Which of the following is a quality metric to assess pharmacist order verification performance?

- A: Number of orders verified per hour
- B: Orders verified in compliance with accepted practice standards
- C: Number of calls received from nursing
- D: Average time spent verifying a medication order

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-888L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF PNEUMONIA DECISION SUPPORT TOOL ON THE CLASSIFICATION AND TREATMENT OF BACTERIAL PNEUMONIA

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**Purpose:** Bacterial pneumonias remain a significant cause of morbidity and mortality. Management with antimicrobial therapy, supportive care, and preventative measures have shown to contribute to improved clinical outcomes. In 2013, the Antimicrobial Stewardship Committee at the William S. Middleton Memorial Veterans Hospital evaluated the appropriateness of classification and selection of empiric antimicrobial therapy for pneumonia. This preliminary study suggested that there were opportunities for improvement in the classification and selection of empiric treatment for pneumonia. In turn, the Antibiotic Stewardship committee developed a pneumonia pathway based on new evidence for health-care associated pneumonia and the current Infectious Diseases Society of America (IDSA) pneumonia guidelines. The purpose of this study is to determine the impact of a pneumonia decision support tool on classification and treatment of bacterial pneumonia through the comparison of these parameters between use and non-use of the tool.

**Methods:** A retrospective analysis of patients hospitalized with a diagnosis of bacterial pneumonia was performed on patients admitted between December 1, 2015 to February 29, 2016. A query of patients was obtained through the VA database utilizing ICD-10 codes. An internal usage report was used to identify instances when the pneumonia decision support tool was utilized. The primary outcomes assessed the appropriateness of classification and choice of empiric antimicrobial pneumonia therapy made by providers with and without assistance of the pneumonia decision support tool. Secondary outcomes included the percent of patients for whom cultures were obtained prior to administration of antibiotics. Results and Conclusions: This study is currently in progress. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Classify bacterial pneumonia as defined by the IDSA and Madison VA Antimicrobial Stewardship Committee

Discuss appropriate empiric antimicrobial therapy for pneumonia based on patient specific criteria

### Self Assessment Questions:

LS is a 65 year old female who presents to the Emergency Department and is diagnosed with pneumonia. Her PMH is significant for RA, which is managed by etanercept. LS recalls feeling similar in the pa

- A Currently hospitalized for 2 days
- B: Recently hospitalized >2 days within the past year
- C: Resides at home
- D: History of repeated antibiotics within the past 90 days

MT is a 72 year old male who presents to the Emergency Department with SOB, confusion, fever. Vitals: BP 135/70, RR 32. MT has otherwise been healthy, lives independently at a nursing home and takes o

- A Aztreonam 2G IV Q8H + Levofloxacin 750mg IV daily
- B Ceftriaxone 1G IV daily + Azithromycin 500mg IV daily x5 days
- C Levofloxacin 750mg PO daily
- D Levofloxacin 750mg IV daily + Piperacillin/tazobactam 3.375G Q8H

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-661L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ASSESSMENT OF SAFE PRESCRIBING OF DIRECT ORAL ANTICOAGULANTS IN AN OUTPATIENT POPULATION

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**Purpose:** Compared to warfarin, direct oral anticoagulants (DOACs) come without the ability for monitoring therapeutic lab values and without well-established recommendations for routine monitoring. These high alert medications create concerns within patient safety organizations regarding safe/effective use of DOACs, streamlined monitoring, and appropriate dosing of these agents in outpatient settings. At the St. Vincent Primary Care Center (PCC) and St. Vincent Medical Group (SVMG) clinics, anecdotal reports of prescribing errors with DOACs have been noted. However, no formal data collection has been completed to determine this rate of error. The purpose of this study is to identify if there were prescribing and monitoring concerns with DOACs at both the PCC and a SVMG clinic. It will then be determined if intervention is needed to improve DOAC safe prescribing and monitoring at these locations. **Methods:** This retrospective chart review was deemed appropriate as a quality improvement project by the St. Vincent institutional review board. Review occurred on PCC and SVMG clinic patients receiving DOAC therapy between January 1, 2014 and June 30, 2015. Patients were included if they had an active prescription for apixiban, rivaroxaban, or dabigatran, within the study time period, specifically for the treatment or prevention of recurrent VTE, or reduction of stroke risk in atrial fibrillation. Patients must have had at least one follow-up after initiation to be included in the study. At each point, lab data, bleeding risk, new thromboembolic events, and drug interactions were collected. Based on predetermined criteria, data collector determined if dosing of the agent was appropriate. Prescribing physicians were notified if potentially inappropriate dosing was identified. Primary objectives of this study were to identify the number of prescribing errors for DOACs at the PCC and/or SVMG clinic.

**Results/Conclusion:** Final results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Explain the potential concerns for less frequent monitoring of DOAC therapy

List monitoring recommendations outlined by European Heart Rhythm Association and Canadian cardiovascular organizations

### Self Assessment Questions:

Why is less frequent monitoring of DOACs a potential concern for safety?

- A Increased risk for non-adherence
- B: Limited assessment of side effects
- C: Decreased monitoring of therapeutic lab values
- D: Both A and B

How often does the European Heart Rhythm Association recommend lab monitoring for direct oral anticoagulants is completed for stable patients?

- A Every month
- B Every 3-6 months
- C Every year
- D Every 3 years

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-889L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**IMPLEMENTATION OF PHARMACIST COUNSELING TO IMPROVE THE HOSPITAL CONSUMER ASSESSMENT OF HEALTHCARE PROVIDERS AND SYSTEMS (HCAHPS) MEDICATION-RELATED SCORES IN HEART SURGERY PATIENTS**

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**Purpose:** Implementing pharmacist medication education after cardiac surgery has the potential to improve patient satisfaction, which could directly influence HCAHPS scores and reimbursement at our facility. In order to obtain a larger sample, a separate patient satisfaction survey will be offered to patients after discharge. The primary outcome of this project is to evaluate whether pharmacist-patient counseling focused on new or changed medications prior to discharge will improve the answers to three of the questions on this survey. Secondary outcomes include medication-related HCAHPS scores, the remaining questions on the survey, capture rate, time spent educating, number of medications educated per patient, and total number of patients educated.

**Methods:** This project has been deemed quality improvement by the Institutional Review Board. Informed consent was not necessary since patients could decline to complete a survey and results were anonymous. This project targeted heart surgery patients that went to the cardiac intensive care unit. Patients were educated about indications and side effects with a focus on new or changed heart-related medications. The patient satisfaction survey included questions to measure how comfortable the patient felt about their medications, especially how they felt after medication education from a pharmacist. It also included physician-patient related communication questions requested by cardiothoracic surgery providers. Survey results were collected every week throughout the intervention period during normal postoperative clinic visits. The medication-related HCAHPS questions were monitored at baseline and at the end of the project. The timeline involved collecting baseline patient satisfaction survey data for 3 months, followed by 3 months of concurrent intervention and survey collection. **Results/Conclusion:** Ongoing data collection is in progress. Final conclusions and findings will be available at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Explain the medication-related questions on the HCAHPS survey along with reimbursement criteria for hospitals including benchmarks.  
Identify why a pharmacist on the healthcare team can be an advantageous addition for patient education.

**Self Assessment Questions:**

From the 2014 HCAHPS results, what is the percentile rate nationally for patients who reported that staff "always" explained about medications before giving them?

- A 52%
- B: 65%
- C: 69%
- D: 80%

What may be an advantage of the addition of a pharmacist on the healthcare team to provide patient education?

- A More frequent identification and resolution of issues in real time
- B The ability to provide clear indications, benefits, and patient motivation
- C Recognizing the most common and pertinent side effects out of them
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-662L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

**LEVERAGING A REMOTE DISPENSING SITE TO INCREASE AMBULATORY CARE PHARMACIST SERVICES AT A NEW PATIENT CENTERED MEDICAL HOME**

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**Purpose:** Healthcare is migrating from a fee-for-service, volume-based treatment model to a pay-for-performance, value-based management model focused on high-quality, patient-centered care provided by a multidisciplinary team. Studies have demonstrated medication-related problems pose significant threats to patient safety and cause substantial economic burden for healthcare systems. Pharmacists are well-equipped to manage medications through direct patient care activities, but justification of pharmacist resources can potentially be a barrier. The purpose of this project is to create an onsite remote dispensing site (RDS) at a new patient-centered medical home (PCMH) with the goals of increasing access to prescription medications and expanding availability of ambulatory care pharmacist services by leveraging efficiencies of telepharmacy technology and revenue generated from prescription capture. **Methods:** This service line development project was deemed exempt from review by the Institutional Review Board. Based on projected primary care provider visits at a new PCMH, the operating budget included a part-time pharmacist to provide ambulatory care services. Pharmacy leadership strategized approaches to gain efficiencies and generate revenue to support increasing the availability of ambulatory care pharmacist services. A business plan was developed detailing a proposal for resources to implement a RDS, including a financial analysis and a return on investment calculation. The RDS will be staffed by a technician pursuant to Wisconsin state law and will be managed by a hospital's outpatient pharmacy. Telepharmacy technology will be deployed to assist pharmacists with virtual prescription verification and patient counseling responsibilities. The project was submitted to and approved by PCMH administration. Leaders from project management and lean departments will assist with RDS implementation, contributing expertise in timeline construction, workflow development, and product sourcing. **Results/Conclusion:** Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Define a remote dispensing site according to Wisconsin state law  
Explain the benefits of a remote dispensing site

**Self Assessment Questions:**

According to Wisconsin state law, what is a remote dispensing site?

- A A licensed pharmacy
- B: An automated dispensing cabinet
- C: A dispensing site that is not licensed as a pharmacy
- D: A supervising pharmacy

What is a benefit provided by a remote dispensing site?

- A Prescription services where a traditional pharmacy is not financially viable
- B A loophole to avoid complying with pharmacy laws
- C Less access to prescription services to patients
- D Lower quality service to patients

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-890L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF A COST-SAVINGS INITIATIVE FOR USE OF LIPOGLYCOPEPTIDE ANTIBIOTICS IN THE EMERGENCY DEPARTMENT

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**Purpose:** Two long-acting lipoglycopeptide antibiotics were FDA approved in 2014 for the treatment of acute bacterial skin and skin-structure infections (ABSSSI) associated with gram positive organisms. Treatment with a long-acting lipoglycopeptide may decrease hospitalizations and healthcare associated costs. The purpose of this study is to determine the cost savings associated with administration of a long-acting lipoglycopeptide antibiotic in the emergency department (ED) versus inpatient admission with multiple doses of intravenous (IV) antibiotics. **Methods:** This study was approved by the Institutional Review Board of Presence Saint Joseph Medical Center. A retrospective chart review and analysis will be conducted on adult patients admitted through the ED and treated for ABSSSI with IV antibiotics between January 1, 2015 and March 31, 2015. Patients were excluded from review if diagnosed with sepsis or septic shock, neutropenia, suspected bacteremia, or skin infections suspected to be polymicrobial or associated with gram negative organisms. Data collection will include current therapy options used for ABSSSI, treatment duration and cost of inpatient therapy. The primary outcome of the study is to determine the average cost of hospital stay and average cost of antibiotic therapy for patients admitted through the ED for ABSSSI. Secondary outcomes will include a cost analysis of projected use of a lipoglycopeptide antibiotic in treating ABSSSI in the ED. With the data collected through retrospective review, a protocol will be developed in collaboration with the antimicrobial stewardship committee to determine which patients would be ideal candidates for treatment with a long-acting lipoglycopeptide antibiotic in the ED. **Results/Conclusions:** Data collection for this research is currently ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify what patient population would be candidates for outpatient treatment of acute bacterial skin and skin-structure infections (ABSSSI) with a long acting lipoglycopeptide

Recognize which patient population would require empiric coverage for MRSA for the treatment of acute bacterial skin and skin-structure infections (ABSSSI)

### Self Assessment Questions:

Which of the following patients would be a candidate for outpatient management of ABSSSI with a long acting lipoglycopeptide?

- A Patient with lower extremity cellulitis and sepsis
- B: Patient with purulent cellulitis after dog bite
- C: Patient with purulent cellulitis of the leg failing outpatient treatment
- D: Patient with nonpurulent cellulitis with no risk of MRSA

Which of the following patients would NOT require empiric MRSA coverage?

- A Patient with purulent cellulitis of the upper extremity
- B Patient with nonpurulent cellulitis failing outpatient treatment with c
- C Patient with cellulitis of the upper arm in IV drug user
- D Patient with nonpurulent cellulitis without prior history of MRSA inf

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-663L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPROVING TRANSITIONS OF CARE THROUGH PHARMACIST-LED DISCHARGE COUNSELING ON AN ACUTE INPATIENT PSYCHIATRIC UNIT

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**Background:** Transitions of care are vulnerable to medication errors. One in eight patients have been found to experience an adverse drug event when discharged from the hospital to the home setting. Commonly, psychotropic medications are implicated in adverse drug events leading to hospital admission. The mental health patient population is particularly susceptible to adverse drug events due to the barriers imposed by their psychiatric illness. Evidence has clearly indicated that when pharmacists are involved in transitions of care, readmissions are prevented, the quality of the discharge process is improved, and the number of preventable adverse drug events is decreased. **Objectives:** 1. Implement a pilot, pharmacist-led discharge counseling service on an acute inpatient psychiatric unit. 2. Reduce medication-related errors during the discharge process. 3. Assess healthcare provider satisfaction with the pilot discharge counseling service. **Methods:** Pharmacists and pharmacy trainees provided medication discharge counseling from August 31, 2015 through October 31, 2015. Patients were excluded from receiving the service if they left against medical advice, refused the service, were discharged to a residential treatment program, or were discharged to a facility where medications are not self-managed. The following data was collected and will be analyzed using descriptive statistics: Demographic variables (age, gender, race), number of new medications prescribed upon discharge, number of medications filled upon discharge, number and type of pharmacist interventions made, and the time spent on the counseling process. A five-question survey assessing healthcare provider satisfaction with the pilot program was conducted at the end of the eight-week period. As a quality improvement project, IRB approval was not required. **Outcomes:** The number and types of pharmacist interventions made will be reported along with the results of the provider satisfaction survey.

### Learning Objectives:

Explain the importance of pharmacist-led discharge counseling on an inpatient psychiatric unit.

Identify types of interventions often made by a pharmacist upon discharge from an inpatient psychiatric unit.

### Self Assessment Questions:

Which of the following is a barrier faced by the mental health patient population that can contribute to adverse drug events?

- A Complex medication regimens
- B: Decreased ability for self-cares
- C: Medication non-adherence
- D: All the above

Which of the following is a medication-related error that could be prevented through pharmacist-led discharge counseling on an inpatient psychiatric unit?

- A Duplication in therapy
- B Lack of follow-up for injection administration
- C Non-adherence
- D All the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-966L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECTS OF SEDATIVE SELECTION AND DOSE FOR EMERGENCY DEPARTMENT PROCEDURAL SEDATION ON ADVERSE EVENTS AND LENGTH OF STAY

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**Purpose:** Procedural sedation is utilized in the emergency department to reduce pain and anxiety associated with emergent procedures. To account for significant cardiopulmonary risks, the American Society of Anesthesiologists recommends routinely monitoring hemodynamics and pulmonary function. The World Society of Intravenous Anaesthesia also advocates for measuring the rate and intensity of interventions used to stabilize patients. Propofol, ketamine, midazolam, and etomidate, are commonly used. Despite known differences in safety profile, drug choice largely relies on patient characteristics and physician preference. This study aims to identify local prescribing patterns associated with adverse effects, need for intervention, and length of stay in three community hospital emergency departments. **Methods:** Patients will be identified from emergency department documentation of sedation. Data will be collected from emergency department and inpatient documentation. This will include sedative drug and dose, analgesic choice and dose, pain, Aldrete score, airway assessment, type of procedure, blood pressure, heart rate, respiratory rate, oxygen saturation, adverse events, length of stay, patient disposition, and required interventions. Demographics will include age, sex, race, weight, height, and history of chronic obstructive pulmonary disease, asthma, acute coronary syndromes, stroke, seizures, alcohol abuse, liver disease, and congestive heart failure. Propofol, ketamine, etomidate, "ketofol," and midazolam will be compared based on airway interventions, hemodynamic interventions, adverse events, and length of stay. Fishers test will determine differences between event rates. The difference in means will be used to compare drug doses. Other predefined adverse events include systolic blood pressure greater than 180 mmHg or less than 90 mmHg, diastolic blood pressure less than 60 mmHg, oxygen saturation less than 90 percent, and respiratory rate less than 10 breaths per minute. At time of submission, the study is pending institutional review board approval. **Results/Conclusions:** Results and conclusions will be presented at the time of the conference.

### Learning Objectives:

Identify the parameters associated with different levels of sedation, as defined by the American Society of Anesthesiologists.  
Describe the pharmacokinetics and pharmacodynamics associated with agents commonly used for procedural sedation.

### Self Assessment Questions:

According to the American Society of Anesthesiologists, which of the following observations is MOST consistent with a moderate level of sedation?

- A Purposeful response to painful stimulation
- B: Purposeful response to verbal stimulation
- C: Airway is unaffected
- D: Spontaneous ventilation is frequently inadequate

Which sedative agent is associated with the longest initial half-life?

- A Propofol
- B Etomidate
- C Midazolam
- D Ketamine

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-664L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF BISPECTRAL INDEX FOR MONITORING SEDATION IN PATIENTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME ON CONTINUOUS NEUROMUSCULAR BLOCKER AGENTS

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**Background:** For patients with acute respiratory distress syndrome (ARDS) requiring neuromuscular blocking agents (NMBA), there are only weak recommendations in the pain, agitation, and delirium guidelines for the monitoring of sedation depth utilizing objective measures such as bispectral index monitoring (BIS). The primary study supporting the use of continuous NMBA in patients with severe ARDS achieved deep sedation prior to initiation of NMBA and maintained a constant sedative infusion rate throughout the duration of NMBA. BIS, an objective measure of sedation validated in patients receiving propofol, has been advocated for monitoring sedation depth in patients on NMBA. In practice, although clinicians have the option to monitor and titrate sedation in these patients utilizing BIS, it is not well established what effect BIS-targeted sedation titration has on sedation exposure or clinical outcomes. **Objective:** To compare the safety and effectiveness of monitoring of sedation with or without BIS for patients with ARDS receiving NMBA. **Methodology:** A non-interventional, retrospective cohort study was completed. The primary outcome was to compare sedation requirements for patients on NMBA receiving sedation titrated with BIS or without BIS. Secondary objectives were to compare differences in clinical outcomes between sedation strategies, including ventilator-free days, ICU-free days, coma-free days, delirium-free days, and incidence of self-extubation. Patients admitted to the ICU with confirmed ARDS who received continuous NMBA were evaluated and separated into cohorts by the presence or absence of BIS titration parameters in the sedative administration instructions while receiving NMBA. Data describing baseline characteristics, total daily sedation and opiate exposure, and clinical outcomes were collected. Nominal data was analyzed using the Chi-Square or Fishers Exact test, as appropriate. Continuous data was analyzed using the Students t-Test or the Mann-Whitney U-Test, as appropriate. Multivariable regression analyses were performed. **Results and conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the management of sedation in patients receiving neuromuscular blockers in the ICU.  
Identify the indications for utilization of BIS in the ICU.

### Self Assessment Questions:

For patients receiving continuous infusion neuromuscular blockers, how is sedation managed?

- A Light sedation to reduce time on mechanical ventilation
- B: Deep sedation prior to initiation of neuromuscular blocker
- C: Neuromuscular blockers are sedating and only analgesia is necessary
- D: Deep sedation titrated to goal after the addition of neuromuscular blocker

According to 2013 pain, agitation, and delirium guidelines, BIS and other processed EEG should be used adjunctively to monitor sedation in which situations?

- A Sepsis
- B Seizures
- C Neuromuscular blockade
- D Elevated intracranial pressure

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-665L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A HEALTH-SYSTEM WIDE ANTIMICROBIAL STEWARDSHIP PROGRAM AT TWO REMOTE COMMUNITY HOSPITALS

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**Purpose:** Bacterial infections have always been a challenge to our healthcare system. In recent years, this issue has been growing at an alarming rate. Healthcare acquired infections plague our institutions and antimicrobial resistance is on the rise. Recently, the CDC has indicated that antimicrobial resistance has been shown to cause about 23,000 deaths and approximately two million illnesses per year. In addition to causing patient harm, antimicrobial resistance is responsible for costing our healthcare systems between 20 and 38 billion dollars annually (2008 dollars). In response to this growing issue, the Centers for Medicare and Medicaid Services (CMS) and the Joint Commission (JC) have instituted a mandate that all acute care health facilities adopt an antimicrobial stewardship program (ASP) by 2017. This mandate stems from the National Action Plan for Combating Antibiotic-Resistant Bacteria published by the federal government in March 2015. The new mandate for implementing ASPs at all acute healthcare facilities has led to challenges for smaller institutions throughout the country. Ideally, all of these ASPs would fall in line with the ASP initiatives as outlined by the guidelines, but this may not be realistic for smaller institutions. Munson Healthcare is an eight-hospital health-system in northern Michigan. Many of the institutions within Munson Healthcare do not have the adequate resources to run an optimal ASP. As a solution, Munson Healthcare is in the process of creating a health-system wide ASP based out of the largest institution, Munson Medical Center. **Objective:** The primary objective of this pilot study is to determine if the implementation of a health-system wide antimicrobial stewardship program (ASP) at two remote community hospitals is a viable option in improving patient outcomes, slowing the growth of antimicrobial resistance, and decreasing health-system costs.

**Results:** Initial results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the five pharmacy-driven interventions outlined in the CDC Checklist for Core Elements of Hospital Antibiotic Stewardship Program.  
Identify strategies to overcome challenges that may be present when implementing an antimicrobial stewardship program at an outlying affiliate institution within a health-system

### Self Assessment Questions:

Which of the following is listed as a pharmacy-driven intervention outlined in the CDC Checklist for Core Elements of Hospital Antibiotic Stewardship Programs?

- A: Reporting cases of C. difficile within the institution
- B: Dose adjustments in cases of organ dysfunction
- C: Distribution of current antibiogram to prescribers
- D: Restricted antimicrobial list

An infectious diseases (ID) pharmacist is working with ID physicians to expand their institution's antimicrobial stewardship program to a newly acquired affiliate hospital. Hospital leadership is working

- A: "Tele-stewardship"
- B: Unit specific antibiograms
- C: Renal dose adjustment policies
- D: Prospective audit & feedback

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-891L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## INCIDENCE OF THROMBOCYTOPENIA IN PULMONARY ARTERIAL HYPERTENSION (PAH) TREATMENT

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**Purpose:** Pulmonary arterial hypertension (PAH) is a rare cause of pre-capillary pulmonary hypertension (PH) that is associated with high mortality rates. Current guideline recommendations suggest the use of parenteral prostacyclins for the treatment of patients in functional classes III and IV. An unclear disorder of platelets leading to thrombocytopenia has been reported in patients receiving prostacyclins. Available data describing the incidence and time to onset of thrombocytopenia in this patient population are limited. The purpose of this study is to describe the incidence and characteristics in PAH patients who received either oral, IV, subcutaneous, or inhaled therapies for PAH at Indiana University Health. **Methods:** Patients aged 18 years and older receiving treatment for PAH (oral, IV, subcutaneous, or inhaled therapy) at an Indiana University Health facility, who had a prior to treatment initiation right-heart catheterization and platelet count were eligible for inclusion in this retrospective study. PAH patients with HIV or liver disease were excluded. The primary endpoint is to compare the incidence of thrombocytopenia (platelets < 150,000/ml) in patients receiving IV or subcutaneous therapy compared to oral and inhaled therapies. Data collected included baseline characteristics, PH etiology, hemodynamic indexes, medication use, baseline, day of therapy start, time to thrombocytopenia and time to and mode of thrombocytopenia recovery were recorded. Categorical data will be reported using chi-square test or Fisher's exact as appropriate. Continuous variables will be reported using Student's t test with Bonferroni's correction as appropriate. **Results/Conclusion:** Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the mechanism by which PAH pharmacotherapy may cause thrombocytopenia.

Identify the PAH pharmacotherapy most likely to induce thrombocytopenia in patients with PAH.

### Self Assessment Questions:

What is/are the hypothesized mechanism(s) by which PH pharmacotherapy causes thrombocytopenia?

- A: Antibody-mediated
- B: Lung vasculature destruction
- C: Fc-mediated platelet activation/destruction via reticuloendothelial system
- D: All of the above

Which of the following pharmacotherapy has been associated with thrombocytopenia?

- A: Ambrisentan
- B: Sildenafil
- C: Epoprostenol
- D: Treprostinil

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-666L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## CLINICAL AND ECONOMIC IMPACT OF PHARMACIST INVOLVEMENT IN A HEPATITIS C CLINIC

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**Statement of Purpose:** Based on recent updates in hepatitis C treatment guidelines and the high cost of therapy, insurance formulary decisions and approval criteria have made it a challenge to ensure patients receive treatment. A pharmacist is in a unique position to play an integral role in medication management and insurance assistance for hepatitis C patients. This study will evaluate the clinical and economic benefit of pharmacist integration into the Gastroenterology Clinic at University of Louisville (UofL GI) by reviewing the time from initial work-up to treatment initiation, cost of treatment, adherence rate and virologic response. **Methods:** This single center retrospective analysis enrolled patients that were treated for hepatitis C at the UofL GI Clinic between January 2014 and December 2015. Patients who were ineligible for treatment based on life expectancy or continued substance abuse were excluded. An electronic query of patients receiving hepatitis C treatment through UofL GI Clinic and pharmacy fill records were obtained for data extraction. For each patient, vital signs, treatment history, hepatitis C genotype, presence of cirrhosis, and laboratory results (baseline, 0, 4, 12, 24 and 36 week) were analyzed. Pharmacy records including insurance provider, prior authorization and payment analysis, and time to prescription approval were recorded. The primary clinical outcomes were defined as the percent of patients with each genotype reaching a sustained virologic response 12 weeks post-therapy completion, and percent of patients requiring pharmacist intervention. The economic outcomes included percent of treatment paid for by the patient and insurance company, percent of patients utilizing patient assistance programs, and time from prescription submission to treatment approval. Descriptive statistics were used to analyze all data. **Results:** To be presented at the Great Lakes Pharmacy Resident Conference **Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Describe the first line treatment regimens available for patients with hepatitis C  
Identify appropriate pharmacist roles for the management of patients with hepatitis C

### Self Assessment Questions:

Based on current AASLD guidelines, which of the following is the most appropriate first line treatment regimen for a patient with hepatitis C?

- A: PEG Interferon and Ribavirin
- B: PEG Interferon and Sofosbuvir
- C: Sofosbuvir and Dasabuvir
- D: Sofosbuvir and Ledipasvir

What is the first step an ambulatory care pharmacist should take before recommending a therapy for hepatitis C?

- A: Determine what prior authorization form must be submitted to the
- B: Perform a complete medication history and reconciliation
- C: Recommend the physician order a liver biopsy
- D: Submit an appeal to the patient's insurance company

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-667L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## MEASURING THE IMPACT OF SPECIALTY PHARMACY SERVICES ON ADHERENCE IN A CYSTIC FIBROSIS PATIENT POPULATION

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**Purpose:** This project will measure cystic fibrosis (CF) medication adherence rates before and after implementation of specialty pharmacy services at a free-standing children's hospital serving approximately 500 pediatric and adult CF patients. Patients managed by commercial specialty pharmacies may experience significant barriers to accessing specialty medications, which may lead to poor adherence. This project aims to increase patient access and improve adherence rates by providing in-house specialty pharmacy services to patients and delivering education and counseling by a pharmacist in the CF clinic.

**Methods:** This IRB-exempt, quality improvement study is a retrospective analysis of prescription claims and medical records. Patients included in the study were prescribed at least one of five CF specialty medications intended for chronic use. Six potential therapy combinations were also identified and assessed for adherence. Chart reviews were conducted to assess the patients intended medication regimen. Baseline demographics will be assessed using descriptive statistics. Adherence scores will be calculated using the Medication Possession Ratio (MPR) and Proportion of Days Covered (PDC) equations. The adherence scores will be compared before and after implementation using the chi-squared test to measure the impact of providing in-house specialty pharmacy services. The secondary measure assessed will be the time to treatment for each of the five CF specialty medications. Time to treatment will be calculated as the average number of days between the date that the prescription was written and the date that the prescription was filled based on claims data. Patient and staff satisfaction will also be evaluated using an internally validated survey. **Results/Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Explain two common measures of medication adherence: medication possession ratio (MPR) and proportion of days covered (PDC).  
Identify the impact of an in-house specialty pharmacy on adherence measures in a cystic fibrosis patient population.

### Self Assessment Questions:

What are some benefits of an in-house specialty pharmacy for patients and families?

- A: Pharmacists have access to the patient's medical record
- B: Increased patient convenience via picking up medications during a
- C: Reduced out-of-pocket costs for prescriptions
- D: Both A and B

What is one advantage of using proportion of days covered (PDC) to calculate adherence versus medication possession ratio (MPR)?

- A: PDC can be calculated to consider adherence to all medications in
- B: PDC can be greater than 100%
- C: PDC accounts for later-than-expected first refills due to delays in p
- D: Both A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-892L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

**PERI-PROCEDURAL INTERNATIONAL NORMALIZED RATIO (INR) CONTROL IN PATIENTS RECEIVING CONTINUOUS WARFARIN THERAPY FOR CATHETER ABLATION OF ATRIAL FIBRILLATION**

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Purpose: Continuous warfarin therapy is a recommended strategy in patients undergoing ablation for the treatment of atrial fibrillation. Tight peri-procedural INR control is important to prevent bleeding and thromboembolic complications. The objective of this study is to describe peri-procedural INR control and factors associated with non-therapeutic post-ablation INRs in patients undergoing catheter ablation to treat atrial fibrillation. A secondary objective is to evaluate the impact of a supra-therapeutic post-ablation INR and dose adjustment on the next clinic INR. This information will allow clinicians to better manage warfarin regimens peri-procedurally and identify patients who may experience non-therapeutic post-ablation INRs. Methods: This is a retrospective cohort study of patients seen between July 21, 2009 and December 1, 2015 in the pharmacist-managed anticoagulation clinic and treated with continuous warfarin therapy for catheter ablation of atrial fibrillation. Patients will be excluded if the last pre-ablation INR was drawn more than 24 hours prior to ablation, first post-ablation INR was drawn more than 48 hours after ablation, and if any vitamin K or fresh frozen plasma was required during the procedure. The following data will be collected: patient age, sex, ethnicity, CHADS2 score, and other pre-specified data to aid the investigation. For the primary outcome, post-ablation INR control will be described as the proportion of patients with INRs that are: sub-therapeutic, therapeutic, and supra-therapeutic as well as those with a 0.5 or greater change in INR from pre- to post-ablation. The secondary outcome will be described as the proportion of subsequent INRs that were: sub-therapeutic, therapeutic, and supra-therapeutic following an initial supra-therapeutic post-ablation INR after a dose was held, lower dose administered, or usual dose administered. Predictors of non-therapeutic post-ablation INRs will also be assessed. This study has been approved by the Institutional Review Board. Results/Conclusion: Results and conclusion will be presented at the Great Lakes Residency Conference.

**Learning Objectives:**

Describe the non-pharmacologic treatment alternatives for managing atrial fibrillation

Discuss the current data regarding peri-procedural anticoagulation management for patients undergoing ablation to treat atrial fibrillation

**Self Assessment Questions:**

Which of the following is an indication for catheter ablation?

- A: Torsades de pointe
- B: Wenckebach's block (mobitz type I second degree heart block)
- C: Paroxysmal or persistent atrial fibrillation
- D: Complete heart block (third degree heart block)

Anticoagulation should be continued for at least \_\_\_\_\_ after catheter ablation?

- A: 30 days
- B: 60 days
- C: 90 days
- D: 180 days

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-668L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

**SEPSIS DETECTION AND TIME-TO-TREATMENT: IMPLEMENTING PROCESS IMPROVEMENTS TO ENSURE CORE MEASURE COMPLIANCE**

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Purpose: Sepsis is the result of a systemic reaction to an infection. If left untreated, sepsis may rapidly progress to severe sepsis (sepsis with organ dysfunction or tissue hypoperfusion) and septic shock (severe sepsis with hypotension refractory to fluids). Treatment of severe sepsis and septic shock has focused on rapid and aggressive management. Implementation of sepsis bundles has been encouraged by the Surviving Sepsis Campaign. These bundles include specific actions to be completed within 3 hours and 6 hours of the recognition of sepsis, respectively. As of October 2015, the Centers for Medicare and Medicaid Services (CMS) have mandated that bundle compliance be assessed via chart abstraction, and completion of bundles will likely be tied to institutional reimbursement. At UW Health, a preliminary sample revealed 43 percent bundle compliance. The purpose of this project is to improve compliance with the sepsis bundles. Methods: Strategies for improving detection and treatment of severe sepsis and septic shock from the literature and from other institutions experience will be evaluated. A search of PubMed as well as online forums for electronic medical record communities and email communications were assessed. The project team will include physician, nursing, and pharmacy members from the emergency department, critical care, and general care areas in addition to information technology and quality staff. Electronic alerts for sepsis detection, decision support tools for ordering sepsis bundle elements, and electronic tools for documentation will be drafted by the project team and implemented within the UW Health electronic medical record. Data will be collected via abstraction monthly to assess core measure compliance. Results: Expected results include creation of electronic tools for sepsis alerts, decision support, and documentation, in addition to data measuring overall sepsis core measure compliance. Conclusions: To be presented at the Great Lakes Residency Conference.

**Learning Objectives:**

Define the requirements of the Centers for Medicare and Medicaid Services (CMS) core measure for sepsis.

Identify implications of the core measure for practice at the institutional and practitioner level.

**Self Assessment Questions:**

What actions are required in the 3 and 6 hour bundles for the treatment of a patient with severe sepsis?

- A: Initial lactate, blood cultures, administration of antibiotics only
- B: Initial lactate, repeat lactate (if elevated initially), blood cultures, ar
- C: Initial lactate, repeat lactate (if elevated initially), blood cultures, ac
- D: Initial lactate, repeat lactate (if elevated initially), blood cultures, ar

What is the most appropriate antibiotic regimen for treatment of a septic patient (without evidence of organ dysfunction) with a suspected urinary source if the provider wishes to meet CMS requirement

- A: Vancomycin, piperacillin-tazobactam, and tobramycin
- B: Moxifloxacin
- C: Ciprofloxacin
- D: Ceftriaxone

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-669L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATING TRANSITIONS OF CARE SERVICES PERFORMED BY PHARMACISTS IN HIGH RISK PATIENTS

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**Purpose:** Transitions of care (TOC) services are a growing field in health care in order to decrease medication errors and hospital readmissions. Opportunities for pharmacists include obtaining accurate medication histories, medication reconciliation review at admission, transfer, and discharge, as well as discharge counseling and follow-up. Pharmacists complete superior medication histories and have been rated as very helpful by patients receiving medication counseling. The purpose of this study is to assess the implementation of pharmacist provided TOC services on 30-day hospital re-admission rate, patient satisfaction, and appropriateness of medication therapy in high-risk patients admitted to a community hospital. **Methods:** This study was approved by the institutional review board at Franciscan Saint Margaret Health (FSMH). Patients were included if they were 18 years of age or older and received TOC services by a pharmacist. The Electronic Health Record (EHR) was used to identify patients. TOC services included obtaining a complete medication history, admission medication reconciliation review by a pharmacist, daily clinical management, discharge medication reconciliation review and counseling by a pharmacist, and follow-up telephone call post-discharge. Basic demographic information, past medical history, workflow information, and pharmacist interventions were collected. Re-admission rates were obtained from system readmission reports. Patient satisfaction scores were collected from Hospital Consumer Assessment of Healthcare Providers and Systems Survey (HCAHPS) scores. The investigators compared a time period pre- and post-implementation of these services (July- September 2015). **Results:** A total of 122 patients were included. Pharmacists performed an average of 4 interventions per patient. HCAHPS scores for understanding the purpose of taking your medications at discharge increased from 45.7% to 51.4% and 48.3% to 61.5%. Re-admission rates will be presented at the Great Lakes Pharmacy Residency Conference. **Conclusion:** Overall, pharmacists identify errors and intervene at each transition of care. Impacting readmission rates consistently will likely require a multidisciplinary approach.

### Learning Objectives:

Identify types of pharmacist activities during transitions of care  
List common types of errors that pharmacists may identify and intervene on from patient admission to home

### Self Assessment Questions:

What are ways that a pharmacist can assist in the continuation of care from admission to home?

- A Perform medication histories and admission medication reconciliation
- B: Perform discharge medication reconciliation review
- C: Perform patient counseling and provide follow-up phone call 48-72
- D: All of the above

Which of the following is a common error pharmacists identify and intervene on during transitions of care?

- A Violating HIPAA privacy laws
- B Missing guarantor information
- C Medication omission
- D Losing patients personal belongings

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-893L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF MIC DATA TO DETERMINE THE IN VITRO BENEFIT OF COMBINING ANTIBIOTICS FOR DOUBLE COVERAGE OF PSEUDOMONAS AERUGINOSA AND OTHER GRAM NEGATIVE BACILLI AT A LARGE ACADEMIC CENTER

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**Purpose:** Practitioners are taught that patients presenting with risk factors for infection with multi-drug resistant organisms, such as *Pseudomonas aeruginosa*, should be empirically treated with a combination of antibiotics that increase the likelihood of adequately covering the infecting organism. Current literature fails to definitively support this practice. The primary objective of this study was to determine the extent of the benefit of adding a non-lactam anti-Pseudomonas agent to a -lactam or -lactam-like anti-Pseudomonas agent for double coverage of *Pseudomonas aeruginosa*. The secondary objective was to determine if the same double coverage regimens were beneficial in the treatment of -lactam-resistant *Escherichia coli* and *Klebsiella* species. Additionally, regimens containing levofloxacin as the primary agent were studied due to the incidence of anaphylactic penicillin allergies within the patient population. **Methods:** This was a single center, retrospective chart review of blood, sputum, and urine specimens growing *Pseudomonas aeruginosa*, *Escherichia coli*, or *Klebsiella* spp from January 1st, 2014 to December 31st, 2014. Cultures were included for evaluation if it was the first culture per source per patient (age 18 years or older) for the year. Exclusion criteria were as follows: sputum cultures from patients with cystic fibrosis, and any culture subsequent to the first culture from a given site from the same patient. Data collection included: source of specimen for culture, and susceptibilities of the organism cultured to piperacillin-tazobactam, cefepime, meropenem, aztreonam, levofloxacin, gentamicin, tobramycin, and amikacin. The susceptibilities were then cross-checked to determine the percentage of organisms sensitive to a non-lactam antibiotic when non-susceptible to the -lactam-like antibiotic. Cross-checking was also performed to determine the percentage of organisms sensitive to an aminoglycoside antibiotic when non-susceptible to levofloxacin because this is a potential double-coverage combination for penicillin-allergic patients. **Results and Conclusions** will be presented at the Great Lakes Residency Conference in April 2016.

### Learning Objectives:

Identify potential adverse effects of using two antimicrobial agents empirically for potential *Pseudomonas aeruginosa* infections  
Recognize the risk factors associated with -lactam resistant Gram-negative infections that may require the use of empiric double gram-negative antibiotic coverage

### Self Assessment Questions:

Which of the following is a potential adverse effect of using levofloxacin in combination with an anti-pseudomonas -lactam antibiotic for healthcare-associated pneumonia?

- A Increased risk of developing *Clostridium difficile* infection
- B: Increased bacterial resistance development to the  $\beta$ -lactam antibiotic
- C: Increased risk of liver failure
- D: Increased mortality

For which of the following patients would double-coverage with two antibiotics active against *Pseudomonas aeruginosa* be most beneficial?

- A 62 year old patient with uncomplicated urinary tract infection who is
- B 62 year old, febrile patient with tachycardia and hypotension who is
- C 80 year old patient with cellulitis
- D Both A and B

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-670L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## OPTIMIZATION OF EMPIRIC THERAPY FOR URINARY TRACT INFECTIONS IN THE EMERGENCY DEPARTMENT: STRIKING THE BALANCE BETWEEN APPROPRIATE THERAPY WHILE AVOIDING UNNECESSARY EXPOSURES

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**Purpose:** Urinary tract infection (UTI) is one of the most frequent infections leading to emergency department (ED) visits. Patients arrive to the ED from a variety of locations including the community and various extended-care facilities. Additionally, patients might differ in their risk factors for drug-resistant organisms (DROs). The optimal antimicrobial regimens for these differing populations remains poorly defined, however they are often treated similarly. We, therefore, designed this analysis to develop a comprehensive strategy for managing UTI in the ED to ensure appropriate antimicrobial therapy, while limiting unnecessary antibiotic exposure. **Methods:** This study will be a retrospective analysis of adult patients with positive urine cultures obtained either in the ED or within 48 hours of admission at Sinai Grace Hospital from October 1, 2014 through October 31, 2015. Duplicate cultures and those cultures growing vaginal colonizers will be excluded. Patients will be identified via a query of the microbiological database, and the electronic medical record will be accessed to capture relevant clinical information. Data collected will include patient demographics, patients presenting location, comorbidities, signs and symptoms of UTI, antimicrobial resistance risk factors, antibiotic exposures, relevant microbiological and disposition data. Based on the collected data, multiple antibiograms will be generated based on the patients presenting location and/or presence of risk factors for DROs. These antibiograms will characterize the susceptibility of uropathogens meeting a given clinical scenario (e.g. community acquired) to commonly used antibiotics, thus furthering our understanding of available agents with acceptable activity. The empiric recommendations for antimicrobial therapy can then be made based off the patients presenting location, potential susceptibility profiles and the severity of illness of the patient with a goal of balancing the importance of appropriate empiric therapy and overuse of broad-spectrum antibiotics.

Data is currently under review and all results will be presented at Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Identify the differences in antimicrobial susceptibility in urinary organisms as a function of presenting location and antimicrobial resistance risk factors

Describe the patient populations where treatment for asymptomatic bacteriuria is appropriate

### Self Assessment Questions:

Which of the following are the risk factors for drug-resistant organisms?

- A Hospitalization > 2 days in the preceding 90 days
- B: Immunosuppressive therapy
- C: Community residence
- D: A & b

Which of the following should be treated appropriately for asymptomatic bacteriuria?

- A Pregnant women
- B Nursing home residents
- C Patients having urologic intervention
- D A & c

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-671L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## ELECTROLYTE ABNORMALITIES IN ICU PATIENTS RECEIVING PARENTERAL NUTRITION: INCIDENCE AND ASSOCIATED OUTCOMES

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**Purpose:** Malnutrition is common in the intensive care unit (ICU). Oral or enteral feeding is preferred whenever possible, and parenteral nutrition (PN) is reserved for patients with a nonfunctional gastrointestinal tract. One common complication of PN is electrolyte imbalances. Although studies have shown an association between various electrolyte abnormalities during critical illness and increased mortality, none of these studies have focused on patients receiving PN. The primary objectives of this study are to determine the incidence of electrolyte abnormalities in ICU patients receiving PN and to assess if any electrolyte abnormalities are associated with increased mortality.

**Methods:** A retrospective study was conducted in adult patients who received PN in the ICU for  $\geq 48$  hours at three Detroit Medical Center hospitals. Data collected included demographic and clinical characteristics, Acute Physiology and Chronic Health Evaluation II score, indication for PN, macronutrient doses, duration of PN in the ICU, electrolyte levels prior to starting PN (sodium, potassium, chloride, bicarbonate, calcium, magnesium, and phosphorous), lowest and highest value for each electrolyte while on PN in the ICU, mean blood glucose during PN, standard deviation of blood glucose levels, presence of hypoglycemia (blood glucose  $\leq 40$  and  $< 70$ ), whether the patient required mechanical ventilation or vasoactive support, length of ICU stay, hospital length of stay, ICU mortality, and in-hospital mortality. The incidence of mild, moderate, and severe electrolyte abnormalities were determined, and logistic regression was used to determine if any electrolyte abnormalities were associated with mortality or length of stay. Univariate and multivariate analyses were conducted. **Results:** N/A **Conclusion:** N/A

### Learning Objectives:

Discuss indications for initiating parenteral nutrition.

Explain causes of electrolyte abnormalities in patients receiving parenteral nutrition.

### Self Assessment Questions:

Which of the following patients should receive parenteral nutrition?

- A A patient who has just had enteral nutrition stopped because of ab
- B: An ICU patient with recent poor nutritional intake, actual body weight
- C: A well nourished patient who has not received any nutrition for 4 d
- D: A patient who has just been admitted to the ICU with severe upper

Which of the following is most likely to cause electrolyte abnormalities in patients receiving parenteral nutrition?

- A Extracellular shifting of electrolytes
- B Intracellular shifting of electrolytes
- C Appropriately customizing electrolyte doses for the individual patient
- D Consulting a specialized nutrition support service to write the parenteral

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-894L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## MATERNAL HIGH DOSE EXTENDED INTERVAL GENTAMICIN DOSING AND NEONATAL GENTAMICIN LEVELS IN CLINICAL CHORIOAMNIONITIS

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**PURPOSE:** Chorioamnionitis, an infection of the placental membranes (the chorion and the amnion) is a common complication of pregnancy. Treatment of chorioamnionitis consists of delivery of the fetus and administration of intrapartum antibiotics to reduce maternal and fetal complications. One of the recommended antibiotics used to prevent neonatal sepsis is gentamicin. Approximately 50% of the gentamicin dose administered to mom crosses the placental barrier. Gentamicin is known to be nephrotoxic and ototoxic at high levels. Serum trough levels <2mcg/mL are targeted to avoid nephrotoxicity. The purpose of this study is to identify a relationship between the maternal gentamicin dose and subsequent gentamicin serum concentration in baby. **METHODS:** This study is a single center retrospective chart review in a 99 bed Level IV Neonatal Intensive Care Unit at St. Vincent Womens Hospital in Indianapolis, IN. All women who were admitted to the high risk unit or to the labor and delivery unit at St. Vincent Womens Hospital between March 1st 2010 and December 31st 2014 were included if they received high dose gentamicin (5mg/kg IV Q24h) prior to delivery and if their baby had a gentamicin level obtained prior to administration of empiric antibiotics. Women who received lower doses of gentamicin, unidentifiable dyads (those patients for whom we could not match maternal and child medical records), and babies who did not have a documented gentamicin level were excluded from the study.

**RESULTS & CONCLUSION:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify when a patient may be at risk for developing gentamicin toxicity  
Recall the indication for gentamicin use in chorioamnionitis

### Self Assessment Questions:

A patient is considered at risk for developing nephrotoxicity from gentamicin if they have a gentamicin serum trough concentration greater than:

- A: 1mcg/mL
- B: 2mcg/mL
- C: 3mcg/mL
- D: 4mcg/mL

Gentamicin is used intrapartum in chorioamnionitis in order to:

- A: induce delivery of the fetus
- B: provide supportive care for the mom
- C: cover the microorganisms that cause neonatal sepsis
- D: cover the microorganisms that cause maternal chorioamnionitis

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-672L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## COMPARISON OF THE EFFICACY, SAFETY AND COSTS OF INTRAVENOUS NITROPRUSSIDE AND NICARDIPINE

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**Purpose:** Sodium nitroprusside (SNP) and nicardipine (NIC) are commonly used for hypertensive conditions which require rapid blood pressure control. Recently, drastic SNP acquisition cost increases have brought attention to the judicious use of cost-effective alternative medications. There are limited head-to-head studies comparing SNP and NIC in the settings of aortic dissection, post-operative hypertension, and hypertensive emergencies. The purpose of this study was to assess differences in blood pressure control, incidence of adverse effects, and associated costs observed between patients treated with intravenous NIC versus SNP. **Methods:** This investigation was a single-center, retrospective, observational cohort study approved by the Investigation Review Board at HFH. Patients older than 18 years who received at least 60 minutes of IV NIC or SNP between January and December 2015 were included. Patients were excluded if they were pregnant, were started on either medication while in the operating room, had acute decompensated heart failure, or received either medication for the management of hypertension in the setting of acute stroke. The primary efficacy endpoint was the difference in mean times to blood pressure goal between the two treatment groups. Secondary endpoint comparisons included percent of patients achieving blood pressure goal in 60 minutes, percent blood pressure reduction at 1, 6, 12, and 24 hours, number of medication dose adjustments, number of additional anti-hypertensives required, and incidence of adverse effects. Demographic data collected were summarized using descriptive statistics. Comparative statistics were used to analyze the clinical endpoints. These clinical endpoints were used to conduct a cost analysis comparison of SNP and NIC. **Results & Conclusions:** Will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the pharmacological and pharmacokinetic similarities and differences between sodium nitroprusside and nicardipine.  
Identify potential benefits of preferred nicardipine use over sodium nitroprusside in the management of hypertensive conditions

### Self Assessment Questions:

Which of the following pharmacodynamic or pharmacokinetic parameters is true for sodium nitroprusside?

- A: Sodium nitroprusside has a long half-life of 15-30 minutes.
- B: Sodium nitroprusside is a dihydropyridine calcium-channel blocker
- C: Sodium nitroprusside exerts its anti-hypertensive effect by decreasing preload
- D: Sodium nitroprusside increases preload in addition to anti-hypertensive effect

Which of the following benefits have been demonstrated with nicardipine use in clinical trials?

- A: Significant lowering of cardiac filling pressures from afterload reduction
- B: Fewer dose adjustments than with sodium nitroprusside to maintain blood pressure goal
- C: Greater blood pressure reductions as compared to sodium nitroprusside
- D: Significantly more successes in reaching goal blood pressure as compared to sodium nitroprusside

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-673L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## GEMCITABINE PLUS LIPOSOMAL DOXORUBICIN FOR RELAPSED REFRACTORY T-CELL LYMPHOMAS

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**Background/Rationale:** T-cell lymphomas account for approximately 10% of non-Hodgkins lymphomas (NHL) and typically have lower complete response rates and duration compared to other types of NHL. In the relapsed refractory setting, response rates to salvage therapy are generally poor, which highlights the need for more effective treatment regimens. Gemcitabine, a pyrimidine antimetabolite, has shown activity as a single agent in T-cell lymphomas with response rates of greater than 50% in the relapsed refractory setting. Liposomal doxorubicin, a newer formulation of conventional doxorubicin with a longer half-life and reduced cardiotoxicity, has also been shown to have activity in T-cell lymphomas both as a single agent and in combination with other chemotherapy, with response rates ranging from 40% to nearly 90%. Given the safety profile and activity of these agents in T-cell lymphomas and lack of alternative therapies, gemcitabine plus liposomal doxorubicin has been administered in the treatment of patients with relapsed refractory T-cell lymphomas who were ineligible for clinical trial and had no other treatment options. The main objectives of this study are to determine the response rate, median progression free survival, overall survival, and safety and tolerability of patients with relapsed refractory T-cell lymphomas treated with gemcitabine and liposomal doxorubicin. **Methods:** This was a single-center, retrospective, medical chart review study. All patients between 18 and 89 years old with relapsed refractory T-cell lymphomas who were treated with a combination of gemcitabine and liposomal doxorubicin between January 2009 and August 2015 were eligible for study inclusion. Data collection included patient demographics, diagnosis, current treatment regimen, previous and subsequent treatment regimens, best response, time to progression/death and toxicities. This study received institutional review board approval prior to data collection and analysis. **Results:** Data collection and analysis is ongoing. **Conclusions:** Final conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review current literature on the use of gemcitabine and liposomal doxorubicin in relapsed refractory T-cell lymphomas

Report the pathologic and radiologic responses as well as toxicity and safety data from patients who received combination gemcitabine and liposomal doxorubicin therapy for relapsed refractory T-cell lymphomas

### Self Assessment Questions:

The liposomal formulation of doxorubicin has been found to have which reduced toxicity?

- A Nephrotoxicity
- B: Cardiotoxicity
- C: Palmar-plantar erythrodysesthesia
- D: Mucositis

Which of the following is a dose-limited toxicity of gemcitabine?

- A Neurotoxicity
- B Nephrotoxicity
- C Myelosuppression
- D Gastrointestinal toxicity

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-674L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE IMPACT OF AN ANTIMICROBIAL PATIENT SCORING SYSTEM ON STAPHYLOCOCCUS AUREUS BACTEREMIA PRACTICE GUIDELINE COMPLIANCE

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**Purpose:** Staphylococcus aureus infections constitute a tremendous burden on hospitals in the United States. Multiple organizations have published practice guidelines to address this issue, aiming to optimize patients outcomes. Several commercially available clinical surveillance systems can further enhance clinical management by directing clinicians attention to specific high-risk patients, such as those with S. aureus bacteremia. However, acquiring the budget and the human resource to implement such systems may be rate-limiting steps. Thus despite tools to assist with patient identification, patients are still being managed outside of guideline recommendations, which has resulted in suboptimal outcomes. The purpose of this project is to develop an Antimicrobial Patient Scoring System (APSS) within our current EMR (Epic, Verona, WI). This system will assign a score to patients based on a positive blood culture for S. aureus, alerting the pharmacists to provide evidence based recommendations to the care team. We hypothesize that this intervention will improve the clinical practice guideline compliance for the management of S. aureus bacteremia at this practice site. **Method:** A retrospective review will be conducted for all patients with S. aureus bacteremia. The pre-group will include patients that were admitted from December, 2014 to February, 2015. The post-group will include patients that were admitted from December, 2015 to February, 2016. The primary objective is to evaluate the overall completeness of S. aureus bacteremia clinical practice guideline adherence before and after the implementation of APSS. Secondary objectives include the evaluation of the following: 1. time to intervention for each recommendation; 2. time to targeted antibiotic therapy for S. aureus bacteremia patients; and 3. the completeness for each individual recommendation adherence outlined in the clinical practice guideline. **Results and conclusion:** Data collection is currently in process. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the importance of creating a patient scoring system within a hospital's current Electronic Medical Record

Discuss the guideline recommended interventions that can improve S. aureus bacteremia patients outcome

### Self Assessment Questions:

Which of the following is true regarding creating a patient scoring system within a hospital's current Electronic Medical Record:

- A More costly than purchasing a clinical surveillance system from a third party
- B: Requires to maintain an interface
- C: Helps to direct clinicians' attention to specific high-risk patients
- D: Forces the clinicians to address the score by firing a pop-up window

Which of the following is the recommended intervention highlighted throughout the presentation:

- A Obtain serum creatinine daily
- B Place patients on a sequential compression device
- C Start patients on daptomycin for confirmed MRSA
- D Order repeat blood cultures

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-675L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE IMPACT OF THE IMPLEMENTATION OF THE EMERGENCY DEPARTMENT PHARMACIST

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**Purpose:** Multiple organizations, including the American Society for Health-System Pharmacists and the American College of Emergency Physicians, have recognized the importance of incorporating a pharmacist into the workflow of the emergency department. Suggested services to be performed by the emergency department pharmacist include medication reconciliation, participation in resuscitation, education of staff and patients, responding to drug information questions, and monitoring for drug interactions. In 2015, a four-hospital community health system dedicated at least four hours a day for a pharmacist at each hospital to spend in the emergency department. This project aims to capture the impact of the emergency department pharmacist and identify opportunities to maximize that impact with the resources available. **Method:** This evaluation was exempt from review by the Investigational Review Board. The primary objective was to objectively evaluate the impact of the emergency department pharmacist based on the number of medication reconciliations performed, patients educated, interventions identified, and pharmacy notes completed. This data was collected through retrospective chart review of all patients who were impacted by the emergency department pharmacists on Mondays through Fridays January 1, 2015 through March 31, 2015 between the time frame of 1300 and 1600. No exclusion criteria were identified. Data will be recollected during the same hours for early 2016 after implementation of recommendations for optimization of pharmacist services. The secondary objective was to subjectively evaluate the overall satisfaction of pharmacist services in the emergency department. A satisfaction survey was created using appropriate survey methodology and validated by a select group of nurses, physicians, and pharmacists. The survey was distributed to midlevel practitioners, nurses, physicians, and pharmacists. Descriptive statistics will be used to analyze the data collected. **Results and conclusion:** Results and analysis of the data are currently in progress. Final conclusions will be presented at the Great Lakes Pharmacy

### Learning Objectives:

Identify three types of services provided by the emergency department pharmacist and the advantages associated with implementing these services.

Describe the objective and subjective parameters that can be used to support a pharmacist in the emergency department.

### Self Assessment Questions:

American Society of Health-System Pharmacists recommends that emergency department pharmacists become involved in which activities

- A Documenting medication histories, participating in medical emerg
- B: Preparing medications and writing inpatient orders
- C: Obtaining intravenous access and administering routine medicatio
- D: Surveying patients for overall satisfaction of care in the emergency

Which of the following actions may be used to increase satisfaction of the emergency department pharmacist?

- A Decrease presence and visibility within the department
- B Limit communication tools to a single device, such as a pager
- C Set measurable workload goals and regularly reassess
- D Focus activities to medication dispensing

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-895L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECTS OF A NURSING-DRIVEN EMERGENCY DEPARTMENT PAIN PROTOCOL ON NUMBER OF DOSES OF PAIN MEDICATION RECEIVED, DEGREE OF PAIN REDUCTION, AND LENGTH OF STAY

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**Purpose:** Nursing-driven pain protocols increase the efficiency of treating patients presenting to the emergency department with acute pain. The objective of this study is to determine the extent to which a newly-implemented, nursing-driven pain protocol decreases patients length of stay in the emergency department and the number of doses of pain medications patients receive in the emergency department, as well as determine any change in degree of pain reduction compared to patients who presented prior to protocol initiation. **Methods:** A retrospective analysis was performed for patients who received medication to treat pain rated 7-10 on a ten point scale while in an emergency department. A group of patients identified prior to initiation of a nursing-driven pain protocol was compared to a group of patients identified after initiation of the protocol. Exclusion criteria included age <18 years, patients who are breastfeeding, who have pain located in the chest, or who take a chronic pain medication at the time of the emergency department visit. Patients were also excluded if the electronic medical record was inadequate to determine inclusion/exclusion criteria. The proportion of patients who got only one drug dose was compared pre- vs post-pain protocol implementation using Pearsons chi-square test. The mean time to the first drug dose (ED admission to start of drug) and mean time in the ED was compared pre- vs post-pain protocol implementation using a two-sample t-test, as was the mean difference between the initial pain score and after the first dose. **Results:** Results will be presented at the Great Lakes

### Learning Objectives:

Describe the benefits of utilizing a nursing-driven pain protocol  
Recognize the ideal way to dose morphine for acute pain in an emergency department

### Self Assessment Questions:

Which of the following is a reason to utilize a nursing-driven pain protocol in an emergency department?

- A Nurses are better able to identify an effective dose of pain medica
- B: It is more cost-effective to have nurses manage pain medication th
- C: Efficiency of pain management is improved by not requiring a doct
- D: Hospital admissions are reduced as a result of nursing managemen

Which of the following dosing strategies for morphine is most appropriate for treating acute pain in an emergency department?

- A Per pain level on a 1-10 pain scale
- B Weight-based
- C Tiered by age
- D Tiered by pain type

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-896L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## VALIDATION OF A HIGH-ALERT MEDICATION STRATIFICATION TOOL

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**Purpose:** To validate an objective tool designed to standardize the identification of high-alert medications (HAMs) according to patient safety risk. **Methods:** Medications were evaluated using a minimally modified version of the American Society of Health-Systems Pharmacists (ASHP) medication safety risk assessment tool, the High Alert Medication Stratification Tool (HAMST). The tool was validated by assessing medications on an organization-approved HAM list and comparing scores with control medications not included on the list. Due to variations in HAMST interpretation by end users in multidisciplinary committees, a revision of the scoring tool was completed to create the High Alert Medication Stratification Tool - Revised (HAMST-R) and the validation assessment was repeated. Both scoring tools range from 0 to 10, with 10 describing agents with highest patient safety risk.

**Results:** The median (IQR) initial HAM (n=44) score utilizing HAMST was 6 (5,7). The median (IQR) control (n=45) score was 1 (0,2). Utilizing the modified tool, HAMST-R, the median (IQR) HAM score was 4 (4,6) vs. 1 (0,1) for control medications. Scores for HAMs were significantly higher than controls utilizing both HAMST and HAMST-R [p<0.001]. Comparing HAMs, intravenous chemotherapeutics scored highest and fondaparinux scored lowest, with both tools. Combination opioid/acetaminophen products were among the highest scoring controls with both tools. HAMST-R scores of 4 or higher define medications as high alert because these scores include 75% of HAMs and no control medications. HAMST-R scores of 7 or higher identify the top 25% of HAMs, those with the highest risk to patient safety. **Conclusion:** Clarification of the ASHP patient safety risk assessment tool was required to increase its reliability and consistency by multidisciplinary users. The revised tool, HAMST-R, is now a validated, objective tool for standardized identification of HAMs. The tool may also be utilized for prospective formulary review of new medications for assessment of patient safety risk.

### Learning Objectives:

Discuss how high-alert medications are currently identified by healthcare institutions

Classify high-alert medications using HAMST-R, an objective scoring tool

### Self Assessment Questions:

High-alert medications are currently identified by which of the following methods?

- A Error reporting, expert consensus, and national safety organization
- B: Error reporting, expert consensus, and objective scoring tools
- C: Published literature, expert consensus, and objective scoring tools
- D: Error reporting, package inserts, and national safety organizations

Using the newly validated, objective high-alert medication scoring tool, HAMST-R, which of the following scores defines medications as high alert?

- A A score of 3 or higher
- B A score of 4 or higher
- C A score of 5 or higher
- D A score of 6 or higher

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-967L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## LACOSAMIDE VS. LEVETIRACETAM FOR PRIMARY PROPHYLAXIS OF EARLY SEIZURES IN NEUROCRITICAL CARE PATIENTS

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**Purpose:** Phenytoin (PHY) has traditionally been used for prophylaxis of early post-traumatic seizures in neurocritical care patients. Newer antiepileptic drugs (AEDs) have recently been introduced into clinical practice due to their favorable side effect profiles and lack of serum concentration monitoring requirements. Levetiracetam (LEV) and Lacosamide (LCM) have been emerging as alternative agents to PHY, but the literature that currently supports their use for primary seizure prophylaxis in neurocritical care patients is sparse. The aim of this study is to compare the incidence of early seizures in neurocritical care patients who receive LCM or LEV for primary seizure prophylaxis.

**Methods:** A retrospective chart review of all patients assigned an (ICD)-9 code for intracerebral hemorrhage, subarachnoid hemorrhage, or traumatic brain injury, who concurrently received LCM or LEV from January 1st 2012 to August 1st 2015 at the Detroit Medical Centers Detroit Receiving Hospital will be performed. Data collected will include patient demographics, past medical history, baseline laboratory values, dose and route of administration of AEDs, presence or absence of documented seizure(s), changes in the PR interval, changes in patient behavior, and any other significant adverse effect reported with the use of LCM or LEV. Patients with a known allergy to LCM or LEV will be excluded. The study's primary outcome is to evaluate the incidence of seizures in neurocritical care patients who receive LCM or LEV for primary prophylaxis of early seizures. The safety profile and side effects associated with the use of LCM and LEV will be assessed as a secondary outcome. Descriptive statistics will be used to analyze the primary and secondary outcomes. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the potential advantages and limitations for the use of lacosamide vs. levetiracetam for primary prophylaxis of early seizures in neurocritical care patients.

Describe the adverse effects associated with the administration of lacosamide and levetiracetam.

### Self Assessment Questions:

Which of the following statement is correct?

- A A. Lacosamide and levetiracetam are both FDA-approved for primary prophylaxis of early seizures in neurocritical care patients.
- B: Lacosamide and levetiracetam are both controlled substances (sc)
- C: Lacosamide and levetiracetam both require dosing adjustments in neurocritical care patients.
- D: Lacosamide and levetiracetam are both available as oral (PO) and intravenous (IV) formulations.

Which of the following adverse effect has been associated with the use of lacosamide?

- A Irritability
- B Hypertension
- C Prolonged PR interval
- D Aggressive behavior

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-676L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT AND IMPLEMENTATION OF A PROTOCOL FOR EPIDERMAL GROWTH FACTOR RECEPTOR INHIBITOR-ASSOCIATED PAPULOPUSTULAR RASH

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**Purpose:** Targeted therapy with epidermal growth factor receptor (EGFR) inhibitors can be very effective in malignancies that overexpress EGFR. Papulopustular rash, also called acneiform rash, is a hallmark adverse effect of EGFR inhibitors (EGFRIs). The severity of papulopustular rash can significantly affect patient compliance, quality of life, and may also lead to dose modifications of EGFR therapy resulting in decreased antineoplastic exposure that can impact patient outcomes. Currently, there is no institutional protocol for the treatment or prevention of EGFR-associated rash at the Richard L. Roudebush VA Medical Center. Standardization of rash management may improve patient outcomes through early treatment or prevention of a dose limiting toxicity, as well as increase provider efficiency and cost-effectiveness by directing providers to formulary treatment options. The primary objective of this project is to identify the need for standardized pre-emptive or reactive protocols for therapeutic management of EGFR-associated rash.

**Methods:** This project will consist of two phases. Phase I will include a retrospective chart review of approximately 100 patients to describe current management of EGFR-associated papulopustular rash. Adult patients who have received at least 1 dose of the following EGFR inhibitors from September 2010 to August 2015 will be included: cetuximab, panitumumab, afatinib, erlotinib, gefitinib, lapatinib, and vandetanib. Patients receiving EGFR therapy from a non-institutional provider or pharmacy at any point during therapy will be excluded. Data collected includes: patient age, race, gender, disease, EGFR therapy, EGFR therapy start/stop date, presence or absence of papulopustular rash, date rash noted, grade of rash, intervention(s) used for rash, start/stop date of intervention(s), duration of intervention(s), dose modifications to EGFR therapy, and date of dose modification to EGFR therapy. Phase II will utilize a retrospective chart review to assess clinical impact of any implemented protocols on patient outcomes.

**Results/Conclusions:** To be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize potential consequences of severe EGFR inhibitor-associated rash.

Describe strategies for pre-emptive or reactive management of EGFR inhibitor-associated rash.

### Self Assessment Questions:

Which of the following can occur as a result of severe papulopustular rash?

- A Reduced patient compliance
- B: Reduced quality of life
- C: Dose modifications leading to reduced antineoplastic exposure
- D: All of the above

Which of the following are crucial components to any pre-emptive rash protocol?

- A Patient compliance
- B Physician buy-in
- C Patient/caregiver education
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-677L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EFFECT OF MULTIDISCIPLINARY GROUP CLASSES AND TELEPHONE FOLLOW-UP ON CONGESTIVE HEART FAILURE (CHF) EXACERBATIONS IN VETERANS WITH CHF

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**Purpose:** Congestive heart failure (CHF) is a common indication for hospitalization and has a high thirty-day readmission rate. The objectives of this project are to evaluate the effect of multidisciplinary group classes and follow-up telephone calls by a pharmacist on CHF exacerbations in Veterans with CHF and provide support for the presence of a clinical pharmacy specialist in the Congestive Heart Failure Nurse Practitioner Clinic (BAC/CHF APN Clinic) at the Battle Creek Veterans Affairs Medical Center.

**Methods:** Ten Veterans were recruited from the BAC/CHF APN Clinic that had an ejection fraction less than forty percent. Each participant's chart will be reviewed in Computerized Patient Record System (CPRS) for information in the four months prior to enrollment up to the enrollment date to establish a baseline exacerbation rate. Exacerbations are defined as shortness of breath and/or weight gain leading to an increase in the dose of the participant's diuretic and/or hospitalization for CHF. The baseline exacerbation rate will be compared to the exacerbation rate determined via CPRS chart review during the four-month study period consisting of the multidisciplinary classes, follow-up phone calls, and an additional four weeks following the end of the study. Classes were taught every two weeks for a total of six weeks and covered disease state management and lifestyle modifications. During each session, participants were assessed and medications adjusted, as needed. After completion of the group course, follow-up phone calls were made on a weekly basis for eight additional weeks by the pharmacy resident to address any issues or questions. Secondary endpoints to be evaluated include quality of life and thirty-day readmission rate.

**Results/Conclusions:** A total of six Veterans participated in this pilot project. Data collection is in the initial stages. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify medications used in the treatment of congestive heart failure that have been shown to reduce morbidity and mortality.

Describe the potential roles of a clinical pharmacist in the management of Veterans with congestive heart failure in a Veterans Affairs Medical Center.

### Self Assessment Questions:

According to Medicare, what is the 30-day readmission rate for patients with congestive heart failure?

- A 15%
- B: 22%
- C: 25%
- D: 32%

Which of the following medications has been shown to reduce mortality in patients with congestive heart failure?

- A Angiotensin-converting enzyme inhibitors
- B Digoxin
- C Diuretics
- D All of the above

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-678L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## SMALL BUTTONS, LARGE CONSEQUENCES: ASSESSING SMART PUMP PROGRAMMING ERRORS

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Smart pumps minimize the risk of administration errors through the use of default administration parameters. However, a safety gap exists between what is ordered through computerized provider order entry and what is defaulted and manually programmed into smart pumps. One possible strategy to minimize errors is the implementation of interoperability between the electronic medical record and smart pump technology. Interoperability allows infusion parameters to be populated from a scanned barcode. In order to understand the impact of interoperability, a baseline understanding of smart pump programming errors is essential. The primary objective of this project is to identify the rate and severity of errors between programmed pump parameters and the electronic medical record. This will be achieved by prospectively collecting programmed pump parameters, comparing these parameters to those entered into the electronic medical record, quantifying discrepancies that are found, and assessing severity by categorizing discrepancies using the National Coordinating Council for Medication Error Reporting and Prevention Index. Secondary objectives include evaluation of preventable medication errors and measurement of pharmacist competency related to smart pumps. A standardized data collection form is being used to collect programmed pump and ordered medication parameters. Random data sampling is being conducted in four intensive care units. A Likert scale will be used to further classify each discrepancy based on the likelihood that interoperability would have prevented the discrepancy. Out of the 32 infusions assessed to date, two errors have been identified. Both of these errors reached the patient, but caused no harm. A dependent samples t-test found pharmacists who completed pharmacy-customized, hands-on education led by nursing reported statistically significant ( $p < 0.001$ ) greater knowledge and skills related to smart pumps compared with pre-education knowledge. Completion of ongoing data collection is needed in order to draw conclusions regarding the primary objective of this project.

### Learning Objectives:

Classify medication errors by severity using the National Coordinating Council for Medication Error Reporting and Prevention Index.

Describe interoperability and its potential impact on the safety of the medication use process.

### Self Assessment Questions:

For the error described below, select the appropriate severity rating using the National Coordinating Council for Medication Error Reporting and Prevention Index: A patient is receiving a continuous h

- A Category B, an error occurred but the error did not reach the patient
- B: Category C, an error occurred that reached the patient but did not
- C: Category D, an error occurred that reached the patient and require
- D: Category E, an error occurred that may have contributed to or result

Which of the following definitions best describes interoperability as discussed in the context of this project?

- A Functionality allowing manual programming of smart pumps by nursing
- B Wireless communication within the EHR that allows nursing staff to
- C The syncing of infusion pumps, when multiple pumps are used on
- D Functionality that populates smart pump infusion parameters with

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-968L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PHARMACY-LED INPATIENT TOBACCO TREATMENT INTERVENTION

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Purpose: A pharmacy-led inpatient tobacco treatment service was implemented in an effort to improve tobacco treatment in the hospital setting while adhering to the Joint Commission measures, which include tobacco use screening, treatment, outpatient referral, and post-discharge assessment. The purpose of this retrospective chart review is to evaluate clinical outcomes after implementation of this pharmacy-led inpatient tobacco treatment service. The service includes pharmacy technicians and students completing tobacco use screenings during hospital admission and providing counseling and referral to outpatient tobacco treatment clinic for patients interested in tobacco cessation. Inpatient pharmacists then order tobacco treatment medications.

Method: A retrospective chart review will be performed for all patients who were screened for tobacco use during hospital admission starting November 4th, 2015 through February 4th, 2016. The primary outcome includes tobacco quit rates one month and three months post-intervention. Secondary outcomes include proportion of patients accepting tobacco treatment medication, counseling, and/or outpatient tobacco treatment clinic referral. Additional data collected will include tobacco treatment medication type, prescriber, and presence of order at discharge. Data collected for tobacco treatment outpatient referral will include the type of referral, type of provider ordering the referral, and status of tobacco treatment clinic consult post-discharge. For veterans who have not quit tobacco, the change in tobacco use post-discharge will be evaluated. Paired categorical variables will be analyzed using the McNemar test. Unpaired categorical variables will be analyzed using Chi Square or Fisher's exact tests. Results/Conclusion: pending

Conflict of interest: The speaker has no actual or potential conflict of interest in relation to the presentation.

### Learning Objectives:

Recognize the Joint Commission measures for tobacco use

Identify the importance of pharmacy involvement with the inpatient tobacco cessation service

### Self Assessment Questions:

Which of the following is a Joint Commission inpatient tobacco cessation measure?

- A Screening for tobacco use
- B: Providing tobacco cessation education material
- C: Ordering nicotine replacement therapy
- D: Prohibiting patients to use tobacco in designated areas (i.e., smoking

67 y/o male smoking 1 pack per day admitted for a COPD exacerbation is interested in quitting tobacco. The pharmacy medication history technician performs the tobacco use screening and may complete the

- A Determine appropriate pharmacologic therapy
- B Provide counseling on non-pharmacologic strategies
- C Order nicotine replacement therapy
- D Provide counseling on medications

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-679L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## UNSCHEDULED RETURNS OF EMERGENCY DEPARTMENT PATIENTS ADMINISTERED FIRST DOSE ANTIBIOTICS FOR URINARY TRACT INFECTIONS PRIOR TO DISCHARGE

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**Purpose:** Patients who present to the emergency department (ED) with urinary tract infections (UTIs) are often given an initial dose of intravenous (IV) or oral antibiotic prior to being discharged with an outpatient prescription for oral antibiotics. There is no evidence to suggest that oral antibiotic therapy is less effective than IV therapy for the treatment of UTIs in patients who do not require hospitalization. Similarly, there is lack of evidence demonstrating improved treatment outcomes in patients with UTIs who receive first dose IV antibiotic followed by a course of oral antibiotics. Due to longer infusion times and higher drug acquisition costs, IV antibiotics have the potential to increase ED length of stay and cost to the institution. The primary objective of this project is to identify if there is an association between unscheduled returns for patients who receive a single dose of IV vs oral antibiotics in the ED prior to discharge for UTI treatment. **Methods:** This is a retrospective chart review of patients presenting to the ED for UTI treatment who did not require hospitalization. All patients who received IV or oral antibiotics but were not admitted to the hospital from January 2015 to June 2015 will be screened for inclusion. The primary outcome is the percentage of patients who returned to the ED within 14 days due to treatment failure. Secondary outcomes measured include association between provider level and antibiotic formulation selection, barriers identified by providers regarding antibiotic formulation selection, ED length of stay, cost of the drug to the institution, and charge to the patient. **Results and Conclusion:** Data collection and analysis are currently being completed and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review IDSA guideline recommendations for treatment of uncomplicated cystitis and pyelonephritis.

Discuss advantages of one-time doses of oral antibiotics compared to IV antibiotics in the emergency department.

### Self Assessment Questions:

What is an A-I recommendation treatment option from IDSA guidelines for women with acute uncomplicated cystitis?

- A Nitrofurantoin monohydrate/macrocrystals 100 mg BID x 5 days
- B: Ciprofloxacin 500 mg BID x 7 days
- C: Cephalexin 500 mg BID x 7 days
- D: A and B

How was provider feedback regarding IV vs oral single dose antibiotics in the emergency department obtained?

- A Mail survey
- B Email survey
- C Phone interview
- D In person interview

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-680L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INITIAL MANAGEMENT OF ATRIAL FIBRILLATION IN CRITICALLY ILL PATIENTS

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**Statement of the Purpose:** The method of atrial fibrillation management that shows the greatest efficacy with limited side effects in intensive care unit patients has not been established. The purpose of this study is to assess the safety and efficacy of common medications used for the initial management of atrial fibrillation in the intensive care unit. The primary outcome is reduction in heart rate of patients in the intensive care unit with atrial fibrillation to less than 120 beats per minute within the first four hours after initial treatment. The Secondary outcome is a safety endpoint of the incidence of hypotension, defined as a mean arterial pressure less than 60 mmHg, within the first four hours following treatment. **Statement of the Methods Used:** This is a retrospective, single centered, cohort study of adult patients treated for atrial fibrillation while admitted to the intensive care unit. Patients were included if they were admitted to the medical, trauma/surgical, or neurocritical care intensive care units at Loyola University Medical Center. Participants were identified for inclusion based on location and receipt of intravenous amiodarone, diltiazem, esmolol, or metoprolol for the initial management of atrial fibrillation. Study participants were required to have atrial fibrillation that was documented on electrocardiogram with an initial rate greater than 120 beats per minute. **Summary of Results to Support Conclusions:** Pending **Conclusions Reached:** Pending

### Learning Objectives:

Discuss the prevalence of atrial fibrillation and the current literature for the management of atrial fibrillation in critically ill patients

Review the results of the study Initial Management of Atrial Fibrillation in Critically Ill Patients

### Self Assessment Questions:

The most common sustained arrhythmia in critically ill patients is:

- A Ventricular tachycardia
- B: Torsades de pointes
- C: Atrial fibrillation
- D: Ventricular fibrillation

Participants were included in the study Initial Management of Atrial Fibrillation in Critically ill Patients if they had:

- A Received a beta blocker, calcium channel blocker, or amiodarone
- B Had atrial fibrillation documented on an electrocardiogram with a rate greater than 120 beats per minute
- C Had atrial fibrillation, but it was not documented on an electrocardiogram
- D A and B

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-681L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT AND IMPLEMENTATION OF PATIENT CARE TOOL FOR THE TOXICOLOGY PATIENT: REVIEW OF POISON CENTER CALLS FOR COMMON INQUIRIES FROM A COMMUNITY HEALTH SYSTEM

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**Purpose:** In 2013, poison control centers across the nation received almost 3.1 million calls and, of those, 2.1 million were human exposures. The top five substances in human exposures were reported as analgesics, cosmetics, household cleaning products, sedatives/hypnotics/antipsychotics, and antidepressants. The poison control center is a vital resource providing information and medical guidance on toxic exposures to health care facilities. The purpose of this project is to partner with the local poison center to review common inquiries from this community health system. Once this information is identified, electronic order sets will be created for use by emergency department providers to effectively care for the toxicology patient. The goals of these electronic order sets are to streamline documentation of communication with the poison center, increase efficiency of the emergency department staff, and decrease potential errors that may arise from transcribing management protocols given to medical staff over the phone. **Methods:** Data was collected from the local poison center and electronic health records from this community health system to determine the common inquiries made to the poison center between October 1st, 2013 and September 30th, 2015. Using the data collected, order sets will be created for the identified top toxins and implemented into the electronic health record for use by emergency department providers. After implementation, a retrospective evaluation of the order sets will be conducted to determine usage by providers and provider satisfaction with the new tool. **Results/Conclusion:** Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the top substances involved in toxic ingestions.  
Describe the potential impact of the created electronic order sets on patient care for less frequent events.

### Self Assessment Questions:

Which of the following were identified as top substances involved in toxic ingestions?

- A: Opioids
- B: Acetaminophen
- C: Non-steroidal anti-inflammatory drugs
- D: All of the above

Which of the following are included in the created electronic order sets?

- A: Adult dosing for medications ONLY
- B: Pediatric dosing for medications ONLY
- C: Both adult and pediatric dosing for medications when possible
- D: Mechanical ventilation instruction

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-682L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## DEVELOPMENT AND EVALUATION OF A PHARMACIST MANAGED CULTURE AND SENSITIVITY REVIEW PRACTICE FOR DISCHARGED EMERGENCY DEPARTMENT PATIENTS

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**Purpose:** This study aimed to develop a protocol that granted pharmacists autonomy to review culture and sensitivity results for discharged Emergency Department (ED) patients and automatically adjust therapy when necessary based on evidence-based resources. This study compared patient outcomes, process measures, and provide satisfaction after transitioning to a pharmacist managed process.

**Methods:** Prior to protocol implementation, midlevel practitioners evaluated culture and sensitivity results for discharged ED patients, changed therapy when necessary, documented interventions, and contacted patients with results and changes. Retrospective data was collected on patients discharged from the ED between November 2014 through February 2015. A similar data set is being collected from November 2015 through February 2016 after protocol implementation. Infectious diseases 7-day readmission rate to the ED based on ICD codes and time of final culture result to time of documentation will be compared between study periods. Protocol development, distribution of surveys to ED providers and pharmacists, and pharmacist education preceded implementation of the pharmacist managed process. Post-implementation survey results will be compared to pre-implementation results. **Preliminary Results:** Pre-implementation surveys were taken by ED providers and pharmacists. Average scores were based on a 5-point Likert scale. ED Providers (n = 4) were comfortable (average 4.69/5) when asked about pharmacists implementing a culture review process, interpreting cultures results and automatically prescribing new or alternative antimicrobials. Pharmacists (n = 8) were comfortable (average score = 4.22/5) when asked about being involved in a new antimicrobial stewardship service in the ED and automatically changing antimicrobial therapy when necessary, based on culture results. All other data is pending. **Conclusions Reached:** Final results and conclusions will be presented at the Great Lakes Residency Conference

### Learning Objectives:

Recognize the value of integrating pharmacists in antimicrobial stewardship practices  
Discuss the process of establishing a pharmacist managed culture and sensitivity review practice for discharged emergency department patients through protocol development, staff education, compilation of resources, and successful transitioning to a new process

### Self Assessment Questions:

Potential benefit(s) of establishing a protocol that allows pharmacists to review culture and sensitivity results for discharged emergency department patients

- A: Allows pharmacists to automatically initiate or modify antimicrobials
- B: Expands antimicrobial stewardship services offered by pharmacist
- C: No benefit, only required for a new service
- D: A and B

Of the following statements, which best describes a successful transition to a pharmacist managed culture and sensitivity review process?

- A: Obtaining support from ED providers and ED pharmacists
- B: Expediting the implementation process
- C: Proper education for ED pharmacists on evidence-based resources
- D: A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-683L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING THE EFFECT OF POLYPHARMACY ON OUTCOMES IN HIV-INFECTED PATIENTS AGE 50 AND OLDER

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**Purpose:** With proper HIV maintenance therapy and medication adherence, HIV has become a manageable chronic condition and thus, the number of older HIV-infected persons is increasing. In 2012, people aged 55 and older accounted for about one-quarter of the estimated 1.2 million HIV-infected people in the U.S. Advancing age among HIV-infected persons is associated with greater burden of chronic co-morbid illnesses that require separate drug treatment. Polypharmacy is associated with older age, medication errors, increased hospitalizations, poor adherence, and drug-drug interactions. The efficacy, pharmacokinetics, adverse effects, and potential drug interactions of ART in older adults have not been systematically studied. This study will investigate what effect polypharmacy has on HIV virologic suppression and other outcomes in older HIV-infected adults. **Methods:** This, IRB approved, retrospective cohort study will evaluate outcomes in HIV-infected patients ages  $\geq 50$  as of 6/1/2013, on ART and seen at the Northwestern Infectious Disease Center between 6/1/2013-5/31/2015. Eligible patients will be stratified by number of prescribed medications:  $\geq 10$  versus  $< 10$  medications. The primary outcome will be detectable vs non-detectable plasma HIV RNA level (viral load; defined as  $< 20$  IU/mL). Secondary outcomes include drug-drug interactions, CD4+ lymphocyte count (cells/mm<sup>3</sup>, CD4), opportunistic infections, medications on the Beers List, and patient reported adverse drug effects. Data to be collected includes: CD4; viral load; medication list; ART resistance mutations; date of diagnosis; self-reported medication adherence as documented in the medical record; number of medications; and drug-drug interactions.

### Learning Objectives:

Discuss reasons whether or not polypharmacy in older HIV-infected patients carries potential risks for the occurrence of poor clinical outcomes.

Define common, and/or potentially significant, drug-drug interactions seen between HIV antiretrovirals and other medications.

### Self Assessment Questions:

Which antiretroviral medication can lead to decreased bone mineral density in older HIV-infected patients?

- A lamivudine
- B: atazanavir sulfate
- C: cobicistat
- D: tenofovir disoproxil fumarate

Older HIV-infected patients on ART are at a higher risk for which of the following?

- A slower CD4 immune recovery
- B drug-drug interactions
- C a and b
- D delayed virologic suppression

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-700L02-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING THE EFFECT OF AN EXPANDED DISCHARGE MEDICATION RECONCILIATION PROCESS ON DISCHARGE MEDICATION DISCREPANCY RATES AND TYPES

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**Purpose:** Recently, the Centers for Medicare and Medicaid Services has decreased reimbursement rates for hospitals failing to meet hospital specific readmission criteria. Studies demonstrate that post-discharge adverse medication events contribute to preventable readmissions. These events can often be avoided by utilizing an in-depth discharge medication reconciliation process. The primary objective of this study is to evaluate the rate of discrepancies between an electronic medical record (EMR) that requires reconciliation of discharge medication orders and one that does not. The secondary objective is to evaluate the types of discrepancies between the systems. **Methods:** This study was submitted to the Institutional Review Board for approval and will include two phases. Phase 1 will evaluate an EMR which does not require physicians to reconcile discharge medication orders while phase 2 will evaluate an EMR which does require reconciliation. Patients discharged during either phase who meet the inclusion criteria will be considered for randomization to include a total of 100 patients for each phase. The following data will be collected for each subject: number of medications prior to admission, number of medications at discharge, age, and length of stay in days. Average daily hospital census during each phase of the study will also be collected. A discrepancy determination algorithm will be utilized to determine the number of discrepancies in patients discharge medications. Discharge medication discrepancies will be placed in the following categories: omissions of pre-admission medications without acknowledgement, omissions compared to maintenance medications initiated during hospitalization, and discharge medications with major/contraindicated drug interactions. **Results and Conclusions:** Will follow data collection and analysis.

### Learning Objectives:

Explain how discharge medication discrepancies can lead to patient harm and hospital readmission.

Identify areas for improvement in the discharge medication reconciliation process.

### Self Assessment Questions:

Of the following options, which discharge discrepancy is likely to lead to patient confusion?

- A A previous home medication not being addressed at the time of discharge
- B: A severe drug interaction between medications at the time of discharge
- C: A medication required for a specific disease state omitted from a patient's discharge medications
- D: Duplication of therapy with two different product names.

Errors in discharge medication orders have been shown to have a \_\_\_-fold increase in hospital readmission within 3 months.

- A 4.5
- B 6.2
- C 7.1
- D 8.0

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-969L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF A PHARMACY CONSULT SERVICE FOR OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY (OPAT)

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**Purpose:** The pillar of OPAT is to provide safe and effective therapy in a setting with minimal risk of complications to the patient, to reduce acute care facility costs and improve outcomes. A Pharmacy OPAT Consult (POC) service was initiated at Henry Ford Hospital (HFH) to optimize antimicrobial regimens, provide patient education, and ensure appropriate transition of care. The purpose of this study was to evaluate the impact of POC interventions on patient outcomes. **Methods:** This IRB approved study was a retrospective, observational cohort design conducted using Henry Ford Health System electronic medical records between May 2015 and December 2015. All adult patients enrolled in Henry Ford Home Infusion Services for OPAT, and who received at least one dose of antimicrobial therapy prior to discharge were screened for inclusion. Patients discharged from HFH who received a POC were compared to patients discharged from Henry Ford West Bloomfield Hospital (HFHB) who did not. Pregnancy, patients scheduled for less than 24 hours of intravenous therapy at discharge, or who were discharged to receive OPAT with hemodialysis only, or at another facility, were excluded. Consecutive patients were enrolled, until 50 were included from HFH and 50 from HFHB. The primary endpoint was quality of care as assessed by an OPAT Bundle. Secondary endpoints include readmission within 30 and 120 days, antimicrobial-related side effect, adverse drug reaction and catheter complication incidences. 100 patients provided 80% power with alpha 0.05 to detect a 35% increase in OPAT Bundle compliance. Chi-square or Fisher's exact test were used to assess categorical, and t-test or Mann-Whitney U test for continuous variables. Based upon bivariate analysis results and clinical rationale, logistic regression was performed to identify independent predictors of bundle compliance and readmission. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe IDSA guideline recommendations for outpatient parenteral antimicrobial therapy.  
Identify the potential role of clinical pharmacists in the management of outpatient parenteral antimicrobial therapy transitions of care.

### Self Assessment Questions:

According to the IDSA guidelines, which of the following statements is correct regarding recommendations for OPAT?

- A: Patient characteristics should not be considered when selecting an antimicrobial
- B: Outcomes with OPAT are supported primarily by prospective literature
- C: Outcomes monitoring is a key element of an OPAT program
- D: All patients should receive IV antibiotics while at a healthcare facility

In the OPAT interdisciplinary team, pharmacists can often play a major role in providing:

- A: Post-discharge placement (disposition)
- B: Patient education
- C: Diagnostic data
- D: IV access management

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-684L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## SEROTONIN-MODULATING ANTIDEPRESSANTS AND RISK OF BLEEDING AFTER TRAUMA

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**Purpose:** Use of Selective Serotonin Reuptake Inhibitor (SSRI) and Serotonin Norepinephrine Reuptake Inhibitor (SNRI) therapy is associated with increased risk of gastrointestinal bleeding and bleeding after elective surgical procedures. Limited data exists regarding potential bleeding risk associated with trauma patients on preinjury serotonin-modulating antidepressants. The purpose of this study is to evaluate use of serotonin-modulating therapy and associated bleeding risk in trauma patients. The results of this study could be used to guide the decision to restart home SSRI or SNRI therapy post trauma or to anticipate any increase in bleeding risk and resuscitation requirements, if a difference exists. **Methods:** This study is a retrospective, single-center, matched-cohort chart review at a large academic health center. The center specific trauma database will be utilized to identify trauma patients admitted with solid organ injury. This database will also be utilized to determine the Injury Severity Score (ISS) and solid organ injury scaling. Patients who were taking SSRIs or SNRIs prior to trauma will be matched to a control group to limit potential confounders. Patients will be excluded from this study if on anticoagulant or antiplatelet therapy prior to trauma, or if the patient has an underlying coagulation disorder. The primary endpoint of this study is the comparison of mean units of packed red blood cells transfused during hospitalization between each group. Secondary endpoints include the comparison of length of ICU stay, in-hospital mortality, and total length of hospital stay between each group. Statistical analysis of endpoints will include Mann-Whitney U, Chi squared two-sample t-test, logistic regression and competing risks regression models. **Results:** Data collection is in progress. Final data analysis will be presented at the 2016 Great Lakes Pharmacy Resident Conference. **Conclusion:** Data collection is in progress. Final data analysis and conclusions will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the role of serotonin as it relates to coagulation.  
Discuss literature evidence of bleeding risk associated with serotonin-modulating antidepressants.

### Self Assessment Questions:

Of the following, which is the primary mechanism of serotonin in coagulation?

- A: Conversion of prothrombin
- B: Induces platelet aggregation
- C: Activation of coagulation factors
- D: Release of calcium into systemic circulation

Which of the following has the greatest effect on total serotonin blockade by serotonin-modulating medications?

- A: Quantity of serotonin receptors
- B: Serum serotonin concentration
- C: Affinity of medication to serotonin transporters
- D: Platelet concentration

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number    0121-9999-16-897L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EFFECTIVENESS AND SAFETY OF TWICE DAILY VERSUS THRICE DAILY SUBCUTANEOUS UNFRACTIONATED HEPARIN FOR VENOUS THROMBOEMBOLISM (VTE) PROPHYLAXIS AT A TERTIARY MEDICAL CENTER

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**Background:** The American College of Chest Physicians (ACCP) guideline for prevention of venous thromboembolism (VTE) recommends low dose unfractionated heparin (LDUH) as an option for VTE prophylaxis in patients at increased risk. The guidelines do not provide a recommendation regarding twice daily (BID) versus thrice daily (TID) LDUH because there are no head-to-head trials comparing these. Meta-analyses evaluating effectiveness and safety differences between BID and TID dosing did not include trials with direct comparisons. The largest meta-analysis assessing dosing frequency of LDUH and low molecular weight heparins (LMWH) included studies comparing agents to one another or control and found no statistically significant differences in VTE rates, death, or major bleeding. Differences in the effectiveness and safety of BID versus TID dosing of LDUH remain unclear.  
**Objective:** To evaluate the incidence of VTE with BID versus TID dosing of subcutaneous LDUH for VTE prophylaxis. The secondary objectives are to assess the differences in incidence of major and minor bleeding.  
**Methodology:** This retrospective cohort included 5,000 adult patients, 18 years or older, admitted to Cleveland Clinic who received subcutaneous LDUH BID or TID for VTE prophylaxis between July 31, 2015 and September 30, 2015. Patients who received LMWH, fondaparinux, both BID and TID dosing of LDUH for at least 48 hours, or those treated with therapeutic anticoagulants for greater than 48 hours before LDUH were excluded. Data collected included patient demographics, risk factors for VTE and bleeding, hospital length of stay, missed doses of LDUH, and incidence of VTE and major and minor bleeding. Patients were matched using propensity score matching. Multivariable logistic regression analysis will be performed for the primary outcome. Subgroup analyses will be performed on groups of interest including hospital location, obesity, liver failure, and surgical patients.  
**Results and Conclusions:** To be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the current American College of Chest Physicians (ACCP) guideline recommendations for VTE prophylaxis with low dose unfractionated heparin (LDUH)

Explain factors that can affect a patient's risk for VTE

### Self Assessment Questions:

Which statement below is true regarding the ACCP recommendations for prevention of VTE?

- A Twice daily dosing of LDUH is less effective than thrice daily dosing
- B: There is no clear recommendation for using twice daily versus thrice daily dosing
- C: Thrice daily dosing of LDUH is not as safe as twice daily due to high bleeding risk
- D: No meta-analyses have evaluated twice daily versus thrice daily dosing

Aspirin use can \_\_\_\_\_ a patient's VTE risk, while patients with active cancer have a \_\_\_\_\_ VTE risk

- A Increase, lower
- B Increase, higher
- C Decrease, lower
- D Decrease, higher

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-685L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## TIME TO APPROPRIATE ANTIFUNGAL THERAPY WITH 1,3-B-D GLUCAN ASSAY COMPARED TO T2 MAGNETIC RESONANCE

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**Purpose:** Invasive candidiasis is difficult to detect with routine blood cultures and is associated with significant morbidity and mortality which increases as appropriate therapy is delayed. The purpose of this study is to compare the effect of the implementation of medication use guidelines combined with either 1,3-B-D glucan or T2 magnetic resonance (T2MR) rapid diagnostic assay on time to appropriate and optimal antifungal therapy.  
**Methods:** Patients who had a positive T2MR assay, a 1,3-B-D glucan greater than or equal to 200 pg/mL, or culture confirmed invasive candidiasis between were considered for inclusion into the study. For patients with recurrent invasive candidiasis, only the first episode was included in the study. Pregnant patients, those with a recurrent invasive candida infection, non-candida yeast, those who received amphotericin B end of life care at the time of diagnosis were excluded. The primary endpoints were the proportion of patients in each group receiving either early (<12 hours) or late (>12 hours) antifungal therapy, and time to identification of Candida species. Secondary endpoints included hospital and ICU length of stay, in-hospital mortality and healthcare resource utilization. Using a two-sided alpha of 0.05, it is estimated that 54 patients are needed from each group to detect a 25% increase in patients receiving early antifungal therapy. Dichotomous variables will be assessed by the Chi-square or Fisher's exact test while continuous variables will be analyzed using Student's t-test or Mann-Whitney U where appropriate.  
**Results:** In progress  
**Conclusions:** Conclusions will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Explain the association between time to appropriate antifungal therapy and mortality rates for patients with invasive candidiasis

Review methods of invasive candida diagnosis

### Self Assessment Questions:

How does the T2MR test differ from other diagnostic methods for invasive candidiasis?

- A T2MR detects only living Candida species
- B: A preliminary result may be obtained in as little as 3-5 days
- C: T2MR is less sensitive and specific than the 1,3-B-D glucan assay
- D: T2MR is more sensitive and specific than traditional blood culture

How does improved detection of invasive candidiasis impact patient outcomes?

- A Early detection reduces time to appropriate antifungal therapy and
- B Early detection delays time to appropriate therapy which results in
- C Early detection reduces time to appropriate antifungal therapy with
- D None of the above.

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-686L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF INFECTIOUS PROPHYLAXIS IN HEART TRANSPLANT RECIPIENTS

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**Purpose:** The purpose of this study is to identify triggers that result in a deviation from first-line prophylaxis (ppx) in heart transplant (HT) recipients. **Methods:** A retrospective, single-center review of adult HT recipients between October 2012 and September 2014 (n=55) was conducted. Demographic data and data pertaining to infectious ppx was collected. **Results:** First-choice ppx for PJP was TMP-SMX (n=33), dapsone (n=4), atovaquone (n=16), and pentamidine (n=2). Reasons for selecting a first-choice agent other than TMP-SMX were G6PD deficiency (n=10), sulfa allergy (n=3), renal failure (n=2), and unknown (n=7). Of the patients who did not tolerate their first-choice drug (n=32; 58%), 26 of 33 (79%) patients initiated on TMP-SMX were changed due to hyperkalemia (n=15), leukopenia (n=6), G6PD deficiency (n=1), and unknown (n=4). Four patients (25%) initiated on atovaquone changed due to improved renal function (n=1), cost (n=1), neutropenia (n=1), and unknown (n=1). Patients initiated on pentamidine were changed to atovaquone or TMP-SMX after renal function improved. Of 3 patients considered high risk (D+/-) for toxoplasmosis, 2 received TMP-SMX and 1 received atovaquone. Patients initiated on TMP-SMX were changed to atovaquone + pyrimethamine/leucovorin or dapsone monotherapy due to hyperkalemia. The patient initiated on atovaquone was changed to TMP-SMX for unknown reasons, developed hemolysis, then changed to atovaquone + pyrimethamine/leucovorin. Regarding viral ppx, ganciclovir then valganciclovir (n=16) or valganciclovir alone (n=29) were used for CMV ppx in patients at moderate (n=31) or high risk (n=14). Nine patients required early termination of CMV ppx due to leukopenia. Ten low risk patients (D-/R-) received acyclovir (n=7), valacyclovir (n=1), or valganciclovir (n=2). Voriconazole (n=20) or micafungin (n=5) was initiated for Aspergillus sp ppx in at-risk recipients. All others received nystatin or fluconazole. **Conclusions:** Common triggers that resulted in changes to ppx include hyperkalemia, leukopenia, renal function changes, and G6PD deficiency.

### Learning Objectives:

Identify opportunistic infections for which heart transplant recipients are at risk.

Discuss infection prophylaxis options in heart transplant recipients.

### Self Assessment Questions:

Which of the following infections requires prophylaxis post heart transplantation?

- A: Mycobacterium avium complex
- B: Cytomegalovirus
- C: Hepatic C Virus
- D: Varicella Zoster

Which of the following drugs is paired with the correct indication for prophylaxis?

- A: Azithromycin and toxoplasmosis
- B: Fluconazole and invasive aspergillosis
- C: Acyclovir and cytomegalovirus
- D: Atovaquone and pneumocystis pneumonia

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-687L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## RETROSPECTIVE REVIEW OF DRUG THERAPY OPPORTUNITIES IN HIV PATIENTS WITHIN AN AMBULATORY CARE SETTING

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**Purpose:** Patients who are infected with human immunodeficiency virus (HIV) often require frequent assessment due to the chronic nature of therapy, evolving therapeutic options, potential for comorbidities, and the use of medication combinations known to interact with prominent metabolic pathways. The purpose of this study is to evaluate the medication management of Marshfield Clinic HIV patients based on current guidelines and recent laboratory values. The study will also evaluate each patient's medication profile to identify drug therapy opportunities including contraindications, drug-drug interactions, need for additional therapy and dosing modifications of highly active antiretroviral therapy (HAART). **Methods:** This retrospective study included Clinic patients 18 years of age and older being treated for an HIV diagnosis. For inclusion, patients were required to have follow-up with a Clinic infectious disease provider between August 2014 and August 2015. Patients receiving pre or post exposure prophylaxis for HIV infection were excluded. During this timeframe, 85 unique patients met the criteria. The Department of Health and Human Services (DHHS) 2014 Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents will be used to evaluate HAART regimens. Data collected includes HAART regimen and start date, HIV viral load, CD4, markers of renal and hepatic function, presence and treatment of common comorbidities in HIV patients including hepatitis B or hepatitis C, cardiovascular disease, diabetes mellitus, dyslipidemia, hypertension, and current smoking status. The severity of drug-drug interactions were classified on a scale of 1 (contraindication) to 3 (moderate) according to the First Databank Drug Interaction Module. Approval from the Clinic Institutional Review Board was obtained prior to study initiation. Monthly meetings with Clinic infectious disease providers will be conducted throughout the projects duration. Descriptive statistics will be used to analyze the data.

**Results/Conclusion:** To be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List key surrogate markers used to assess immune function and level of HIV viremia in HIV patients currently on antiretroviral therapy. Identify the mechanisms that make numerous HAART options prone to drug-drug interactions.

### Self Assessment Questions:

Which surrogate markers should be used to assess immune function and level of HIV viremia in HIV patients currently on antiretroviral therapy?

- A: CD4 Count
- B: Procalcitonin
- C: HIV RNA Viral Load
- D: A & C

What HAART class is most prone to drug-drug interactions due to CYP induction, CYP inhibition, and P-gp inhibition?

- A: Protease Inhibitors
- B: Nucleoside Reverse Transcriptase Inhibitors
- C: Integrase Inhibitors
- D: CCR5 Antagonists

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-16-701L02-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF THE APPROPRIATENESS OF ANTIBIOTIC AND ANTICOAGULANT DISCHARGE PRESCRIPTION PRACTICES IN A COMMUNITY HOSPITAL EMERGENCY DEPARTMENT

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**Purpose:** Optimal medication therapy for patients discharged from the emergency department (ED) may help to reduce the number of adverse drug events and re-visits. The purpose of this study is to evaluate current antibiotic and anticoagulant discharge prescription practices by clinicians in a community hospital ED in an effort to determine if interventions should be made to optimize therapies based on current treatment guidelines that are both safe and effective for discharged patients. **Methods:** The institutional review board has approved this retrospective chart review. The electronic medical record system will identify patients seen in the ED from September 1, 2015 and before until a power of 85% or 440 patients is achieved. Inclusion criteria are patients discharged from the ED with a diagnosis of either infectious or thrombotic etiology along with an order for either an antibiotic or an anticoagulant prescribed by an ED provider. Collected data will encompass the elements necessary to evaluate the appropriateness of an antibiotic or anticoagulant prescription, which include the dose, directions, duration, and drug interactions. All data will be de-identified and kept confidential. The overall appropriateness of the antibiotic or anticoagulant prescription will be determined based on current treatment guidelines. **Results:** Data collection is currently in progress. Results and conclusions will be presented at the 2016 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List potential consequences that may occur when patients receive inappropriate antibiotic therapy upon discharge from the emergency department.

Describe the impact that pharmacists can make by reviewing discharge prescriptions from the emergency department.

### Self Assessment Questions:

Which of the following is a potential consequence that patients may face due to the inappropriate prescribing of antibiotic therapy upon discharge from the emergency department?

- A Cost savings
- B: Prevention of superinfections
- C: Increased risk of antibiotic resistance
- D: Avoidance of antibiotic side effects

The goal of pharmacist review of discharge prescriptions from the emergency department is to:

- A Increase hospital admissions
- B Increase number of outpatient prescriptions
- C Slow down the discharge process
- D Improve patient care

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-688L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PRAZOSIN IN PTSD NIGHTMARES AT THE JESSE BROWN VA MEDICAL CENTER

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**Background:** In the United States, projected lifetime prevalence of posttraumatic stress disorder (PTSD) is 8.7%, while it has been found to affect 12-20% of veterans. Currently, antidepressants and/or psychotherapy are considered first-line for PTSD treatment. However, due to the treatment-resistant nature of nightmares, adjunctive therapy may be required in some patients. Studies have found that prazosin, a lipophilic  $\alpha_1$ -receptor antagonist with the ability to cross the blood brain barrier, improves nightmares associated with PTSD. The current Veterans Affairs (VA) and Department of Defense (DoD) guidelines on PTSD recommend adjunctive use of prazosin for sleep or nightmares in patients who have failed two treatment trials. The recommendation is to initiate prazosin at 1mg at bedtime to avoid first-dose orthostatic syncope and titrate towards a goal of 6-10mg at bedtime as blood pressure allows. **Purpose:** The purpose of this study is to evaluate the effectiveness, safety and prescribing practices of prazosin in nightmares associated with PTSD at the Jesse Brown VA Medical Center (JBVAMC). **Methods:** This is a retrospective, electronic chart review of patients at JBVAMC prescribed prazosin for PTSD nightmares between January 1, 2011 and September 30, 2014. The primary endpoint of this study is the percent of patients with an improvement in PTSD nightmares after reaching a stable dose of prazosin. Secondary outcomes include incidence of adverse drug reactions attributed to prazosin, percent of patients maintaining an improvement in PTSD nightmares up to 12 months after prazosin initiation, time to achieving a stable prazosin dose, and percent of patients on concurrent pharmacotherapy for PTSD. Percent of patients with an improvement in PTSD nightmares will also be analyzed in the following dosing subgroups: 1-5mg/day, 6-10mg/day, and >10mg/day. **Results/Conclusion:** Data collection and analysis are ongoing and will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

State the target dose of prazosin for PTSD nightmares as recommended by the VA and DoD PTSD guidelines.

Identify the treatment options for the treatment of PTSD as recommended by the VA and DoD PTSD guidelines.

### Self Assessment Questions:

Which of the following prazosin doses fall in the target dose range for PTSD nightmares as recommended by the VA and DoD PTSD guidelines?

- A 3 mg
- B: 5 mg
- C: 8 mg
- D: 12 mg

Which of the following is recommended as first-line treatment of PTSD according to the VA and DoD PTSD guidelines?

- A Alprazolam
- B Sertraline
- C Prazosin
- D Amitriptyline

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-689L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INFECTIOUS OUTCOMES POST RITUXIMAB USE IN KIDNEY TRANSPLANT RECIPIENTS

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**Purpose:** Rituximab is used off-label in solid organ transplant for desensitization and treatment of antibody-mediated rejection. It targets CD20 and results in depletion of B cells. Although it may be effective in preventing or stopping rejection, its use may be associated with unfavorable infectious outcomes. The purpose of this study is to evaluate infectious outcomes in kidney transplant recipients who receive rituximab. **Methods:** This is a single-center retrospective cohort study. Living and deceased donor kidney transplant recipients at Northwestern Memorial Hospital from January 1, 2007 through October 1, 2015 were screened for inclusion. The Northwestern Medicine Enterprise Data Warehouse (NMEDW) was used to identify patients who received a kidney transplant and received at least one dose of rituximab during the study period. Electronic records in PowerChart and the Organ Transplant Tracking Record (OTTR) were reviewed by NMEDW to collect data. The following criteria must be met for inclusion: alemtuzumab induction; age 18 years or older; receipt of at least one dose of rituximab. Patients will be excluded for the following: receipt of any organ transplant prior to the study period; receipt of another organ simultaneously with the kidney transplant; receipt of rituximab for an oncologic indication; patients with human immunodeficiency virus. The primary efficacy endpoint was the incidence of infectious events over 1 year following the last dose of rituximab. The primary safety endpoint included patient and graft survival at 1 year following the last dose of rituximab.

### Learning Objectives:

Discuss the use of rituximab in solid organ transplant  
Identify potential infectious risks associated with the use of rituximab

### Self Assessment Questions:

Rituximab is a monoclonal antibody that binds to which of the following receptors?

- A: Cd52
- B: Cd25
- C: Cd80
- D: Cd20

Which of the following is an FDA approved indication for rituximab?

- A: Non-Hodgkins Lymphoma
- B: Antibody-mediated Rejection
- C: Desensitization
- D: Multiple Sclerosis

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-690L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## REDUCING MISSING MEDICATION WITHIN A COMMUNITY HEALTH SYSTEM

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**Purpose:** Missing medications are a recurring issue institutions face with detrimental effects on patient care, employee engagement, and medication budgets. Missing medication is defined as a patient specific medication that cannot be found around the time of administration. In the past, missing medications were significantly reduced with automated dispensing systems (ADS), efficient workflows, improved medication delivery, and improved nursing and pharmacy communication. However pharmacy and nursing staff continue to encounter frequent interruptions and distractions regarding missing medications. As a consequence, medication errors and reduced productivity are a risk. This project aims to reduce missing medications by 25% from the prior year. Reducing missing medications should directly reduce waste and minimize interruptions, which, in turn, may increase productivity, enhance patient safety, and improve employee engagement. **Methods:** The first step was identifying data and indicators to analyze and track missing medication within a community health-system. The determined indicators were missing medication messages, percentage of medication dispensed from ADS, percentage of medication with no vend in 90 days, vend to fill ratio, and stock outs. Next, missing medication messages were analyzed and medications with a high number of missing messages were identified. With a taskforce of pharmacists, analysts, and pharmacy technicians, interventions such as utilizing premix products, optimizing ADS, and optimizing workflows were standardized between sites to reduce missing medication messages. Perception of missing medications from pharmacy and nursing staff was also assessed for employee engagement. To reduce missing medications, defining standard stock (medications not to be removed from ADS), enhancing workflows for medications not used in 60 days, and setting expectations to replenish stocked out medications were standardized within the health-system. The indicators were assessed monthly to determine the impact of these interventions.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the importance of reducing missing medications  
Describe at least three interventions that can help reduce missing medications

### Self Assessment Questions:

What is (are) potential consequence(s) of missing medications for pharmacy and/or nursing?

- A: Medication errors
- B: Reduced direct patient care
- C: Increased waste
- D: All of the above

What are potential interventions to reduce missing medications?

- A: Nurses calling pharmacy for missing medications
- B: Optimizing automated dispensing system and workflows
- C: Charting missed dose on the medication administration record
- D: Nursing sending pharmacy missing medication messages

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-898L04-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## KETADEX FOR ADULT PROCEDURAL SEDATION IN THE EMERGENCY DEPARTMENT

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**Purpose:** A combination of ketamine and propofol for adult procedural sedation and analgesia in the emergency department is a recommended option in the 2014 American College of Emergency Physicians guidelines. Current literature suggests it provides a similar frequency of respiratory depression to propofol alone. Dexmedetomidine may offer an alternative for procedural sedation, and lacks significant respiratory depression. Our purpose is to evaluate the frequency of airway and respiratory adverse events associated with a novel combination of dexmedetomidine and ketamine in adult patients undergoing procedural sedation and analgesia in the emergency department. **Methods:** This study is a prospective, open-label, pilot study of a combination of ketamine and dexmedetomidine for procedural sedation and analgesia in the emergency department. Institutional Review Board approval was attained prior to study initiation. Patients 18 years and older with an expected procedure duration of 10 minutes or greater will be included in the study. The following patients will be excluded: inability to give consent, American Society of Anesthesiologists physical status classification system greater than 3, known hypersensitivity to ketamine or dexmedetomidine, pregnant, alcohol intoxication, acute ischemic stroke, heart rate less than 65, systolic blood pressure less than 100, history of carotid artery disease with greater than 80% stenosis or occlusion, severe sepsis or septic shock, advanced heart block, known or suspected ejection fraction less than 30%. The primary outcome evaluated will be the frequency of airway and respiratory adverse events. Secondary outcomes will include procedural success, patient satisfaction, patient recall, rates of hypotension, and bradycardia. **Results and Conclusions:** Final results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the pharmacological advantages and disadvantages among current guideline recommended and novel medications for procedural sedation in the emergency department  
Select an appropriate medication regimen for a patient requiring procedural sedation in the emergency department

### Self Assessment Questions:

An otherwise healthy 38-year-old male presents to the emergency department after dislocating his right hip during an ice hockey game. Which one of the following medications is the most appropriate option?

- A propofol + ketamine
- B: etomidate
- C: dexmedetomidine
- D: ketamine

A 20-year-old male with a history of Diabetes Mellitus Type 1 presents to the emergency department after dislocating his shoulder secondary to a possible seizure. The physician determines he will require

- A 10 mcg/kg/min propofol infusion with 1 mg/kg ketamine IV as needed
- B 0.5 mg/kg each ketamine and propofol used in combination given
- C etomidate 0.3 mg/kg and rocuronium 1 mg/kg IV push once
- D dexmedetomidine 1 mcg/kg bolus IV infusion over 10 minutes, followed by

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-691L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## COMPARISON OF GLYCEMIC CONTROL BEFORE AND AFTER IMPLEMENTATION OF INSULIN ORDER SET

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**Purpose:** Hyperglycemia in hospitalized patients has been linked to poor outcomes including increased morbidity and mortality. Guideline recommendations discourage the sole use of sliding scale insulin and rather promote the use of basal-bolus insulin plus a supplemental scale. Therefore, our institution is transitioning from sliding scale insulin to a scheduled weight based basal-bolus plus supplemental insulin regimen. The primary objective of this study is to compare glycemic control before and after implementation of the new basal-bolus correctional insulin order set. **Methods:** A single centered retrospective chart review will be conducted analyzing glycemic control and safety in patients admitted to the hospital. Pre-implementation data will be collected from the month of February 2015 and compared to post implementation data that will be collected in the month of February 2016. Inclusion criteria includes patients admitted to a general medical floor at HSHS St. Elizabeths Hospital that were prescribed either the sliding scale order set, pre-implementation, or basal-bolus plus supplemental scale order set, post-implementation, and between 18-90 years of age. Patients were excluded if they were in the intensive care unit or obstetrics unit. Baseline characteristics, corticosteroid use, glucose lab values, and use of glucagon or 50% dextrose use will be collected. The primary endpoint will be number of hyperglycemic events and secondary endpoints will include number of hypoglycemic events and utilization of hypoglycemic rescue agents. **Results/Conclusions:** Data collection and analysis is pending. Results to be presented.

### Learning Objectives:

Identify the appropriate basal-bolus insulin order for a patient presenting with hyperglycemia in the hospital in a non-critical care setting  
Indicate the benefits of basal-bolus with correctional insulin to sliding scale insulin

### Self Assessment Questions:

Which total daily insulin dose calculation would be appropriate for a 75 year old patient with a history of DM, GFR rate of 70 ml/min, and an admitting blood glucose level of 255 mg/dl who is on the

- A 0.3 units/kg
- B: 0.4 units/kg
- C: 0.5 units/kg
- D: 0.6 units/kg

Which of the following statements is true?

- A Sliding scale insulin is a proactive method to correcting blood glucose
- B Basal bolus correctional scale provides all day glycemic control
- C Sliding scale insulin is the preferred method of treatment of hyperglycemia
- D All of the above statements are true

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-692L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATING THE IMPACT OF PHARMACIST INTERVENTION WITHIN TRANSITIONS OF CARE ROLES ON PATIENTS ADMITTED WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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**Statement of Purpose:** A current issue facing many institutions is thirty-day chronic obstructive pulmonary disease (COPD) readmissions and the associated Centers for Medicare and Medicaid Services (CMS) penalties. Previous studies show that a major cause of COPD readmissions is non-compliance to medication therapy, often due to affordability or lack of education related to medications. The aim of this study is to reduce COPD readmission rates by utilizing pharmacists as part of an interdisciplinary health care team to ensure that patients with COPD are discharged on safe, effective, and accessible therapy with a thorough understanding of their medications. **Statement of Methods Used:** During this prospective study, pharmacists work as part of a multidisciplinary hospital-wide pilot program to reduce COPD admissions. Patients admitted to this non-profit, three hundred forty-five bed hospital with a diagnosis of COPD are assessed by respiratory therapy following admission. Respiratory therapy then consults pharmacy on patients determined to be at high risk for readmission. Pharmacists interventions are focused on transition of care roles including medication accessibility, medication reconciliation and assessment, profile review and recommendations, and patient education. The hospital's outpatient Lobby Pharmacy and 340B pricing was utilized to develop a protocol that allows pharmacy to provide free or discounted medications to certain patients in need. The primary endpoint analyzed will be change from baseline in all cause thirty-day COPD readmission rates. Number of patients consulted versus number of patients on which pharmacy is able to intervene, number of medication reconciliation discrepancies identified, and number of prescriptions filled through Lobby Pharmacy will also be tracked.

**Summary of Results to Support Conclusion/Conclusions Reached:** Data collection and analysis are currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize risk factors associated with 30-day hospital readmissions. Describe pharmacists' interventions within the transitions of care setting and explain how those interventions can be used to reduce readmission rates.

### Self Assessment Questions:

Which of the following has NOT been identified as a common contributing factor towards medical errors, adverse events, and/or preventable readmissions?

- A Inadequate communication between healthcare providers
- B: Lack of patient education and understanding
- C: Multiple labs pending upon discharge
- D: Lack of scheduled follow-up appointments on discharge

Which of the following are opportunities for pharmacist intervention in the transition of care setting?

- A Medication reconciliation
- B Patient education and counseling
- C Medication accessibility
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-693L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EMERGING ROLES FOR THE COMMUNITY PHARMACIST: RAPID INFLUENZA DIAGNOSTIC TESTING AND LINKAGE TO CARE

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**Purpose:** Influenza is an acute respiratory illness that affects thousands of people each year. Many people who are infected will recover with no medical intervention; however, there are certain populations at higher risk of developing serious complications. While there are laboratory tests like molecular assays, immunofluorescence, and viral culture to diagnose influenza, these tests cannot be performed in a reasonable amount of time for outpatient management. Rapid influenza diagnostic tests (RIDT) are a fast and effective point-of-care test that can be used to identify positive cases of the flu. The primary objective of this research project is to utilize RIDT in the community pharmacy and link patients to care at the medical center. The secondary objective is to assess whether patients value the pharmacy-based service by utilizing a survey. **Methods:** This prospective study was designed to screen patients in the community pharmacy for positive cases of influenza using RIDT. All patients that underwent screening received supportive care counseling from the community pharmacist and were directed to their physician for further clinical evaluation after the study visit. The physicians were contacted by the pharmacist for a prescription to initiate anti-viral therapy, if appropriate, in patients with a positive screening during the study visit. All patients were given a survey to evaluate their perception of the pharmacy-based service. **Results and Conclusion:** Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify populations at high-risk for developing complications related to influenza.

Describe the benefits of using Rapid Influenza Diagnostic Tests (RIDT) in the community pharmacy.

### Self Assessment Questions:

Which of the following populations is at high-risk for developing complications related to influenza?

- A Adults who are under the age of 65 years
- B: People with a history of pulmonary disease
- C: Children who are over the age of 5 years
- D: People who are overweight (BMI 25 or higher)

Which of the following is a benefit to using RIDT screenings in the community pharmacy?

- A All RIDT kits provide high sensitivity and specificity ranges
- B RIDT kits can generally be used to screen patients for influenza a
- C RIDT kits provide results within a clinically relevant time-frame (<
- D All RIDT kits are CLIA- waived and can be used for point-of-care t

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-16-899L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPACT OF VANCOMYCIN ON MYELOID ENGRAFTMENT IN AUTOLOGOUS STEM CELL TRANSPLANT RECIPIENTS

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**Background:** Peripheral blood stem cell transplant (PBSCT) is a common treatment option for patients with hematologic malignancies. A chemotherapy conditioning regimen is given, followed by stem cell infusion. Engraftment usually occurs 10-14 days after stem cell infusion. Prolonging the time to myeloid engraftment increases the risk of infection and the length of hospital stay. Vancomycin is commonly used for neutropenic fever. Neutropenia induced by vancomycin has been reported to occur at rates of 2-12% in the previously published literature. Progenitor cell growth suppression by vancomycin following stem cell transplantation and vancomycin associated engraftment failure have been shown in case reports. Currently there are no studies that evaluated the impact of vancomycin exposure prior to engraftment on myeloid engraftment in stem cell transplant patients. **Purpose:** To assess the effect of vancomycin exposure on time to myeloid engraftment after autologous stem cell transplant in patients with multiple myeloma. **Methods:** The design is a retrospective, cohort study that will be performed by reviewing the database of patients at Northwestern Memorial Hospital (NMH) who have undergone autologous PBSCT for multiple myeloma and received high-dose melphalan conditioning regimen. Patients with microbiologically documented infections are excluded since infections can delay myeloid engraftment. The primary outcome of this study is time to myeloid engraftment, which is defined as the first day with an absolute neutrophil count (ANC) of  $> 0.5 \times 10^9/L$  (ANC 500). Time to myeloid engraftment for patients who received intravenous vancomycin will be compared to patients who did not. Subgroup analysis will be performed to evaluate the impact of vancomycin duration of use, day of initiation, and vancomycin serum concentrations. **Results/Conclusions:** Data analyses are ongoing. Research results and conclusions will be presented at the conference.

### Learning Objectives:

Discuss the proposed mechanism of vancomycin induced neutropenia  
Describe the risks associated with delayed myeloid engraftment

### Self Assessment Questions:

By which of the following mechanisms do vancomycin induce neutropenia?

- A: immune mediated effect
- B: accelerate the process of neutrophil apoptosis
- C: direct toxic effect on bone marrow
- D: A & c

Which of the following is associated with prolonged time to myeloid engraftment?

- A: higher risk of infection
- B: lower risk of engraftment failure
- C: lower health care cost
- D: shorter length of hospital stay

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number    0121-9999-16-694L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPLEMENTATION OF USP 797 AND OPTIMIZATION OF SAFETY AND WORKFLOW IN A COMMUNITY HOSPITAL IV ROOM

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**Purpose:** USP 797 is a set of pharmacy compounding regulations used to protect the health of patients by reducing the potential for contamination. These regulations apply to sites that compound sterile preparations. Currently, the IV room at Community Memorial Hospital is not fully compliant with USP 797. These requirements must be met in all healthcare settings to ensure safe medication practices and patient safety. The purpose of the study is to successfully implement a USP 797 compliant IV room and create optimal workflows. The goals are to target anticipated regulatory requirements, utilize best practices in sterile product preparation for patient safety, and optimize workflow in the IV room. The primary objective is to increase the USP 797 compliance rate, a percentage, as determined by gap analyses pre/post construction. Secondary objectives are to optimize workflow by implementing barcode technology, improve missing medication doses pre/post construction, and reduce IV room waste pre/post construction.

**Methods:** This is a quality improvement project. It started in August of 2015 and has an anticipated end date of February 2016. Workflows will be developed using the Change Acceleration Process and will incorporate pharmacy technician and pharmacist input. Workflows will be developed for various phases of construction and post construction. Barcode technology will also be implemented in the IV room during construction. It will be used to optimize workflows and maximize use of safety features in our current technologies. **Results/Conclusions:** The

### Learning Objectives:

Recognize the importance of having a USP 797 compliant IV room and optimal workflow.

Identify barriers that may be encountered when implementing changes in the IV room.

### Self Assessment Questions:

What is USP 797?

- A: A chapter in the Purple Book used to enforce sterile compounding
- B: A chapter in the Orange Book used to enforce sterile compounding
- C: A chapter in the USP National Formulary used to enforce sterile compounding
- D: A guide of how to prepare parental medications

What are potential barriers that may be encountered when remodeling an IV room?

- A: Construction proceeding on time
- B: Resistance to change from staff
- C: Workflow staying exactly the same
- D: Excessive help from staff

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number    0121-9999-16-970L05-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EFFECTIVENESS OF VENOUS THROMBOEMBOLISM PROPHYLAXIS IN PATIENTS WITH LIVER DISEASE

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**Purpose:** Patients with liver disease are concomitantly at increased risk of venous thromboembolism (VTE) and bleeding events due to changes in the balance of pro- and anti-hemostatic substances<sup>1</sup>. As such, recommendations for the use of pharmacological VTE prophylaxis are lacking. With significant limitations to the available literature, our study seeks to establish if pharmacological VTE prophylaxis is effective and safe in patients with liver disease. **Methodology:** A non-interventional, retrospective cohort study will be conducted to primarily evaluate a composite endpoint of incident VTE or VTE progression and major bleeding in patients with liver disease receiving pharmacological VTE prophylaxis versus those receiving no pharmacological VTE prophylaxis. **Secondary objectives** include comparing differences in clinically relevant non-major bleeding, hospital length of stay (LOS), intensive care unit LOS, and in-hospital mortality. Adult patients with acute or chronic liver failure hospitalized for at least 48 hours will be included in the study. Patients will be excluded if they received treatment with full dose anticoagulation for any indication other than incident VTE, or if they had a history of congenital or acquired thrombophilia or hemophilia. Data describing patient demographics, baseline characteristics, severity of liver disease, and VTE prophylaxis will be collected. Patients will be matched and analyzed based on propensity score. Nominal data will be analyzed with logistic regression and continuous data will be analyzed using linear mixed effect models with transformations for data that is not normally distributed. **Results and Conclusions:** Results to be presented at Great Lakes Residency Conference.

### Learning Objectives:

Review the abnormalities in the coagulation cascade that occur in patients with liver disease

Discuss current literature evaluating the effectiveness of pharmacological venous thromboembolism prophylaxis in patients with liver disease

### Self Assessment Questions:

Which of the following is associated with increased risk of VTE?

- A: Immobility
- B: Decreased synthesis of Factor II
- C: Increased tissue plasminogen activator
- D: Decreased platelet count

Data evaluating the efficacy of pharmacological VTE prophylaxis has been:

- A: Very conclusive; pharmacological VTE prophylaxis should be given
- B: Very conclusive; pharmacological VTE prophylaxis should be given
- C: Very conclusive; pharmacological VTE prophylaxis should be given
- D: Not conclusive; studies have been conflicting in regards to their

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-695L01-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## IMPLEMENTING MULTIDOSE MEDICATION DISPENSING FOR DISCHARGE ACROSS AN INTEGRATED HEALTH CARE SYSTEM

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**Purpose:** Multidose Medication Dispensing for Discharge (MMDD) is the process of providing partially-used multidose medications for patient use after hospital discharge. This is a nationally recognized practice for reducing pharmaceutical waste. It is also a highly satisfying practice for the patient. The purpose of this project is to develop and implement a standardized approach to multidose medication dispensing on discharge across Aurora Health Care, an integrated health care system. **Methods:** Initial steps of the project involved establishing legality of implementing MMDD, obtaining stakeholder approval, development of an appropriate standardized approach to implementing the process across the system, and providing education to process participants. Further steps will include collaborating with process participants on standardized workflow, promotion of the MMDD process across the system, and assessment of compliance with the defined conditions of the process. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify three reasons why a Multidose Medication Dispensing for Discharge process was pursued for implementation at Aurora Health Care.

Explain why this process can take place, per Wisconsin law, without pharmacist counseling and relabeling.

### Self Assessment Questions:

Which of the following was part of the rationale for implementing the Multidose Medication Dispensing for Discharge (MMDD) process?

- A: To avoid using multidose medications on more than one patient.
- B: Patient satisfaction from being able to take home remaining doses
- C: To decrease workload of nurses by removing need to return medications
- D: A policy change was made to allow for implementation.

Which of the following statements is true per Wisconsin law?

- A: Once a product has been dispensed to a patient, it is then the property of the patient
- B: Counseling and relabeling of a product that has already been dispensed is required
- C: Multidose medications must initially be dispensed from the pharmacy
- D: A & B

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number    0121-9999-16-706L03-P

Activity Type: Knowledge-based    Contact Hours: 0.5

## EVALUATION OF THE USE OF EMERGENCY DEPARTMENT SERVICES

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**Purpose:** The overutilization of the Emergency Department (ED) is a growing concern among health care providers. Preventable emergency department visits correlate with an increase in health care spending. Recent literature focuses on characterizing the disproportionate utilization of emergency services. Although "frequent users" only make up 8% of ED patients, they account for 21-28% of all ED visits. The purpose of this study is to determine reasons for frequent usage of emergency services; and how insurance coverage, access to care, and medication availability accounts for the wide variance of ED use within this population. **Methods:** This study was IRB approved. A verbal survey and retrospective review of electronic medical records were conducted for emergency department patients from two community hospitals. Adult patients who presented to the ED for acute care services were selected from a census list and enrolled in the study. The survey consisted of selected questions from the National Health Interview Survey and the National Hospital Ambulatory Medical Care Survey. Emergency department utilization data was obtained using medical record numbers and the date of emergency department service

**Results/Conclusions:** Out of 100 emergency department patients, this study found that 26% of patients reported issues with medication access or compliance. Emergency department physicians documented 26% of ED visits were directly related to disease state exacerbation, medication nonadherence, or medication side effects. Additionally, 77% of patients reported that they had access to a primary care physician, but 10% of patients came to the ED because their primary care physician was unavailable. Patients frequently reported cost, transportation, and forgetfulness as reasons for their medication access or compliance issues. Based on these findings, a pharmacotherapy clinic will be evaluated to assess if pharmacists can reduce disease state exacerbation, medication noncompliance, and ED usage.

### Learning Objectives:

Describe the incidence of "frequent users" among emergency department patients.

Identify common patient reported reasons for issues with medication access or compliance.

### Self Assessment Questions:

What is the incidence of "frequent users" among emergency department patients?

- A 3%
- B: 8%
- C: 15%
- D: 25%

Which of the following are commonly identified reasons for problems with medication access or compliance?

- A Cost
- B Forgetfulness
- C Transportation
- D All the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-900L04-P

Activity Type: Knowledge-based Contact Hours: 0.5

## INFLUENCING PRESCRIBING PATTERNS OF THE HEPARIN-PLATELET ANTIBODY LAB IN PATIENTS WITH SUSPECTED HEPARIN-INDUCED THROMBOCYTOPENIA

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**Purpose:** To determine if the implementation of clinical decision support, pharmacist review of laboratory orders, and a hospital guideline will have an effect on the percentage of orders placed for the heparin-platelet antibody lab in patients at low risk for the development of heparin-induced thrombocytopenia (HIT) based on their 4T score (a scoring system utilized to determine a patient's risk level for the development of HIT). **Methods:** This evaluation was exempt from review by the Investigational Review Board. A retrospective chart review will be conducted to evaluate what percentage of orders for the heparin-platelet antibody lab were inappropriately drawn for "low-risk" patients, as defined by their 4T score. The pre-intervention analysis will include 170 patients that were admitted between 9/04/2014-9/29/2015, were 18 years of age or above, received heparin, enoxaparin, or dalteparin during their hospital admission, and had an order resulted for the heparin-platelet antibody lab during their admission. A link to a 4T risk calculator will be embedded in the order for the heparin-platelet antibody lab within the electronic health record software. Pharmacists will be alerted to review all lab orders placed for the heparin-platelet antibody lab, and a hospital guideline will be created. A post-intervention analysis will occur after these interventions have been implemented to evaluate the effectiveness on reducing inappropriate ordering of the heparin-platelet antibody lab. A calculated sample size of 170 patients per group will be required to detect a difference with 80% power with statistical significance set at 0.05. Data will be evaluated using the Chi squared test. **Results and conclusion:** Results and analysis of the data are currently in progress. Final conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the components of the 4T score and how a 4T score is calculated.

Identify patients who are at low risk for the development of heparin-induced thrombocytopenia.

### Self Assessment Questions:

A patient's calculated 4T score is 2. Which of the following statements is correct?

- A The patient has a moderate risk for the development of heparin-induced thrombocytopenia.
- B: The patient has a low risk for the development of heparin-induced thrombocytopenia.
- C: The patient has a high risk for the development of heparin-induced thrombocytopenia.
- D: The patient should receive further testing to confirm the diagnosis

A patient has a 60% drop in platelet count 6 days after initiation of heparin. The patient has a suspected thrombus and does not have any other apparent causes for thrombocytopenia. Which of the following is correct?

- A a. The patient has a 4T score of 1 and is at low risk for the development of heparin-induced thrombocytopenia.
- B The patient has a 4T score of 7 and has a high risk for the development of heparin-induced thrombocytopenia.
- C The patient has a 4T score of 4 and has a moderate risk for the development of heparin-induced thrombocytopenia.
- D The patient's 4T score is unable to be calculated based on the above information.

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-696L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF ACADEMIC DETAILING PROVIDED BY A PHARMACY RESIDENT IN AN OUTPATIENT MENTAL HEALTH SETTING

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**Purpose:** Academic detailing is a service that provides educational outreach visits focused on interactive discussion of unbiased, evidence-based medicine with healthcare providers in a one-on-one or small group setting. These outreach visits have demonstrated to be effective in changing prescribing habits in a variety of practice settings. The focus of this pilot project is to improve upon standards encompassed in the VA national Psychotropic Drug Safety Initiative (PDSI). This initiative promotes evidence-based prescribing practices for psychotropic drugs by facilitating clinical review of patients who may need additional evaluation of their medication regimens. One major focus is evidence-based prescribing for patients with post-traumatic stress disorder, specifically looking at the use of benzodiazepines, antipsychotics and multiple concurrent psychotropic drugs in this patient population. The primary objective of this pilot project is to evaluate the prescribers perception of academic detailing focused on prescribing patterns in patients with post-traumatic stress disorder (PTSD). **Methods:** This study is a single-centered quality improvement project that will be completed at Chalmers P. Wylie Veterans Affairs Ambulatory Care Center. A survey will be distributed to mental health providers immediately following the academic detailing sessions provided by a pharmacy resident held during the month of February 2016. The focus of these sessions will be Post-traumatic Stress Disorder. The survey will evaluate key objectives concerning how mental health providers perceive academic detailing will assist in their improvement of competence, performance and patient outcomes. Additional items that will be evaluated include provider satisfaction, what barriers they anticipate facing in their current practice setting, and how the content presented will impact their current practice and/or healthcare team.

**Results:** No results available at this time. **Conclusions:** This study is currently in progress.

### Learning Objectives:

Recognize evidence-based guidelines for the treatment of post-traumatic stress disorder

Discuss the benefits of academic detailing provided by clinical pharmacists

### Self Assessment Questions:

First line pharmacologic treatment options for post-traumatic stress disorder include

- A Benzodiazepines
- B: Atypical antipsychotics
- C: Antidepressants
- D: All of the above

Psychotherapy interventions available for the treatment of post-traumatic stress disorder include

- A Cognitive-based therapy
- B Exposure-based therapy
- C Stress inoculation
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-697L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF STANDARDIZED CLINICAL DECISION SUPPORT TOOLS FOR RISK EVALUATION AND MITIGATION STRATEGIES (REMS)

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**Purpose:** In 2007, the Food and Drug Administration Amendments Act (FDAAA) granted the Food and Drug Administration (FDA) authority to require risk evaluation and mitigation strategies (REMS) from manufacturers beyond the structured product labeling to ensure that benefits of certain drugs and biological products outweigh their risks.

A REMS program may be required before approval for new products or post-approval for existing products if new safety information arises. It may incorporate one or more of the following four components: 1) medication guide, 2) communication plan, 3) elements to assure safe use (ETASU), 4) implementation system. If ETASU is included, prescribers or pharmacies may be required to complete certification, register the patient, and/or document patient informed consent and monitoring. Currently at NorthShore University HealthSystem, the electronic health record (EHR) does not have clinical decision support tools (CDS) to intervene on these REMS programs. The goal of this project is to develop and implement standardized CDS tools within the EHR to ensure compliance with REMS requirements. **Methods:** A review of all REMS medications prescribed within the inpatient and outpatient settings was conducted. A select number of REMS medications were identified encompassing all combinations of the individual components and ETASU. Clinical decision support tools targeted at the medication guide component and ETASU elements will be developed in conjunction with the stakeholders identified within the physician, nursing, and pharmacy departments in both outpatient and inpatient settings. Tools developed will be standardized for future application to all REMS programs. Building, testing, and troubleshooting of developed tools will be completed within the EHR and workflows will be updated. Subsequent training and implementation of updated workflows will be done at each site within the health-system.

**Results/Conclusion:** Implementation of the project is ongoing. Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Review the history of risk evaluation and management strategies (REMS)

Describe clinical decision support tools used to help guide compliance with REMS requirements

### Self Assessment Questions:

1. Which act granted the Food and Drug Administration authority to require risk evaluation and management strategies?

- A The Federal Food, Drug and Cosmetic (FDC) Act
- B: The Food and Drug Administration Amendments (FDAAA) Act
- C: The Food and Drug Administration Modernization Act
- D: The Durham-Humphrey Amendment

Which group/s of healthcare professionals are affected by REMS requirements?

- A Pharmacists
- B Prescribers
- C Nurses
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-16-971L05-P

Activity Type: Knowledge-based Contact Hours: 0.5

## EVALUATION OF PHARMACIST INTERVENTION ON THE APPROPRIATE USE OF PROTON PUMP INHIBITOR (PPI) USE OUTSIDE OF THE INTENSIVE CARE UNIT (ICU) SETTING

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**Background:** Current literature shows there is a growing misuse of stress ulcer prophylaxis (SUP) outside of the ICU setting in low risk patients. This rising misuse places patients at a higher risk for adverse drug effects and unnecessary increases healthcare expenditure.

**Purpose:** The purpose of this study is to evaluate the effect of pharmacist interventions on the appropriate management of SUP outside of the ICU setting. **Methods:** An 8-week prospective evaluation of appropriate PPI therapy was conducted. Appropriate indications for PPI use included healing of erosive esophagitis, GERD, eradication of *H. pylori* infection, gastric ulcer, Zollinger-Ellison syndrome and use in the prevention of NSAID and dual antiplatelet induced ulcers in moderate to high risk patients. Patients that were receiving PPI therapy prior to admission were excluded from this study. If use was deemed inappropriate, the pharmacist intervened to discontinue therapy. The primary endpoint was the number of patients on inappropriate PPI therapy. Secondary endpoints included the acceptance rate of pharmacist interventions, the number of patients continued on inappropriate PPI therapy at discharge, and documented reasons for continuation of inappropriate PPI therapy. **Results:** The study pharmacists did not find a difference in the number of inappropriate PPI therapy prescribed for SUP over the 8 weeks. However, there was an increase in the number of accepted pharmacist interventions and a decrease in the number of inappropriate PPIs continued at discharge. **Conclusion:** This interventional study did not show a decrease in the number of patients on inappropriate PPI therapy but did establish that prescribers are willing to make changes when approached with literature-based recommendations. Results from this study will help establish a protocol for future pharmacist intervention to decrease inappropriate PPI therapy.

### Learning Objectives:

Discuss the appropriate indications for the use of proton pump inhibitors outside of the ICU

Identify different ways pharmacists can intervene to reduce the inappropriate use of PPIs for stress ulcer prophylaxis

### Self Assessment Questions:

Which of the following is an appropriate indication for the use of stress ulcer prophylaxis outside of the ICU?

- A: Patient is on rivaroxaban for atrial fibrillation
- B: Patient is on oral prednisone 40mg twice daily and aspirin 325 mg
- C: Patient is on dual antiplatelet therapy and has a history of upper GI bleed
- D: Patient is complaining of worsening abdominal pain over the last 24 hours

How can pharmacists make the most impact for preventing the inappropriate prescribing of proton pump inhibitors (PPI) for stress ulcer prophylaxis outside of the ICU?

- A: Provide educational materials to pharmacists about the FDA approved PPIs
- B: Form a coalition team with physicians, nurses, and other allied health professionals
- C: Text or page physicians to discontinue patient's PPI
- D: Create prompts/alerts to alert prescribers/ pharmacists to review PPI use

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-16-698L01-P

Activity Type: Knowledge-based Contact Hours: 0.5

## IMPLEMENTATION OF A PHARMACIST-DRIVEN PAIN MANAGEMENT SERVICE FOR PATIENTS AT HIGH RISK FOR RESPIRATORY DEPRESSION

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**Background:** Opioid analgesics rank among the drugs most frequently associated with adverse drug events. In recognition of the nationwide epidemic of opioid-induced respiratory depression and over-sedation, The Joint Commission released Sentinel Event Alert #49 addressing the safe use of opioids prescribed and administered within the inpatient hospital setting. The Alert provides a number of evidence-based recommendations that can be taken to avoid the unintended consequences of opioid use among hospital inpatients, one of which is to create and implement policies and procedures for a second-level review of pain management plans with high-risk opioids by pain specialists or pharmacists. **Objectives:** The primary objective of this study is to evaluate the effect of an inpatient pharmacist-driven pain management service and opioid stewardship on the number of respiratory depression and over-sedation cases, amount and types of opioids prescribed, and overall patient outcomes. **Methodology:** This study is currently being completed at Southwest General Health Center, a 358-bed, non-profit hospital with a full range of medical, surgical and emergency services. IRB approval has been granted. A daily computer generated report is obtained with a list of all "high-risk" patients, who meet at least one of the following criteria: age greater than 70 years, weight greater than 150 kg, serum creatinine greater than 1.4 mg/dL, presence of sleep apnea, and patients undergoing general anesthesia. The pain medication stewardship pharmacist's duties include thorough assessment and monitoring of analgesic medications for safe and effective use, and providing appropriate, evidence-based recommendations to prescribers. Safety is evaluated by number and type of opioid(s) prescribed and administered in twenty-four hours, with morphine equivalents as the primary endpoint. Secondary endpoints include pain scale scores, respiratory rate, indication(s) for pain medication(s), sedation scale scores, number of interventions made and whether accepted or denied, and length of stay. **Results and Conclusions:** To be determined.

### Learning Objectives:

List specific criteria that place a patient in the high risk category for development of respiratory depression

Discuss ways to avoid unintended consequences of opioid use among hospital inpatients, according to recommendations from JCAHO Sentinel Event Alert #49

### Self Assessment Questions:

Which of the following criteria places a patient at high risk for development of respiratory depression?

- A: Age greater than 40 years
- B: Weight less than 150 kg
- C: Serum creatinine (SCr) less than or equal to 1.2 mg/dL
- D: Presence of sleep apnea

According to Sentinel Event Alert #49, which of the following is an evidence-based recommendation that can be taken to avoid the unintended consequences of opioid use among hospital inpatients?

- A: Prescribing, administration and monitoring of opioid use by pain specialists or pharmacists
- B: Constant capnography monitoring for all inpatients
- C: Second-level review of pain management plans with high-risk opioids by pain specialists or pharmacists
- D: Implement a hospital policy that does not allow for administration of opioids

Q1 Answer: D Q2 Answer: C

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