

## EVALUATING TIME TO GOAL MAP AFTER IMPLEMENTATION OF A NEW DEFAULT NOREPINEPHRINE ORDER

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**Background:** In the US approximately 1.7 million adult cases of sepsis occur annually, contributing to 270,000 deaths each year. A cardinal sign of septic shock is reduced tissue perfusion which can lead to end organ damage and poor outcomes. Since perfusion of the vital organs cannot be measured directly, mean arterial pressure (MAP) is used most commonly as a surrogate marker. In patients with severe sepsis and/or septic shock the "Surviving Sepsis Guidelines" recommend adequate fluid resuscitation followed by initiation of vasopressors in order to maintain a MAP goal of > 65 mmHg. Norepinephrine is the first-line agent to correct hypotension after adequate fluid resuscitation. Achievement of goal MAP is highly dependent on vasopressor dosing. However, standardization for norepinephrine dosing is lacking in current literature.

**Statement of Purpose:** To evaluate the difference in time to goal MAP after implementation of a new default norepinephrine order.

**Methods:** This is a quasi-experimental study. Inclusion criteria includes patients ≥ 18 years, admitted to the medical intensive care unit, and started on norepinephrine as the primary vasopressor. Pre-intervention group includes patients admitted to Henry Ford Hospital from January 1st-June 30th, 2017 and January 1st to June 30th, 2018 for the post-intervention group. Data collected from medical record includes demographics, fluid status, total fluids received before vasopressor initiation, MAP before initiation of vasopressor, time until vasopressor discontinuation, source of infection, time to first antimicrobial, antimicrobial selection, time and duration of corticosteroids, total hours on mechanical ventilation, hospital length of stay, ICU length of stay, SOFA score, history of hemodialysis, and history of arrhythmias.

Data is currently being collected, and results will be presented at the conference.

### Learning Objectives:

Discuss the standard of care for the management of septic shock  
Describe the consequences of persistent hypotension

### Self Assessment Questions:

According to the "Surviving Sepsis Guidelines" when is the initiation of a vasopressor indicated?

- A: Immediately after antibiotic administration
- B: If hypotension persists after fluid administration
- C: Immediately after intubation
- D: Vasopressors are not indicated in sepsis care

Profound persistent hypotension is an independent risk factor of?

- A: Decreased mortality
- B: Increased mortality
- C: Sepsis
- D: All of the above

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMAL OPIOID PRESCRIBING FOR THE TREATMENT OF ACUTE PAIN IN POST-OPERATIVE PATIENTS

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**Purpose:** In light of the opioid epidemic crisis significant effort is being made to determine effective ways to reduce patient harm and prevent the overprescribing of opioids. The objective of this study is to evaluate if opioid prescribing habits are impacted after creating operation specific guidance documents for post-operative opioid prescribing at a community hospital.

**Methods:** This single center retrospective chart review was conducted at Indiana University Health Arnett Hospital. A literature review of operation specific opioid prescribing recommendations was conducted and guidance documents were created and presented to providers in October 2018. Recommendations referenced included those published by the Center of Disease Control, Opioid Prescribing Engagement Network, John Hopkins, and Mayo Clinic Department of Orthopedic Surgery. Patients between the ages of 18 and 89 years of age who were admitted to the hospital and underwent the operations of interest between November 1st, 2017 to January 31st, 2018 and between November 1st, 2018 to January 31st, 2019 were included in this study. Patients were excluded if they were pregnant, incarcerated, in hospice care, or received opioids within 30 days prior to their procedure. The electronic medical record for each patient was reviewed to identify the prescribed opioid, strength, and quantity prescribed at the time of discharge. All doses of prescribed opioids were converted to morphine milligram equivalence (MME). The primary endpoints include the difference in MME of opioids prescribed at discharge post-operatively and number of patients with prescription(s) for long-acting opioids prior to education compared to post education. The secondary endpoints were the MME of opioids prescribed at discharge post-operatively and the number of patients with prescription(s) for long-acting opioids divided by subgroups of surgery specialty. Appropriate statistical analysis were utilized to analyze the outcomes.

**Results/conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review Review published recommendations for the treatment of post-operative pain.

Discuss Discuss the impact of educational interventions and providing operation specific recommendations on provider prescribing habits.

### Self Assessment Questions:

1. What resources are available to guide providers when prescribing opioids for post-operative pain AND were used in providing recommendations at Indiana University Health Arnett?

- A: Mayo Clinic Department of Orthopedic Surgery
- B: Opioid Prescribing Engagement Network
- C: John Hopkins
- D: All of the above

The likelihood of long-term opioid use increases after only \_\_\_\_\_ days.

- A: 7
- B: 5
- C: 3
- D: 1

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## TARGET-SPECIFIC ORAL ANTICOAGULANT USE IN MORBID OBESITY AND RATES OF VENOUS THROMBOEMBOLISM AND STROKE

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Current guidelines from the International Society of Thrombosis and Hemostasis (ISTH) recommend against the use of target-specific oral anticoagulants (TSOACs) in morbidly obese patients, defined as a body mass index (BMI) greater than 40 or weight greater than 120 kilograms (kg). However, use of TSOACs in this population is seen in clinical practice. The purpose of this study was to determine the rate of cardioembolic ischemic stroke or venous thromboembolism in morbidly obese patients on TSOACs versus warfarin.

This was a retrospective, single-center chart review. Patients were identified using International Classification of Diseases, Tenth Revision ICD-10 codes for venous thromboembolism and acute cardioembolic ischemic stroke. Patients were included if they had a BMI greater than or equal to 40 or weight greater than or equal to 120 kg and were prescribed either warfarin or a TSOAC for venous thromboembolism or stroke prevention. The primary outcome was the rate of venous thromboembolism or stroke in morbidly obese patients on a TSOAC compared to warfarin. Secondary outcomes include hospital length of stay, mortality, and a review of appropriate prescribing and dosing based on package insert recommendations. Student's t-test or Mann-Whitney U test was used to evaluate continuous data, and Chi-squared or Fisher's Exact test was used to evaluate categorical data.

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

- Discuss current evidence for use of oral anticoagulants in morbidly obese patients
- Review pharmacokinetics of oral anticoagulants

### Self Assessment Questions:

Which of the following management strategies is suggested by the ISTH when dealing with morbidly obese patients requiring anticoagulation?

- A Use standard TSOAC doses without drug level monitoring in morbidly obese patients
- B Use an alternative to TSOACs in morbidly obese patients
- C Use higher TSOAC doses in morbidly obese patients
- D Use parenteral anticoagulants only, do not use oral anticoagulants

Which of the following is true regarding the pharmacokinetics of TSOACs?

- A The bioavailability of rivaroxaban is unchanged with food
- B Dabigatran is extensively metabolized by CYP3A4
- C Apixaban is approximately 30% renally eliminated
- D Edoxaban has a very low volume of distribution

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
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## EFFECTS OF CFTR MODULATORS ON PHARMACOKINETICS OF TOBRAMYCIN DURING ACUTE PULMONARY EXACERBATIONS IN THE PEDIATRIC CYSTIC FIBROSIS POPULATION

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Purpose: Individuals with cystic fibrosis (CF) require higher dosages of aminoglycosides due to an increased volume of distribution (Vd) and clearance. Optimal dosing of aminoglycosides in the CF population is essential as repeated exposure to aminoglycosides during acute pulmonary exacerbations increases risk of nephrotoxicity and ototoxicity. Improvement of kidney CFTR function due to chronic therapy with a CFTR modulator would reduce observed clearance of aminoglycosides and potentially alter optimal dosing requirements in patients with CF. To date, no studies have evaluated whether chronic CFTR modulator therapy affects pharmacokinetics of aminoglycoside antibiotics in CF patients. The objective of this study is to determine if CFTR modulator therapy affects elimination rate (Ke) for tobramycin in the pediatric CF population.

Methods: This study was approved by the Indiana University Institutional Review Board. The retrospective chart review included patients aged 2 to 18 years with CF receiving chronic therapy with a CFTR modulator. Patients included have inpatient admissions both pre- and post-chronic CFTR modulator therapy during which they received therapy with IV tobramycin. Patients who did not have two post-dose tobramycin levels drawn during each admission were excluded. The primary endpoint evaluated is change in calculated tobramycin Ke between pre- and post-chronic CFTR modulator therapy admissions. Continuous data points will be analyzed via a paired t-test or Wilcoxon signed rank test. Nominal data will be analyzed via a Chi-squared or Fisher's exact test.

Results: To date, twenty-three patients are included with a mean ( $\pm$ SD) age at post-CFTR modulator initiation inpatient admission of 8.6 ( $\pm$ 2.4) years and CFTR treatment duration of 6.4 ( $\pm$ 4.1) months. The mean difference in tobramycin Ke between pre- and post-CFTR therapy admissions is 0.0072 ( $\pm$ 0.068) hr<sup>-1</sup> (P = 0.66). Patient screening and data collection is currently ongoing.

Conclusions: Final results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify differences in the pharmacokinetic disposition of aminoglycoside antibiotics in patients with cystic fibrosis vs the general population  
Describe the mechanism of CFTR modulators in the treatment of cystic fibrosis and identify beneficial effects observed with CFTR modulator therapy

### Self Assessment Questions:

Which of the following is true regarding the changes in pharmacokinetic parameters seen in patients with cystic fibrosis compared to the general population?

- A Vd, decreased
- B Ke, increased
- C Ke, decreased
- D T1/2, increased

Which of the following has been an observed benefit of ivacaftor vs placebo in clinical trials?

- A Reduced likelihood of acute pulmonary exacerbation
- B Weight loss
- C Increased sweat chloride
- D Increased mucous viscosity

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT OF GLUCOSE MANAGEMENT WITH PHYSICIAN-DRIVEN INSULIN DOSING VERSUS AN ELECTRONIC GLYCEMIC MANAGEMENT SYSTEM

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**Purpose:** A number of studies have shown that poor glycemic control leads to negative patient outcomes in hospitalized patients. Hospital management of hyperglycemia is challenging, leading to an increase in the use of computer-guided insulin dosing software to optimize therapy. The objective of this study is to determine how glucose management with Endotool SubQ (ETSQ), an FDA approved Electronic Glucose Management System (eGMS), compares to glucose management with physician-driven insulin dosing.

**Methods:** This study is a single center, quality improvement, quasi-experimental, retrospective chart review which includes three months of data with physician-driven insulin dosing and three months of data with ETSQ. There were 238 patients with Type 2 Diabetes included in the study. The primary outcome was the average percent of normal blood glucose readings (70-180 mg/dL) with ETSQ versus physician-driven insulin dosing. Secondary outcomes included the average percent of blood glucose readings with severe hyperglycemia (>300 mg/dL), hyperglycemia (>180 mg/dL), hypoglycemia (<70 mg/dL), and severe hypoglycemia (<50 mg/dL) with ETSQ versus physician-driven insulin dosing.

**Results:** The average percent of normal blood glucose readings was 64% in the physician-driven insulin group vs. 61% in the ETSQ group. Averages for hyperglycemia readings were 34% vs. 38%, severe hyperglycemia averages were 5% vs. 5%, hypoglycemia averages were 2% vs. 1%, and severe hypoglycemia averages were 0.3% vs. 0.1%. All p values in this study were >0.05.

**Conclusion:** This study showed no statistically significant difference in glycemic control when comparing physician-driven insulin control with ETSQ. A large factor contributing to the results is the complexity of setting up new patients in the software, which causes the ETSQ algorithm to under-dose patients. Shortly after completing this study, pharmacy took responsibility for initiating set up of ETSQ to ensure optimal use of the eGMS.

### Learning Objectives:

Identify Identify patient specific variables that Endotool SubQ uses to provide precise dosing recommendations

Discuss Discuss the advantages and disadvantages of an electronic glycemic management system

### Self Assessment Questions:

Which of the following patient specific variables does the Endotool SubQ algorithm take into account when dosing insulin?

- A: Hemoglobin A1C
- B: Carbohydrate intake
- C: Steroid use
- D: All of the above

JT is a 45 year old male who was admitted to the hospital for an asthma exacerbation. He was started on methylprednisolone 60 mg daily, and consequently started having elevated blood glucose levels b

- A: Basal/Bolus/Correction
- B: Correction Only
- C: Sliding scale
- D: None of the above

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## POST HEMATOPOIETIC STEM CELL TRANSPLANT REVACCINATION COMPLIANCE

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**Purpose:** The University of Illinois Hospital & Health Sciences System performs an average of 80 hematopoietic stem cell transplants each year. Several organizations throughout Europe and North America have established guidelines for preventing infectious complications after hematopoietic stem cell transplant (HSCT). Consensus between these guidelines recommend revaccination of all HSCT recipients. The aim of this study is to define the appropriate vaccine schedule in the post-transplant setting based on current guidelines and review the vaccination compliance at UI Health through a retrospective chart review.

### Methods:

A retrospective chart review will be conducted on patients who received an HSCT at the University of Illinois Hospital & Health Sciences System between July 1st, 2015 to September 1st 2018. All patients will be screened for inclusion and exclusion criteria. The following data will be collected during the study period: medical record number, date of birth, gender, race, date of HSCT, type of HSCT, date of immunizations, type of immunizations, number of appointments (where immunizations were administered), insurance type and reasons for missed immunizations (e.g. hospitalizations around the time vaccine was due, relapse of disease, immunosuppressive therapy and various lab values). The study subjects' immunization records will be compared to an immunization schedule created by study investigators. Current immunization guidelines were used to create this immunization schedule. The primary endpoint of this study is to analyze the percent compliance to current immunization guidelines. The secondary endpoints are to analyze the percent compliance to our ideal immunization schedule, explore reasons for non-compliance to vaccination recommendations, and evaluate the number of appointments needed to complete the patient's vaccination course.

**Results:** Data collection is ongoing. Full results and conclusion will be

### Learning Objectives:

Identify Identify the utility of revaccination in post-hematopoietic stem cell transplant patients.

Describe Describe the immunization schedule recommended for post-hematopoietic stem cell transplant patients by the Infectious Disease Society of America (IDSA) guidelines.

### Self Assessment Questions:

How long are hematopoietic stem cell transplant patients immunocompromised for post-transplant?

- A: 1-2 months
- B: 3-6 months
- C: 6-12 months
- D: 12-18 months

Which of the following vaccines is NOT recommended for post-hematopoietic stem cell transplant patients by the Infectious Disease Society of America (IDSA) guidelines?

- A: Hepatitis B
- B: Tetanus, Diphtheria, Pertussis (Tdap)
- C: Haemophilus Influenza Type B
- D: Pneumococcal

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EXPERIENCE USING 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE FOR THE REVERSAL OF FACTOR Xa INHIBITORS IN A LARGE COMMUNITY HOSPITAL

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**Purpose:** 4-Factor Prothrombin Complex Concentrate (4F-PCC) is widely used to reverse serious bleeding in patients on vitamin K antagonists. In the absence of alternative reversal agents, 4F-PCC has also been used off-label to reverse bleeding in patients on factor Xa (FXa) inhibitors such as rivaroxaban and apixaban. The purpose of this study is to evaluate 4F-PCC use in patients on a FXa inhibitor who present with a serious or life-threatening hemorrhagic stroke.

**Methods:** Patients admitted to St. Joseph Mercy Ann Arbor from May 2014 to October 2018 who present with an intracranial bleed on a pre-injury FXa inhibitor will be included. The study population and data will be retrieved with the use of the electronic medical record. The primary efficacy outcome is to assess the progression of the intracranial bleed as reported by the computed tomography (CT) image.

**Results:** Of the 31 patients included, 42% were on apixaban and 58% were on rivaroxaban prior to admission. The majority, 58% presented with a subdural bleed followed by 26% who presented with an intraparenchymal bleed with the remaining bleeds including intracranial and subarachnoid. The mean volume measured using the ABC/2 method on initial CT was calculated to be 14.59 mL, in comparison to the mean on the follow-up CT being 9.8 mL with a notable volume decrease of 32%. After 4F-PCC administration, 10 patients (32%) required neurosurgery the majority being either craniotomy or craniectomy. Irrespective of operations, a total of 20 patients (64%) experienced < 20% volume expansion on comparison between initial and follow-up CT images, two patients had a thrombosis, and two suffered from death.

**Conclusions:** 4F-PCC demonstrates a benefit in controlling blood volume expansion with minimal thrombosis or mortality outcomes in patients who present with an intracranial bleed on a pre-injury FXa inhibitor.

### Learning Objectives:

Recognize the safety and efficacy outcomes of 4F-PCC administration to reverse a FXa inhibitor in patients with an intracranial hemorrhage

Outline the current literature that supports the use of 4F-PCC and discuss the ABC/2 method to measure intracranial bleed expansion

### Self Assessment Questions:

Currently, which of the following agents does 4F-PCC carry an FDA labeled indication to reverse?

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

Prothrombin complex concentrate contains all of the following coagulation factors except:

- A: Factor II
- B: Factor V
- C: Protein C
- D: Protein S

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE SAFETY AND EFFICACY OF INTRAVENOUS LIDOCAINE FOR RENAL COLIC IN THE EMERGENCY DEPARTMENT

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**Purpose:** Due to the growing opioid epidemic and recent shortage, health care providers are encouraged to explore alternative approaches to pain management. Renal colic pain is often managed in the emergency department with intravenous ketorolac, a nonsteroidal anti-inflammatory drug (NSAID), and opioids. Intravenous lidocaine has been studied to treat perioperative pain, chronic neuropathic pain, and various types of acute pain such as renal colic. Lidocaine contains anti-inflammatory and analgesic properties, which offers theoretical potential for an opioid-sparing, multimodal treatment approach of acute pain in the emergency department. The objective of this study is to evaluate the efficacy and safety of intravenous lidocaine in combination with ketorolac compared to ketorolac alone for the treatment of pain associated with renal colic.

**Methods:** This is a single-center retrospective chart review of adult patients that have been diagnosed with renal colic in the emergency department from January 1, 2018 through December 31, 2018. Patients that received intravenous lidocaine and ketorolac will be compared to those that received ketorolac alone. The primary endpoint will be average reduction in pain score. Secondary endpoints will be adverse events and opioid usage in morphine equivalents. These outcomes will be evaluated to measure the safety and efficacy implications intravenous lidocaine has as an adjunctive pain treatment option.

**Results/Conclusions:** Results and conclusions will be presented at the

### Learning Objectives:

Review the current ACEP treatment recommendations for renal colic pain

Identify the correct dose of intravenous lidocaine for renal colic analgesia

### Self Assessment Questions:

Select the treatment option(s) the American College of Emergency Physicians recommends for the management of renal colic pain

- A: NSAIDs such as ketorolac
- B: Intravenous lidocaine
- C: Opioids
- D: Both A and C

Which dose of intravenous lidocaine 2% would be most appropriate for a patient who weighs 70 kg?

- A: 50 mg
- B: 75 mg
- C: 100 mg
- D: 250 mg

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PRESCRIBING ERRORS INTERCEPTED BY PHARMACISTS AT A LARGE ACADEMIC MEDICAL CENTER

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### Background

Preventable medication errors occur every day in the healthcare setting. Errors occur during dispensing, transcription, ordering, and administration of medications. More than 50% of errors in the medication use system occur during medication ordering. A systematic review of literature from 1985 to 2007 found 7% of all orders, 52% of all patient admissions, and 2.4% of all patient days were associated with a prescribing error. Another review of 3 hospitals found a mean prescribing error rate of 14.7% of all orders. Evidence exists representing the positive impact pharmacists have within the emergency department (ED) at intercepting prescribing errors. To date, no studies capture prescribing errors pharmacists intercept throughout an entire hospital, or across multiple institutions. The primary objective of this study is to determine the number of prescribing errors intercepted by pharmacists per patient admission at NMH.

### Methods

Prescribing errors intercepted at the time of verification will be documented in excel by pharmacists working in included practice areas (overnight, medicine, transplant, medical intensive care unit, and oncology) between January 30, 2019 and March 13, 2019. The following data will be collected about each error: patient name, medical record number, unit, unit census for the day, prescribing error type, medication, dose/frequency/rate, therapeutic class, recommendation to provider, severity of potential harm, and prescriber response. Prescribing errors intercepted before an electronic order is placed, or after verification has occurred, will be excluded. All documented errors will be reviewed by a second pharmacist to ensure consistency in categorization and ranking of severity. A smaller subset of errors will be reviewed by a physician. The primary outcome will be the number of errors intercepted per patient admission. Data collected at NMH will be included in a multicenter Vizient study.

Results/Conclusion: To be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Discuss the prevalence of errors in the medication use system  
Describe the impact pharmacists have on intercepting prescribing errors

### Self Assessment Questions:

What step in the medication use process can medication errors occur?

- A Dispensing
- B: Ordering
- C: Administration
- D: All of the above

Historically, what percent of errors occur during the "ordering" step of the medication use process?

- A Less than 25%
- B Less than 50%
- C Greater than 50%
- D Greater than 75%

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## UTILITY OF THE DUAL ANTIPLATELET THERAPY SCORE IN DETERMINING DURATION OF THERAPY IN A VETERAN POPULATION

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Purpose: Dual antiplatelet therapy (DAPT) is typically used to treat patients with acute coronary syndrome for 12 months. Some studies suggest the benefit of prolonged DAPT in high-risk patients may outweigh bleeding risk, however the optimal duration of DAPT remains unclear as identifying these patients is challenging. The DAPT score has been proposed as a tool used to predict combined ischemic and bleeding risk for patients receiving DAPT beyond one year after percutaneous coronary intervention (PCI). The purpose of this study is to evaluate the utility of the DAPT score in determining duration of DAPT after PCI in a veteran population.

Methods: This study is a quality improvement project utilizing retrospective chart review. Patients who underwent PCI at the Lexington VA Health System from 2010-2015 and received one year of DAPT will be included. Patients will be excluded if they were receiving concomitant therapy with an oral anticoagulant or had a prior stroke. A DAPT risk score will be calculated for all patients using the American College of Cardiology DAPT Risk Calculator. The relationship between DAPT score and risk of major adverse cardiovascular and cerebrovascular events (MACCE) and fatal or major bleeding will be evaluated to determine the utility of the DAPT Risk Calculator in determining duration of DAPT in a veteran population. Other outcomes will include whether there is a relationship between type of antiplatelet agent used, MACCE, and fatal or major bleeding, as well as which patients appear to benefit the most from prolonged DAPT therapy. Lastly, we will examine if there are any opportunities for improvement in the management of patients on DAPT following PCI at the Lexington VA Health System. Appropriate statistical analysis will be utilized to analyze the outcomes.

Results & Conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the 2016 ACC/AHA Guidelines on the duration of DAPT after PCI.  
Discuss the American College of Cardiology DAPT Risk Score.

### Self Assessment Questions:

What is the recommended duration of DAPT after PCI?

- A 12 months for everyone
- B: No definitive recommendation; individualized based on indication
- C: 6 months except for BMS
- D: 12 months, except if patient is a high bleed risk, then only 6 months

Which clinical factor is a part of the DAPT Risk Score?

- A renal insufficiency
- B hypertension
- C previous MI or PCI
- D type of stent

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PRESCRIBING AND TIME TO ADMINISTRATION OF ANTIBIOTICS IN FEBRILE NEONATES IN THE EMERGENCY DEPARTMENT

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**Purpose:** Febrile neonates are at significant risk for serious bacterial infections and mortality is about 10%. Antibiotics administered within 60 minutes correlates with improved outcomes. This study aims to characterize antibiotic prescribing for febrile neonates at the University of Illinois Hospital & Health Science System emergency department (UIHED). If barriers to timely and appropriate antibiotic prescribing are identified, targeted interventions such as guidelines, order sets and staff education will be implemented to improve antimicrobial prescribing and potentially impact patient outcomes.

**Methods:** This retrospective chart review included febrile neonates who presented to the UIHED between 1/1/12 and 8/31/18. The primary outcomes were to determine which antimicrobials are being ordered and administered to febrile neonates in the ED and to determine the time (in minutes) to antibiotic administration from triage time. The secondary outcomes were to evaluate appropriateness of empiric antibiotic regimens (drug, dose, route, frequency and order priority), evaluate activity of empiric antibiotic regimen against isolated pathogens, and identify potential barriers to timely and appropriate antibiotic therapy.

**Preliminary Results:** Thirty-three neonates with a mean gestational age of 39.4 weeks and mean postnatal age of 18 days old were analyzed. The majority of patients were female (57%) and African American (52%). Antimicrobials administered to neonates in order of frequency were: ampicillin (n=28), gentamicin (n=24), cefotaxime (n=5), acyclovir (n=5), vancomycin (n=3) and ceftazidime (n=1). Average time to first antibiotic administration was 219 minutes (range 92 to 419 min). No patients received antibiotics within 60 minutes of presentation.

**Preliminary Conclusions:** Overall, empiric antimicrobials ordered and administered were appropriate for neonatal sepsis. Time to first antibiotic administration was not within 60 minutes of patient presentation. This suggests there is an opportunity for improvement and implementation of targeted interventions to improve time to antimicrobial administration at the UIHED.

### Learning Objectives:

Discuss Discuss the pathophysiology and management of neonatal sepsis

Describe Describe the management of neonatal sepsis at the University of Illinois Hospital & Health Science System emergency department

### Self Assessment Questions:

What are the common organisms of concern in patients with late-onset neonatal sepsis presenting from the community?

- A: MRSA, E. Coli, Listeria monocytogenes
- B: Group B Streptococcus, E. Coli, Enterobacter species
- C: Group B Streptococcus, Listeria monocytogenes, E. Coli
- D: Group B Streptococcus, E. Coli, MRSA

What is the goal time to antimicrobial administration in patients presenting with neonatal sepsis?

- A: 120 minutes
- B: 90 minutes
- C: 60 minutes
- D: 30 minutes

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## MEASURING THE COMPLIANCE OF THERAPEUTIC INTERCHANGE PROTOCOLS IN AN ACADEMIC MEDICAL CENTER

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Therapeutic interchanges are formulary management strategies implemented to drive formulary compliance. The formulary at Froedtert Health includes 109 therapeutic interchanges. When a provider places an order for a nonformulary medication with an associated therapeutic interchange, an alert fires in the electronic health record (EHR) recommending a formulary alternative. This point-of-order entry formulary management technique was integrated into the Froedtert Health EHR in 2014, but compliance has never been formally evaluated.

This is a pre-post observational study designed to assess compliance to therapeutic interchange alerts. The primary objective of this study is to evaluate the percentage of therapeutic interchange alternatives accepted at the point of nonformulary medication ordering. Secondary objectives include identification of rationale for use of nonformulary medications and quantification of intervention types used to promote formulary compliance. For the 6-month pre-intervention period, alternative alert reports were used to identify medication classes with an associated therapeutic interchange where providers continued with the nonformulary medication 50 times or more.

During the 6-month pre-intervention period, 16,620 alerts fired for 17 included medication classes. The provider accepted a formulary alternative with a frequency of 70.1% (11,658 alerts) and continued with the original nonformulary order 14.3% of the time (2,383 alerts). The top 5 alerts with the lowest compliance included intravenous immune globulin, sodium citrate intracatheter solution, albuterol nebulizer, metformin and U-100 insulin lispro. Interventions included EHR alert optimization (n = 9), therapeutic interchange modification (n = 5), and formulary addition (n = 1). Two therapeutic interchanges did not require intervention.

The post intervention period will take place from March 2019 through May 2019. Future directions include analysis of the rate of alternative alerts accepted at the point of nonformulary medication ordering. Preliminary results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain Explain the benefits of integrating therapeutic interchanges into the electronic health record.

Describe Describe interventions to increase compliance with therapeutic interchange protocols.

### Self Assessment Questions:

Which of the following are benefits seen with integrating therapeutic interchanges into the electronic health record?

- A: To aid providers with dose selection of therapeutic alternatives
- B: To guide pharmacist interventions to increase formulary adherence
- C: To aid providers with formulary agent selection at the point of nonf
- D: Both A & C

Which of the following statements about interventions to therapeutic interchange protocols is correct?

- A: Once a therapeutic interchange has been integrated into the elect
- B: One way to increase compliance with therapeutic interchanges is t
- C: Addition of "pharmacist to select P&T-approved formulary alternati
- D: Both B & C

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPACT OF PHARMACIST INTERVENTIONS ON PATIENT OUTCOMES IN A PHARMACIST-DRIVEN CLOZAPINE CLINIC

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**Purpose:** In treatment-resistant schizophrenia, clozapine has proven superiority compared to other antipsychotics. While clozapine can positively impact treatment, diligent monitoring is required due to its large side effect profile. A survey within the Veterans Health Administration found that while psychiatrists identified the benefits of clozapine, they hesitated in prescribing it due to a lack of monitoring support. As a result of the national survey, the VA Sierra Nevada Health Care System implemented a pharmacist-driven clozapine clinic, but outcomes of the clinic were not evaluated. Currently, minimal literature exists describing the efficacy, safety, and cost-saving benefits of pharmacist management in a clozapine clinic. The objective of this study is to identify the benefits of a pharmacist-driven clozapine clinic.

**Methods:** This retrospective chart review will evaluate patients enrolled in the clozapine clinic from September 1, 2018 to February 28, 2019. The primary outcome is to evaluate the impact of pharmacist involvement on clozapine adherence and discontinuation rates, which will be assessed through a medication fill history review. Patient education and clozapine-related clinical interventions will be evaluated as secondary endpoints. An additional secondary endpoint includes pharmacy coordination performed for patients, such as support with patient assistance programs, de-prescribing of psychotropic medications, or adherence counseling. Secondary endpoints will be evaluated via a flowsheet in the electronic medical record created by the study team or by manual chart review. Endpoints will be evaluated at baseline, three months, and six months after clinic enrollment.

**Preliminary Results/Conclusion:** Since protocol approval, over 50 patients have met inclusion criteria and had at least one clinic appointment with the clinical pharmacist. Data collection is on-going as patients continue to enroll in the clinic. Study results of the pharmacist-driven clozapine clinic within Eskenazi Health have the potential to define and expand the role of clinical pharmacists in a clozapine clinic nationally.

### Learning Objectives:

Identify potential barriers that impact the use of clozapine  
Describe the gaps in literature that exist regarding clozapine therapy and a pharmacist-driven clozapine clinic

### Self Assessment Questions:

What is a major barrier that limits prescribing of clozapine for treatment-resistant schizophrenia?

- A Low side effect profile
- B: Lack of insurance coverage
- C: Lack of monitoring support
- D: Use is restricted only to certain providers

Which of the following topics regarding clozapine is lacking in the literature?

- A Efficacy of clozapine in treatment-resistance
- B Impact of pharmacist-management on patient outcomes
- C Side effects associated with clozapine use
- D Impact of clozapine on suicidality

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RETROSPECTIVE ANALYSIS OF 3.5 MONTHS OF VALSARTAN ACTIVE PHARMACEUTICAL INGREDIENT RECALLS IN A COMMERCIAL POPULATION: IMPACT ON UTILIZATION PATTERNS AND TREND

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**Purpose:**

On July 13, 2018 the U.S Food and Drug Administration (FDA) announced a recall of multiple valsartan products due to N-nitrosodimethylamine (NDMA), a carcinogenic impurity in the active pharmaceutical ingredient (API). Since July 13th, additional recalls have been issued to include products due to the presence of both NDMA and N-nitrosodiethylamine (NDEA), an additional carcinogenic impurity. The FDA announced that all angiotensin II receptor blockers (ARBs) would be investigated for these impurities. It is relatively unknown how widespread generic drug recalls may shift product utilization or affect utilization of branded products. This study seeks to determine if the valsartan recalls caused shifts in utilization and trend that would warrant additional intervention from the health plan in future recalls to promote the most cost-effective and safe alternatives to members.

**Methods:**

Retrospective pharmacy claims were used to determine the utilization of valsartan after the recalls. Commercial Blue Cross and Blue Shield of Illinois members ages 18 to <65 years old with at least one pharmacy claim for a valsartan product from 3/1/18 to 7/12/18 were included. Members were categorized into either a recalled subset or nonrecalled subset based on the recalled products and dates. Pharmacy claims were captured for both population subsets from 7/13/18 through 10/31/18. Members in the recalled and nonrecalled subset were evaluated for discontinuations of the valsartan product or switches to an alternative medication. Categories of potential therapy switches were defined as a switch to an alternative nonrecalled valsartan product, alternative ARB, angiotensin-converting enzyme inhibitor (ACE), direct renin inhibitor, or other antihypertensive class. In addition, trends in the member and plan paid amounts as well as Dispense as Written (DAW) codes were evaluated.

**Results and Conclusion:**

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the most common causes of drug recalls in the United States.  
Define Class I, Class II, and Class III drug recalls.

### Self Assessment Questions:

What is the most common cause of drug recalls in the United States?

- A Mislabeling
- B: Incorrect potency
- C: Contamination
- D: Defective product

Which drug recall classification is correctly matched to the definition?

- A Class I: A dangerous or defective product that could cause serious
- B Class II: A product that is unlikely to cause any adverse health re
- C Class III: A product that might cause a temporary health problem c
- D Class III: A dangerous or defective product that could cause seriou

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CODE SEPSIS RAPID RESPONSE: IMPLEMENTATION OF A PHARMACIST AND NURSE DRIVEN PROTOCOL

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**Purpose:** Sepsis is the primary cause of death from infection, especially if not recognized promptly. In 2015, the Center for Medicare & Medicaid Services (CMS) introduced the "Core Measure SEP-1: Early Management Bundle of Severe Sepsis/Septic Shock" with the purpose of improving timely delivery of high-quality sepsis care. The goal of this quality improvement project is to evaluate the impact of the new Code Sepsis Rapid Response protocol on patient outcomes, specifically SEP-1 bundle compliance, mortality, length of stay, and time to antibiotic administration. **Methods:** This is a retrospective study that has received approval from the Institutional Review Board. This single-center, retrospective chart review assessed patients who have an ICD diagnosis code of sepsis. The intervention includes a new Code Sepsis protocol as well as education to the healthcare team in both the emergency department and inpatient units. The data will be collected from patients admitted between November 2017 to January 2018 for the control group and November 2018 through January 2019 for the intervention group. The primary endpoint will be the absolute difference in overall sepsis bundle compliance. A patient must meet every component of the 3- and 6-hour SEP-1 bundle to meet the primary endpoint. Secondary endpoint will include a sub-analysis of the primary endpoint along with all-cause inpatient mortality, length of stay, and time to antibiotic administration. Data collection and statistical analysis is ongoing. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the criteria used by CMS to identify patients with sepsis  
Describe the impact that specific elements of the SEP-1 bundle have on patient outcomes

### Self Assessment Questions:

Which of the following criteria are used by CMS to classify a patient with "severe sepsis"?

- A Suspected or known infection with a SIRS score greater than or equal to 2
- B Suspected or known infection with a qSOFA score greater than or equal to 2
- C Suspected or known infection with a SIRS score greater than or equal to 3
- D Suspected or known infection with a qSOFA score greater than or equal to 3

Which of the following factors decreases mortality in patients with sepsis

- A Administration of a 30 mL/kg fluid bolus within 3 hours of sepsis identification
- B Timely administration of antimicrobial therapy as soon as sepsis is identified
- C Obtaining a procalcitonin level as soon as sepsis is identified
- D Timely administration of vasopressors as soon as sepsis is identified

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CATHETER-DIRECTED VS SYSTEMIC THROMBOLYSIS VS ANTICOAGULATION ALONE FOR ACUTE PULMONARY EMBOLISM

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**Purpose:** Pulmonary embolism (PE) is a common form of venous thromboembolism that is associated with high rates of mortality and morbidity. Furthermore, those who survive an initial event may have marked impairment in quality of life and are at increased risk for development of long-term complications. Due to the unproven mortality benefit of systemic thrombolytics and potentially cumbersome adverse events such as major bleeding, alternative methods have been proposed, such as catheter-directed ultrasound-assisted thrombolytics (USAT). Two USAT trials, ULTIMA and SEATTLE II have shown improvement in RV (right ventricular) function, measured by mean RV/LV ratio and RV systolic function. In addition, bleeding rates in ULTIMA were similar between USAT and anticoagulation alone. However, USAT requires specially trained personnel and increases time to initial infusion of thrombolytics. To our knowledge, systemic vs. catheter-directed thrombolytics vs. anticoagulation alone have not been directly compared as the treatment for acute pulmonary embolism. The objective of this study is to compare the effects of systemic thrombolytic vs. catheter-directed thrombolytics vs. anticoagulation alone on hemodynamic markers as well as weighing bleeding outcomes.

**Methods:** This retrospective cohort study will be conducted at Northwestern Memorial Hospital using electronic health record data from January of 2013 through November of 2018. Patients will be included in the study if they were greater than 18 years of age with a diagnosis of acute submassive or massive pulmonary embolism according to American Heart Association (AHA) guideline definitions. The primary outcome will be percent change in left ventricular outflow tract velocity time integral (LVOT VTI) on admission and post-treatment. One-way ANOVA analysis will be used for continuous data and Chi-squared test will be used for nominal data.

**Results:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Outline the current treatment approach for acute pulmonary embolism  
Discuss the differences in effect on hemodynamics and bleeding risk between each treatment modality

### Self Assessment Questions:

AB presents with an acute saddle pulmonary embolism with a blood pressure of 140/90, elevated troponin, and normal BNP. No RV strain is noted on the CT. What is the most appropriate initial treatment

- A Systemic thrombolytics
- B Catheter-directed thrombolytics
- C Systemic anticoagulation
- D Both B and C

JK is a 46 year old male who presents with an acute massive pulmonary embolism, still has a pulse, and is responding to commands. The PERT team is activated and wants to start systemic alteplase. JK

- A 100mg intravenous over 2 hours
- B 50mg intravenous over 1 hour
- C 15mg bolus intravenous, then 85mg over 90 minutes
- D 50mg intravenous over 1 hour, give another 50mg if hemodynamic

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## STAPHYLOCOCCUS AUREUS BACTEREMIA BUNDLE ADHERENCE PRE- AND POST-IMPLEMENTATION OF MANDATORY INFECTIOUS DISEASES CONSULTATION AND ANTIMICROBIAL STEWARDSHIP PHARMACIST INTERVENTION

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**Purpose:** Staphylococcus aureus bacteremia (SAB) is frequently complicated by metastatic infections such as osteomyelitis and endocarditis and is associated with poor outcomes. Infectious diseases consultation (IDC) and antimicrobial stewardship intervention have been independently shown to improve quality of care for SAB. Studies have demonstrated that IDC improves evaluation and treatment of patients with SAB, resulting in morbidity and mortality benefits. The implementation of an antimicrobial stewardship program has been shown to decrease cost of care and length of stay (LOS) for SAB patients. However, limited evidence exists to support the combination of both interventions in SAB. This study aims to assess adherence to quality care indicators for SAB pre- and post-implementation of mandatory IDC and antimicrobial stewardship pharmacist intervention within our multi-site health system. **Methods:** This retrospective, quasi-experimental study includes all adult inpatients with blood cultures positive for S. aureus from January 1st, 2016 to December 31st, 2018 at seven Advocate hospitals. Outcomes will be compared between three groups: pre-mandatory IDC, post-mandatory IDC and pre-antimicrobial stewardship pharmacist review, and post-both interventions. The primary outcome is adherence to the following quality care bundle: appropriate intravenous antimicrobial therapy, appropriate duration of therapy, repeat blood cultures every 24-48 hours until documented clearance, echocardiography, removal of indwelling intravenous catheters, and source control, if applicable. Secondary endpoints include the individual components of the composite bundle score, time to IDC, time to definitive therapy, hospital LOS, intensive care unit LOS, bacteremia-related readmission, and in-hospital all-cause mortality. Descriptive statistics will be used to analyze the data. Continuous data will be analyzed with a 3-way ANOVA or Kruskal-Wallis test, as appropriate. A chi square test or Fisher's exact test will be used for nominal data, as appropriate. **Results/Conclusion:** Data analysis is in progress. Results and conclusion will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the available evidence to support mandatory Infectious diseases consultation and antimicrobial stewardship pharmacist intervention for improving outcomes for patients with Staphylococcus aureus bacteremia

Identify appropriate guideline-recommended therapy for Staphylococcus aureus bacteremia

### Self Assessment Questions:

Which of the following interventions have been shown in previous studies to reduce mortality for patients with Staphylococcus aureus bacteremia?

- A: Infectious diseases consultation
- B: Antimicrobial stewardship pharmacist intervention
- C: Echocardiography
- D: Both B and C

Which of the following is an appropriate treatment option for a patient with complicated methicillin-resistant Staphylococcus aureus bacteremia?

- A: Intravenous trimethoprim/sulfamethoxazole for four weeks
- B: Intravenous daptomycin for two weeks
- C: Intravenous vancomycin for four weeks
- D: Oral linezolid for four weeks

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTING AN ELECTRONIC PRIOR AUTHORIZATION (EPA) SUBMISSION SOFTWARE AT AN ACADEMIC MEDICAL CENTER

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**Purpose:** To decrease time to therapy by implementing an electronic prior authorization submission workflow at an academic medical center. **Methods:** A current state analysis was conducted through direct observations of the central prior authorization team. A weekly meeting between the central prior authorization team and the primary investigator was created to communicate current workflow and identify opportunities to optimize the workflow with an electronic submission software. Data between October 2017 and October 2018 was obtained from the EMR to perform a time assessment of prior authorization submissions. The data included prior authorization turnarounds, medication specific turnaround, and if the prior authorization submitted was a new start or renewal. Specific criteria was utilized to evaluate and select an ePA vendor. Pharmacy, information services, security and compliance evaluated the criteria to select a vendor. Once a vendor was selected, the primary investigator and project team worked with the vendor to determine an implementation timeline and project kickoff date. Weekly meetings with the implementation team were established to communicate project needs, identify next steps and maintain progress towards the implementation date. A task force was created to build the new prior authorization submission workflow, create training material and develop a plan to disseminate the training material. The primary investigator served as the primary contact for post go-live clinic issues following implementation. An analysis of the results from pre and post implementation were collected using the same EMR data pull and analysis as pre-implementation to compare the time standards for the new workflow and to predict the time to therapy for medications requiring a prior authorization. **Results:** Results will be presented at the Great Lakes Pharmacy Resident Conference  
**Conclusions:** Time to therapy for specialty medications that require a prior authorization should be significantly reduced by utilizing an electronic prior authorization submission software.

### Learning Objectives:

Describe the process of selecting and implementing the software  
Identify key outcomes from project implementation

### Self Assessment Questions:

Which of the following is a benefit of implementing an electronic prior authorization submission software?

- A: Decreased prior authorization turn-around time
- B: Decreased time to therapy
- C: Increased time to therapy
- D: A and B

What should be considered when selecting an electronic prior authorization submission software?

- A: Cost
- B: Time to implement
- C: Impact to current workflow
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## SINGLE-CENTER RETROSPECTIVE ANALYSIS EVALUATING THE SAFETY AND EFFICACY OF A PHARMACIST-MANAGED INPATIENT WARFARIN DOSING SERVICE

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**Purpose:** Literature has demonstrated that pharmacists are as effective as physicians in dosing warfarin and achieving a therapeutic international normalized ratio (INR) in patients within a similar period time. However, there are limited studies that have investigated the need or appropriateness for reversal agents in the case of a supratherapeutic INR. It is important to take reversal agents into account, which could increase length of the patient's hospital stay as the patient would need to be brought back to therapeutic INR. It would also lead to increased cost to the patient.

**Methods:** This will be a retrospective chart review in which we will screen inpatient medical records for those that meet inclusion criteria. The criteria includes patients on warfarin five months prior to pharmacist driven warfarin dosing and five months after pharmacist driven warfarin initiation. We will be evaluating patient information from December 2017 to October 2018. This data will be collected on paper format and patient will be identified through a prespecified encoded number assignment. The de-identified data will then be transferred to an excel document and sent to a statistician for statistical analysis. The primary investigator will then interpret the data and make final conclusions. The primary factors we will be evaluating is frequency at which patients received reversal agents and the appropriateness of it according to guidelines from the American College of Chest Physicians. Other factors that will be taken into consideration are, the frequency at which patients experienced a subtherapeutic or supratherapeutic international normalized ratio (INR), interacting drugs, primary diagnosis, concurrent comorbidities, age, weight, BMI, height, days to therapeutic INR and days in therapeutic INR. Safety outcomes that will be taken into consideration are bleeding and thromboembolic outcomes.

**Results:** Currently analyzing

**Conclusions:** Currently analyzing

### Learning Objectives:

Discuss The pharmacokinetics of anticoagulation reversal agents that may be used to reverse bleeding for a patient taking warfarin

Recall What medications may have an interaction with warfarin

### Self Assessment Questions:

How long would it take to see the onset of action of IV vitamin K?

- A 10 minutes
- B: 1-2 hours
- C: 6-10 hours
- D: 24-48 hours

Which of the following drugs would have a possible interaction with warfarin?

- A Lisinopril
- B Amiodarone
- C Metoprolol
- D Lidocaine

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARING THE USE OF DIRECT ORAL ANTICOAGULANTS TO WARFARIN IN TRANSPLANT RECIPIENTS

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Direct oral anticoagulants (DOACs) are increasingly being used as an alternative to warfarin due to their shorter half-lives, predictable pharmacokinetics, and fewer drug-drug and drug-food interactions. Several studies have established DOACs to have a similar efficacy and comparable safety profile compared to warfarin for the treatment and prevention of venous thromboembolism (VTE) and the prevention of stroke and systemic embolism in patients with atrial fibrillation. There is limited literature comparing the overall safety and efficacy of DOACs versus warfarin in transplant patients. The purpose of this study is to compare the safety and efficacy of DOACs to warfarin in solid organ transplant recipients.

This study is a retrospective cohort study of solid organ transplant recipients taking warfarin or a DOAC for anticoagulation. Patients prescribed anticoagulation prior to transplant or who received anticoagulation for 7 days or less are excluded. Subjects are matched based on type of solid organ transplant. The primary endpoint is evaluating safety of DOAC use versus warfarin in transplant recipients using definitions for major and minor bleeding established by the International Society on Thrombosis and Haemostasis (ISTH). Secondary endpoints include treatment failure defined as VTE and/or stroke while on DOAC or warfarin therapy. Additional data collected includes patient demographics, disease characteristics, comorbid conditions, perioperative management of anticoagulation, concomitant interacting medications, and patient outcomes. Continuous, normally distributed data is compared with Student's t test and continuous, non-normally distributed data is compared using Mann Whitney U test. Categorical variables are compared via Chi-square or Fisher's exact test as appropriate. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the advantages and disadvantages of using DOACs versus warfarin for the treatment and prevention of VTE and the prevention of stroke in patients with atrial fibrillation

Review current literature on the use of DOACs in transplant recipients

### Self Assessment Questions:

Which of the following is correct?

- A DOACs have a slower onset of action compared to warfarin
- B: A reversal agent exists for use with all DOACs
- C: DOACs are safer than warfarin for use in patients with creatinine c
- D: DOACs are not recommended for use in patients with moderate to

Which of the following is true regarding current literature on the use of DOACs in transplant recipients?

- A Transplant recipients receiving DOACs were found to have an incr
- B Transplant recipients receiving DOACs were found to have no sigr
- C The extent of the literature is limited, and no conclusions are able
- D Comparative studies assessing warfarin versus DOAC in transplar

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHORCAS REFERENCES ON OVERALL APPLICATION SCORE FOR POSTGRADUATE YEAR ONE (PGY1) PHARMACY RESIDENCY CANDIDATES

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### Purpose:

Pharmacy residency programs are receiving an increasing number of applications each year with 6533 applicants participating in the match in 2018. The disparity between the number of applicants and available PGY1 residency positions increases the need to optimize how applicants are evaluated. While scoring procedures vary between programs, references are often an integral piece of the application in the Pharmacy Online Residency Centralized Application System (PhORCAS). A small, single site study showed PGY1 candidates with higher overall PhORCAS reference scores, more standout words, and teaching references are more likely to be offered an onsite interview (McLaughlin et al). To our knowledge, no multisite study has evaluated the impact of reference ratings on overall application score and applicant ranking. The purpose of this study is to evaluate the relationship between the ratings from references and overall application score/applicant ranking.

### Methods:

This multi-center, retrospective study evaluated PGY1 applications between 2015 and 2018. We evaluated the relationship between the ratings of the 13 characteristics evaluated and overall applicant rating in PhORCAS to overall application score/applicant ranking. The key themes evaluated in the comments section of the references were grinstone words, standout words, empathy references, teaching references, illustrative, and flaw phrases (McLaughlin et al). Statistical comparisons were made between overall application score and applicant ranking, as assigned by the program, and characteristic ratings using Pearson and Spearman's correlations. The total number of key words in each theme was compared to overall application score and applicant ranking.

### Results and Conclusions:

This study evaluated 7137 PhORCAS references from 2379 PGY1 applications from five pharmacy residency programs. Preliminary results show that of the characteristics evaluated in PhORCAS, 74.4% were scored as exceeds. Data analysis is ongoing, and conclusions are pending.

### Learning Objectives:

Discuss the current literature regarding the characteristics of the ideal postgraduate year 1 pharmacy residency candidate and methods of evaluation.

Describe the characteristics evaluated in a pharmacy residency candidate's PhORCAS reference.

### Self Assessment Questions:

Which of the following part of a postgraduate year 1 pharmacy residency candidate's application is the most highly valued, according to the literature, by residency programs?

- A Letters of recommendation (or references)
- B: Publications
- C: Poster Presentation
- D: Office in a professional organization

Which of the following characteristics is evaluated in the standardized reference form portion of PhORCAS (dimensions marked as exceeds, appropriate, fails to meet, or not applicable)?

- A Leadership
- B Academic performance
- C Honors and awards
- D Work experience

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE IMPACT OF MEDICATION-ASSISTED TREATMENT FOR ALCOHOL USE DISORDER ON HOSPITALIZATION RATES IN A VETERAN POPULATION

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### Purpose:

Alcohol use disorder (AUD) is a significant issue among military veterans, leading to frequent hospitalization, morbidity, and mortality due to both acute and chronic causes. Many patients with AUD have co-occurring psychiatric disorders that affect their likelihood of establishing and maintaining good clinical outcomes. The Veterans Affairs and Department of Defense have published guidelines for management of substance use disorder (SUD) which includes strong recommendations for medication assisted treatments (MAT) for AUD. The aim of this study is to evaluate the impact of MAT for AUD in patients enrolled in residential addiction treatment on readmission rates related to alcohol use.

### Methods:

This study is a retrospective chart review of veterans with AUD discharged from the Captain James A. Lovell Federal Health Care Center's residential addiction treatment program (ATP). Electronic medical records were reviewed to identify patients initiated on MAT during treatment and compared to those not initiated on MAT receiving psychosocial intervention (PSI) alone.

The primary outcome comparing days until alcohol-related hospitalization within one year of discharge from ATP will be measured with a Kaplan-Meier survival analysis and log-rank test, with and without adjusting for confounding variables (Cox analysis). Secondary outcomes will compare differences between groups on specific MAT utilized, comorbid psychiatric disorders, medication adherence by using medication possession ratios (MPR) and proportion of days covered (PDC), as well as participation in recommended PSI and outpatient aftercare programming.

Descriptive statistics will be used to summarize findings with mean and standard deviation values reported for continuous variables, and frequencies and percentages for categorical variables. Baseline characteristics and secondary outcomes will be compared between groups using chi-square analyses for categorical and analysis of variance (ANOVA) for continuous variables.

Results: pending

Conclusions: pending

### Learning Objectives:

Identify which medications are recognized by the VA/DoD guidelines for the treatment of alcohol use disorder.

Recognize what other conditions can complicate the treatment of alcohol use disorder.

### Self Assessment Questions:

Which of the following medications are recommended by the VA/DoD guidelines for the treatment of alcohol use disorder?

- A Naltrexone
- B: Acamprosate
- C: Baclofen
- D: A and B

Which of the following conditions can further complicate the successful treatment of alcohol use disorder?

- A Hypertension
- B Post Traumatic Stress Disorder
- C Polysubstance Abuse Disorder
- D B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A PHARMACIST-LED INTERVENTION STUDY ON PATIENTS AT RISK FOR DRUG-INDUCED QTc INTERVAL PROLONGATION

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**Purpose:** Prolongation of a patient's QTc interval is associated with increased risk of torsade de pointes (TDP) and life threatening arrhythmias. Risk factors that may predispose patients to prolonged QTc intervals include drug interactions, female sex, electrolyte abnormalities, and pre-existing arrhythmias. At St. Joseph Mercy Oakland, pharmacists are alerted of QTc prolonging drug interactions during the verification process. In September 2018, a retrospective analysis revealed a lack of documented interventions on these alerts. The purpose of this study is to increase documentation of pharmacists' interventions on QTc interval prolonging drug interactions.

**Methods:** The Institutional Review Board approved this study to examine the impact of pharmacist-led interventions on known-risk QTc prolonging medications. In November of 2018, pharmacists received education on intervention strategies including ECG monitoring and medication substitutions. Post-intervention data collection reviewed documentation of drug interaction alerts during December of 2018. Patients met criteria for inclusion if they were prescribed and treated with medications for which a drug-drug interaction alert notified the verifying pharmacist. Risk assessment was based on the CredibleMeds® list of medications which prolong QTc and/or cause TDP. Patients were excluded if they were <1 years of age or if the alert was due to a home medication that was not prescribed during hospitalization. The primary outcome of the study will be the number of documented pharmacist-led interventions per total number of system alerts compared to the retrospective analysis findings. The secondary outcomes were an analysis of the type of interventions made and the total number of interacting medications with any severity. Additionally, a subgroup analysis will be completed to review the change in QTc interval following the acceptance or rejection of the pharmacists' recommendation, if available.

**Results/Conclusion:** Data collection and analysis remain ongoing. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize individual risk factors which predispose a patient to QTc interval prolongation

Identify medications which have known-risk for causing QTc interval prolongation

### Self Assessment Questions:

Which of the following is a patient specific risk factor for QTc interval prolongation?

- A: Hyperlipidemia
- B: Hypomagnesemia
- C: Alcoholism
- D: Male sex

Which of the following is a known-risk QTc-prolonging medication?

- A: Dofetilide
- B: Doxycycline
- C: Lorazepam
- D: Simvastatin

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ANALYSIS OF A PHARMACOGENOMICS PROGRAM WITH PHARMACY BENEFIT MANAGER INTERVENTION

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**Purpose:** Genetic makeup affects medication metabolism. Pharmacogenomics (PGx) testing is a tool that may assist in providing safe and effective medications to individual patients. The purpose of this study is to assess medication management guided by pharmacogenomics and the associated pharmacy costs.

**Methods:** Pharmacy prescription claims data was obtained for two successive 8-month time periods, July 1, 2017- February 28, 2018 (pre-PGx test) and March 1, 2018- October 31, 2018 (post-PGx test). The sample was divided into two groups; the intervention group included members who followed the recommended changes and the non-intervention group included members who continued therapy without making the recommended changes. Participants that had ≥ 1 gene-drug interaction during the enrollment month were included in the analysis. Participants were also asked to complete a user experience survey.

**Results:** There were 54 gene/drug interactions among 80 participants (mean age 44). Follow up was not possible with 5 of the gene/drug interactions due to insurance coverage differences. Out of 49 gene/drug interactions, there were 24 medication changes. Repeated measures ANOVA indicated a significant interaction was detected among all three cost variables: plan paid per day, member paid per day, and total cost per day of therapy. Post hoc analysis of total cost per day of therapy indicated the intervention group decreased from 1.05 ± .31 to .17 ± .25 (-83%). The non-intervention group did not change their cost per day of therapy .89 ± .30 to .91 ± .25 (+2%). The survey results showed that 94.4% of the members agreed with the statement "I was overall satisfied with the program as whole".

**Conclusions:** The findings suggest that incorporating pharmacogenomic testing in prescribing practices may result in cost-savings. On average, the individuals in the intervention group saved 88 cents per day of therapy. Further studies are needed to support pharmacogenomics testing for prescribing medications and cost avoidance.

### Learning Objectives:

Identify To identify the impact of pharmacogenomics testing on medication changes and pharmacy costs associated with those changes  
Review To review user experience with the pharmacogenomics testing process

### Self Assessment Questions:

Jennifer is interested in learning more about pharmacogenomics testing and she asks you what pharmacogenomics means. How would you define pharmacogenomics to Jennifer?

- A: Pharmacogenomics is the study of how drugs affect a person's gene
- B: Pharmacogenomics is the study of how a person's environment affects
- C: Pharmacogenomics is the study of how genes affect a person's race
- D: Pharmacogenomics is the study of how drugs affect a person's body

Omeprazole is metabolized by CYP2C19 to its inactive form. Cindy's PGx results show that she has a CYP2C19 genotype \*1/\*17 with a predicted phenotype of rapid metabolizer. Which of the following state

- A: Cindy may have increased exposure to the active drug
- B: Cindy may experience increased side effects
- C: Cindy will experience normal levels of omeprazole according to FDA
- D: Cindy may experience decreased efficacy

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING THE IMPACT OF PHARMACIST CONDUCTED PRE-VISIT CALLS FOR HIGH-RISK PATIENTS IDENTIFIED USING THE CAN SCORE: PART 1

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### Purpose:

The Care Assessment Need (CAN) score is a tool designed to assist primary care providers in identifying patients who would benefit most from clinical services available at the Veterans Administration (VA). The CAN score was created in effort to support the VA's health care model, which is focused on personalized, proactive, and patient-driven care. Parameters considered when calculated consider a multitude of factors including vitals, lab values, medications, conditions, and healthcare utilization. Literature supports the positive impact of pre-visit interactions in both no-show rates and compliance measures. Based on current utilization and possibility of impact, a pilot pharmacist-run intervention was developed and implemented in a primary care setting for patients identified as high-risk.

### Methods:

This quality improvement study is a prospective chart review of patients seen by Purple Clinic Physicians in the primary care setting at the Richard L. Roudebush VA Medical Center between September 2018 and February 2019. Patients were contacted at least one day but up to 2 weeks prior to their appointment via phone by a clinical or resident pharmacist. To be included patients must be 18 years or older, have a CAN score of  $\geq 95$ ,  $\geq 10$  medications, and at least one ambulatory care sensitive condition. Exclusion criteria include living in a facility or having home-based care, current hospitalization, emergency room (ER) visit, or passing away before their scheduled appointment. The primary outcome is quantifying the type and number of pharmacy interventions including referral to pharmacy or other clinic services and medication reconciliation with discrepancies. Secondary outcomes include number of hospitalizations or ER visits 30 and 90 days after contact, number of deaths, satisfaction rate of providers with added service, cost savings, and no-show rate comparison.

### Results and Conclusions:

Results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the Care Assessment Need (CAN) score, including each component used in its calculation

Discuss the importance of identifying high-risk patients among a vulnerable patient population

### Self Assessment Questions:

Which of the following is a component of the Care Assessment Need (CAN) score?

- A Ethnicity
- B: Family History
- C: Age
- D: Service Connection

Robert is an 82 YOM with PMH of DM, COPD, HTN, HLD, CKD, and RA who is on your list of high-risk CAN score patients. Which of his PMH is considered an Ambulatory Care Sensitive Condition?

- A Ra
- B Copd
- C Hld
- D Ckd

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IDENTIFICATION OF RISK FACTORS CONTRIBUTING TO VENOUS THROMBOEMBOLISM (VTE) AFTER ORTHOPEDIC TRAUMA AND UTILIZATION OF A STANDARDIZED VTE PROPHYLAXIS ALGORITHM FOR ORTHOPEDIC TRAUMA PATIENTS

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Guidelines for VTE prophylaxis in orthopedic trauma patients differ between professional medical groups which results in inconsistent VTE prophylaxis in these patients. Studies have shown the location of the trauma influences the risk of VTE and that additional VTE risk factors must be considered. This study's objectives are to identify common risk factors that increase the risk of VTE after an orthopedic trauma. Additionally, a standardized VTE prophylaxis algorithm will be implemented.

Orthopedic trauma patients admitted to Franciscan Health-Lafayette (FHLLA) between January 1, 2018-June 30, 2018 will be evaluated for various VTE risk factors. Patients will be divided based on whether or not they developed VTE within 3 months of their orthopedic trauma. A VTE prophylaxis algorithm will be implemented and used by pharmacists to assess current trauma patients' VTE risk. When indicated, VTE prophylaxis with LMWH will be recommended by the pharmacist to the physician. Data retrospective of the algorithm implementation will be compared with data after the algorithm is implemented. The following outcomes will be collected for each patient: occurrence of thromboembolism, RAP score, Hemorrhages score, time immobilized and type of fracture, among other factors. Demographic factors that may affect patient care and outcomes will also be collected and analyzed, including gender, age, weight, baseline hemoglobin and platelets, among other factors.

5.69% (7/123) of orthopedic trauma patients developed VTE prior to the implementation of the VTE prophylaxis algorithm. The average Caprini score and RAP score in patients that developed VTE were 7.4 and 5.7, respectively. There were no events of major bleeding in either group. Multiple factors influence VTE risk in orthopedic trauma patients. Patients that are considered high risk for VTE should receive LMWH during hospitalization according to a standardized algorithm. VTE prophylaxis after discharge should be considered to further help reduce risk of VTE.

### Learning Objectives:

Identify the most common risk factors that increase VTE risk in orthopedic trauma patients.

Select appropriate prophylactic anticoagulation for trauma patients at risk for VTE.

### Self Assessment Questions:

Which of the following patient characteristics would increase a patient's risk for VTE after an orthopedic trauma?

- A Age 21
- B: History of skin cancer 5 years ago
- C: Femur, tibia and fibula fractures
- D: Glasgow Coma Scale score: 13

Select the appropriate VTE prophylaxis for the following orthopedic trauma patient: 21-year old female, with femur, tibia, and fibula fracture: with a history of DVT four years ago after an eight-hour

- A aspirin 81 mg PO every 12 hours
- B Mechanical VTE prophylaxis only
- C No VTE prophylaxis
- D Enoxaparin SQ (using the appropriate dosage approved at your institution)

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PHARMACIST-DRIVEN PENICILLIN ALLERGY SKIN TESTING IN A COMMUNITY HOSPITAL

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**Purpose:** Up to 20 percent of hospitalized patients claim an allergy to penicillin; however, a majority of patients report an unclear allergy history. Recent studies have shown approximately 90 percent of all patients reporting a penicillin allergy did not demonstrate histamine-mediated reactions when tested. Documented penicillin allergies are associated with increased incidence of antibiotic resistance, cost, and patient morbidity. Penicillin allergy skin testing is the most rapid, sensitive, and cost-effective modality to identify patients with true penicillin allergies. The objective of this prospective-historical control study is to assess the feasibility of pharmacist-driven penicillin allergy skin testing at a rural community hospital. **Methods:** Decentralized pharmacists will screen for patients and refer them to pharmacists trained to administer penicillin skin testing. The pharmacist performing testing will receive authorization to test from the patient's attending physician, interview the patient, and collect detailed patient history via chart review. If the patient meets inclusion criteria and qualifies for testing, patient education will be provided and consent will be obtained. The penicillin allergy skin testing will be completed using a skin prick test, intradermal test, and oral amoxicillin challenge. If a positive skin reaction to either the skin prick test or the intradermal test occurs, further testing will stop. Negative results will be documented in the patient's chart, the attending physician will be notified, the patient will receive a pocket card with testing results, and the penicillin allergy will be removed from the electronic medical record. The primary outcome is the feasibility of penicillin skin testing on staff time constraints. Secondary outcome measures include cost savings and the impact on antimicrobial stewardship as compared to a historical control. Results and conclusion will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify Identify the appropriate patient population for penicillin skin testing based on patient history

Discuss Discuss barriers affecting the feasibility of pharmacist-driven penicillin allergy skin testing in a small community hospital setting

### Self Assessment Questions:

Which patient would be an ideal candidate for penicillin skin testing based on the patient's allergy history?

- A: 38 year old male with anaphylaxis 2 years ago after receiving amp
- B: 72 year old female with nausea and vomiting after receiving amoxi
- C: 64 year old male who reports a rash after receiving penicillin as a c
- D: 44 year old female who reports blistering and peeling of skin after

Which of the following represents the greatest challenge affecting the implementation of a pharmacist-driven penicillin allergy skin testing service in a small community hospital such as EMRMC?

- A: Cost of testing supplies
- B: Time requirement of gathering supplies and performing testing
- C: Limited number of trained staff
- D: Unwillingness of patients to be tested

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## SOCIAL DETERMINANTS OF HEALTH AND THE LINK TO CARDIOVASCULAR DISEASE RISK AND INTERVENTION: THE PRAPARE TOOL

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**Purpose:** Social determinants of health consist of economic stability, neighborhood/environment characteristics, education, food resources, and community/social context. The National Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) tool provides socio-economic measures that may be extrapolated to help better understand a patient's barriers to health. **Primary Objectives:** (1) Determine the correlation between positive PRAPARE responses and cardiovascular disease risk, (2) Determine correlation between positive PRAPARE responses and interventions/referrals made. **Secondary Objective:** Assess changes in cardiovascular risk measures following interventions/referrals. **Methods:** This project is a retrospective analysis of data collected during patient visits to an interdisciplinary cardiovascular risk reduction clinic at a Federally Qualified Health Center in west Louisville. Cardiovascular measures have been collected since October 2018 as part of the CDC/Kentucky Department of Public Health grant funded program for controlling high blood pressure and reducing cardiovascular risk, the "Signature Project". Data collected October 2018 to January 2019 from patients who participated in this program will be included in data analysis. De-identified data from visits will be exported from the electronic health record into Excel for analysis by the investigators. Participants signed a participation consent which allowed sharing of personal health information (PHI) to parties outside of the direct care team. Data received will be statistically analyzed via ANOVA and multiple regression for comparison of positive PRAPARE response to cardiovascular disease measures. Positive PRAPARE markers will be analyzed for how they correlate to cardiovascular disease risks (i.e. blood pressure, ASCVD risk, lipids, BMI, etc.), lifestyle changes implemented (per patient report), and interventions/referrals made by the interprofessional team. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the PRAPARE tool.

Describe the methodology and outcomes that will be collected to assesses positive PRAPARE markers to cardiovascular disease risk and interventions/referrals.

### Self Assessment Questions:

The PRAPARE tool is used to assess which of the following?

- A: Veteran status, language, and income.
- B: Neighborhood, education, and dependents.
- C: Socio-economic measures that may be extrapolated to help better
- D: A & C

In this retrospective analysis, what cardiovascular disease risks were assessed?

- A: Glucose, height, and weight.
- B: Blood pressure, BMI, and ASCVD risk.
- C: Lipids, blood pressure, and glucose.
- D: Height, ASCVD risk, and creatinine clearance.

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE SAFETY AND EFFICACY OF A VASOPRESSIN CONTINUOUS INFUSION PROTOCOL IN PATIENTS WITH CENTRAL DIABETES INSIPIDUS

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### Purpose

Central diabetes insipidus (CDI), a condition associated with impaired antidiuretic hormone (ADH, vasopressin) secretion, is characterized by hypernatremia and polyuria. In adults, CDI is most often secondary to severe head injuries and is associated with high mortality. Parenteral desmopressin is commonly utilized for CDI, however, continuous infusion of vasopressin offers advantages for critically ill patients. Fixed-dose vasopressin infusion is commonly used for shock, however there is a lack of dosing information available for use in adults with CDI. This study aimed to evaluate the safety and efficacy of a protocolized vasopressin titration strategy in adult critically ill patients with CDI.

### Methods

This study was a retrospective chart review at a Level 1 trauma center. Vasopressin continuous infusions were initiated in eleven CDI patients per the institution's protocol. Efficacy was evaluated based on correction of urine output, normalization urine chemistry, and potential for organ donation. Safety outcomes included incidence of kidney injury, blood pressure changes, cardiac injury, ischemia, and hyponatremia.

### Results

The average time to goal urine output (less than 200 mL/hour) was 3.7 hours, and at two hours after infusion initiation, all patients had a decreased urine output by at least 38.5 percent. When comparing after and prior to the infusion, statistically significant differences were observed in serum osmolality, urine osmolality, and urine specific gravity values ( $p < 0.005$ ). All of the patients were deemed potential candidates by the state's organ donation association. Hyponatremia was experienced in one patient during the vasopressin infusion. No study participants had evidence of tissue ischemia or cardiac injury, and there were no statistical differences in blood pressure or serum creatinine values.

### Conclusion

The correction of urinary output and osmolality, limited toxicity, and high potential for organ procurement supports the use of this vasopressin continuous infusion dosing protocol in critically-ill adults with CDI.

### Learning Objectives:

Recall the etiology and presentation of central diabetes insipidus (CDI) in critically ill adult patients.

Discuss the pharmacotherapy options in treating critically ill patients with CDI.

### Self Assessment Questions:

What hormone is deficient in central diabetes insipidus (CDI)?

- A Insulin
- B: Aldosterone
- C: Antidiuretic hormone
- D: Cortisol

What is an advantage that a continuous infusion of vasopressin offers over intermittent desmopressin in treating critically ill patients with CDI?

- A Reduced hypertensive effects due to V-2 receptor selectivity
- B Allows close monitoring and adjustments due to short half-life
- C Provides prolonged anti-diuretic effects even after discontinuation
- D Reduced renal toxicity due to selectivity of V-1 receptors

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE INCIDENCE OF IRON DEFICIENCY AND EFFICACY OF ORAL IRON IN PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION

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Purpose: Iron deficiency is a common comorbidity in patients with heart failure and reduced ejection fraction (HFrEF). Iron deficiency increases hospitalizations and overall long term all-cause mortality in patients with heart failure. Oral iron supplementation is usually the initial treatment option for iron deficiency, with a target dose of 150-180mg of elemental iron daily. Oral iron in patients with HFrEF has shown to increase ferritin TSAT, and hemoglobin after 180 days of supplementation. While oral iron does show efficacy in improving ferritin, TSAT, and hemoglobin, it does have quite a few adverse effects, such as GI upset and constipation. Patients who suffer from these effects have a decreased quality of life, contradicting the purpose of oral iron supplementation. The purpose of this study is to determine the incidence of iron deficiency as well as review subsequent management with oral iron in the population with HFrEF at the Hershel "Woody" Williams Veterans Affairs Medical Center in Huntington, West Virginia. Methods: A retrospective chart review for ~250 patients will be conducted to evaluate the incidence of iron deficiency in patients with HFrEF. Iron studies including ferritin levels will be analyzed after the first echo showing an ejection fraction  $\leq 40\%$ . The utilization of oral iron supplementation will also be analyzed, along with the frequency of laboratory monitoring (iron panels, ferritin, and hemoglobin) in patients receiving oral iron. The efficacy of oral iron will also be evaluated in patients who have laboratory values available after receiving at least 180 days of oral iron. Results & Conclusions: Results and conclusions are currently pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the definition of iron deficiency in heart failure patients.

Identify differences between intravenous iron formulations and their effectiveness in heart failure patients.

### Self Assessment Questions:

Which test is utilized to define absolute iron deficiency in heart failure patients?

- A Iron
- B: Transferrin
- C: Ferritin
- D: Hemoglobin

Which iron formulation has the most evidence in patients with heart failure?

- A Iron sucrose
- B Ferric carboxymaltose
- C Iron dextran
- D Sodium ferric gluconate

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PHENOBARBITAL USE FOR ALCOHOL WITHDRAWAL IN A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** Historically benzodiazepines have been used first-line to treat alcohol withdrawal, despite potential adverse effects such as respiratory depression and delirium. Phenobarbital has been studied as an alternative therapy and found to be beneficial in those patients who are refractory to benzodiazepines or those with more severe symptoms of alcohol withdrawal at presentation. It has been proposed that phenobarbital can decrease the risk of respiratory depression, agitation, and delirium compared to benzodiazepines. These complications could potentially prolong hospitalizations. The purpose of this study is to assess the effects of phenobarbital protocol for alcohol withdrawal on hospital length of stay.

**Methods:** This study will be submitted to the institutional review board for approval. Electronic medical record data will be reviewed for those patients who received lorazepam for alcohol withdrawal from October 1, 2017, through September 30, 2018 (one year prior to the implementation of the updated treatment protocol on October 1, 2018). Those patients will be compared to those who receive phenobarbital via the new protocol from October 1, 2018, through March 31, 2018. Patients will be excluded if they are transferring from an outside hospital or admitted to an acute care psychiatric unit. The primary outcome studied will be total length of hospital stay. Secondary outcomes will include ICU length of stay, clinical institute withdrawal assessment for alcohol scores, mortality, and adverse effects such as seizure, need for mechanical ventilation, falls, and delirium.

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

### Learning Objectives:

Describe the potential benefits of phenobarbital use, as compared to benzodiazepine use, for alcohol withdrawal

Review the phenobarbital treatment regimen for alcohol withdrawal

### Self Assessment Questions:

Which receptors does phenobarbital act on?

- A GABA and 5-HT3
- B: Dopamine and glutamate
- C: Glutamate and GABA
- D: Alpha-1 and opioid

What is the recommended phenobarbital loading dose for alcohol withdrawal?

- A 20 mg/kg
- B 130 mg
- C 5 mg/kg
- D 260 mg

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## VALPROIC ACID VS QUETIAPINE FOR TREATMENT OF DELIRIUM IN CRITICALLY ILL PATIENTS

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**Purpose:**

Delirium is a commonly encountered complication that occurs in critically ill patients admitted to the intensive care unit (ICU). The etiology of ICU delirium has yet to be fully understood, making it a challenging disease state to treat. Current treatment of ICU delirium often involves use of atypical antipsychotic agents, although an optimal pharmacologic treatment strategy has not been established. Since September 2015, Bronson Methodist Hospital has been utilizing quetiapine and/or valproic acid (VPA) for treatment of ICU delirium. The purpose of this study is to compare the efficacy of quetiapine versus VPA for treatment of ICU delirium in patients admitted to the medical or trauma intensive care unit. Results of this study may enhance patient care by guiding future selection of pharmacologic agents for treatment of ICU delirium in critically ill patients.

**Methods:**

Data was collected retrospectively from a single-center electronic medical record database. Patients were included if they were at least 18 years of age, admitted to the Trauma or Medical ICU, had a documented positive CAM-ICU score during their ICU stay, and used VPA or quetiapine for delirium for at least 48 hours. Patients were excluded if the use of VPA or quetiapine was for any indication other than ICU delirium, if either medication was prescribed prior to admission, if both medications were used concurrently during admission, or if the subject was pregnant. The primary outcome of this study is mean time to resolution of ICU delirium. Secondary outcomes will include mean daily sedative dose, mean daily opioid dose, total number of parenteral haloperidol doses administered, and adverse effects related to VPA or quetiapine use.

**Results/Conclusions:**

Data collection and analysis are currently in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe •Describe the advantages and disadvantages of using valproic acid versus quetiapine for treatment of ICU delirium.

Review •Review the current data supporting the 2018 Pain, Agitation, Delirium, Immobility, & Sleep Disruption (PADIS) guideline recommendations for treatment of ICU delirium.

### Self Assessment Questions:

1. According to the 2018 Pain, Agitation, Delirium, Immobility, & Sleep Disruption (PADIS) guidelines, which agent is currently recommended for the treatment of ALL patients with ICU delirium?

- A Valproic Acid
- B: Lorazepam
- C: Quetiapine
- D: There is currently no recommendation for the treatment of ALL patients

Which of the following is an advantage of using valproic acid over quetiapine for treatment of ICU delirium?

- A Does not cause sedation
- B Never gets continued upon discharge
- C No effect on QTc
- D Time to resolution of delirium is 4 times quicker than quetiapine

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **SAFETY AND EFFICACY OF THROMBOELASTOGRAPHY GUIDANCE OF ANTIFIBRINOLYTIC THERAPY IN TRAUMA PATIENTS**

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**Purpose:** Tranexamic acid (TXA) is an antifibrinolytic therapy intended to decrease blood loss and improve hemostasis in traumatic hemorrhage. TXA's place in therapy is dependent on incidence of hyperfibrinolysis in the severely injured. Viscoelastic assays, such as thromboelastography (TEG), allow for the identification of a patient's specific hemostasis, such as clot formation, clot integrity, and fibrinolysis. Recent literature demonstrates a large number of trauma patients in fibrinolytic shutdown, which contradicts the principle of TXA application. The purpose of this research study is to evaluate the safety and efficacy of TEG guided antifibrinolytic therapy in trauma patients who meet TXA inclusion parameters.

**Methods:** This study is a retrospective, single-center analysis of trauma patients meeting inclusion criteria for TXA and who receive TEG assay testing within three hours from arrival at OhioHealth Grant Medical Center between May 1, 2017 and October 31, 2018. The primary objective is to compare safety outcomes for patients within different fibrinolytic groups receiving TXA versus not receiving TXA. Fibrinolytic groups are defined per TEG LY30 data and stratified into the following categories: hyperfibrinolytic (LY30 >2.9%), physiologically fibrinolytic (LY30 0.8% - 2.9%), hypofibrinolytic/ fibrinolytic shutdown (LY30 < 0.8%). Safety outcomes are defined as 24 hour mortality, overall mortality, and thromboembolic events. Secondary aims include comparing efficacy for patients within the fibrinolytic classes receiving TXA versus not receiving TXA. Efficacy will be assessed by blood product utilization, length of hospital and intensive care unit (ICU) stay, and incidence of acute kidney injury. We will additionally perform subgroup analyses to evaluate outcomes based on age, gender, mechanism of injury, Glasgow Coma Scale (GCS), and injury severity score (ISS).

**Results/Conclusions:** A total of 434 patients were screened during the data collection process. Of these patients, 55 were included for evaluation and analysis. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Define Define tranexamic acid's mechanism of action

Describe Describe the safety and efficacy of thromboelastography guided antifibrinolytic therapy

### **Self Assessment Questions:**

What is tranexamic acid's mechanism of action?

- A Promotes fibrin clot degradation
- B: Vitamin K antagonist
- C: Inhibits fibrin clot degradation
- D: Factor Xa inhibitor

Which component of thromboelastography (TEG) data can be used to help guide antifibrinolytic therapy?

- A Ma
- B Alpha (rapid angle)
- C Ly30
- D R-time

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **RETROSPECTIVE REVIEW OF VENOUS THROMBOEMBOLISM OCCURRENCE, TREATMENT, AND RISK IN ONCOLOGY PATIENTS AT A RURAL COMMUNITY HOSPITAL**

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**Purpose:** Venous thromboembolism (VTE) is a highly prevalent complication of malignancy and one of the leading causes of morbidity and mortality in cancer patients. Patients who present to the Emergency Department with VTE, including deep vein thrombosis (DVT) and pulmonary embolism (PE), should be started on anticoagulation therapy. The treatment of choice for VTE in cancer patients is low molecular weight heparin, per the National Comprehensive Cancer Network (NCCN) guidelines. The purpose of this study is to review the rate of occurrence in specific cancer types, treatment of choice during admission and discharge, and additional risk factors for cancer patients who are admitted with VTE.

**Methods:** This is a single-center, retrospective study reviewing the occurrence, treatment, and risk factors for VTE in oncology patients with active malignancy. Cancer patients 18 years of age or older will be included in this study if they were admitted and treated for VTE. Exclusion criteria includes patients with other pre-existing coagulopathies, such as antiphospholipid syndrome, Factor 5 Leiden mutation, or thrombophilia. Data to be collected includes age, gender, weight, serum creatinine, cancer type, active treatment for cancer, length of time of active malignancy, reason for admission, VTE treatment of choice during hospital stay and discharge, home anticoagulation therapy and history of VTE. Results will be analyzed to determine if patients are being treated according to recommended guidelines and to determine patients at highest risk for VTE.

**Results/Conclusion:** Research is still in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

List risk factors associated with VTE.

Identify appropriate anticoagulation therapy for oncology patients with VTE.

### **Self Assessment Questions:**

LC is an 82 year old male who presents to the emergency department with pain and swelling in his left lower extremity and is found to have a DVT. He was recently diagnosed with metastatic non-small cell

- A Age
- B: Active malignancy
- C: Obesity
- D: All of the above

KM is a 53 year old female who presents to the hospital with complaints of shortness of breath and chest pain. Upon further workup, she is found to have a PE. She was diagnosed 1 year ago with breast

- A Apixaban 10 mg PO BID
- B Enoxaparin 80 mg SQ BID
- C Warfarin 10 mg PO daily
- D Enoxaparin 40 mg SQ daily

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PHARMACIST-GUIDED DEPRESCRIBING IN THE ELDERLY POPULATION OF A COMMUNITY HOSPITAL

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**Purpose:** Deprescribing has become more relevant in recent years as a result of our aging population. About 15% of the U.S population is 65 years or older, and according to the 2010 U.S. Census, this age group accounts for 34% of medication costs, 40% of medication-related hospitalizations and 50% of medication-related deaths. In these patients the risks of side effects, drug interactions, and cost of medications can outweigh the benefits of treatment. Ultimately, the goal of deprescribing is to reduce medication burden and patient harm while maintaining or improving quality of life. While there is some guidance in the ambulatory setting, the process for deprescribing in the inpatient setting is unclear.

**Methods:** Deprescribing algorithms have been developed to guide pharmacists in identifying patients eligible for deprescribing as well as process for notifying physicians of deprescribing recommendations. These were implemented in January 2019. Pre-implementation data has been collected from January to March 2018. Post-implementation data will be collected from January to March 2019. Impact of the pharmacist-guided deprescribing recommendations will be measured by the percentage of accepted recommendations in the inpatient setting and post-discharge in the ambulatory setting. Additional outcomes will include percentages of patients who had study medications deprescribed during current admission, after hospital discharge at 1, 2, and 3 months, and resumption of study medication within 3 months of stop date. **Results/Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review Review specific recommendations of statins, proton pump inhibitors, and bisphosphonates in elderly patients.

Discuss Discuss the impact a pharmacist-guided deprescribing protocol can have on adhering to current guidelines and recommendations for elderly patients.

### Self Assessment Questions:

What is a potential risk of chronic proton pump inhibitor use?

- A Myalgia
- B: Osteoporosis
- C: Pneumonia
- D: Ulcers

In which patient should a pharmacist recommend deprescribing based on the statin algorithm?

- A A 73 year old with no clinical ASCVD and LDL 117 mg/dL
- B A 83 year old with no clinical ASCVD and LDL 178 mg/dL
- C A 76 year old with history of peripheral vascular disease and LDL 117 mg/dL
- D A 80 year old with no clinical ASCVD and LDL 91 mg/dL

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE EFFECTIVENESS OF UNFRACTIONATED HEPARIN TREATMENT WITHOUT THE USE OF A WEIGHT-BASED NOMOGRAM IN PEDIATRIC PATIENTS

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**Purpose:** This research project aims to evaluate the effectiveness of current heparin practices in pediatric patients that are admitted to the pediatric intensive care unit at Cabell Huntington Hospital. The current guidelines recommend utilization of a weight-based nomogram when dosing heparin in pediatric patients. The Hoops Family Children's Hospital at Cabell Huntington Hospital does not currently utilize a weight based protocol for heparin use in the pediatric population. This research includes three main objectives: Evaluate the effectiveness of current heparin practice in pediatric patients at CHHI utilizing available aPPTs and anti-Xa levels; Assess the time to therapeutic levels based on available aPTT and anti-Xa levels; Determine the effectiveness of aPPT versus anti-Xa levels with regard to reaching therapeutic levels of UFH.

**Methods:** Retrospective chart review from January 1, 2013 to December 1, 2018 of all patients less than 18 years of age that were started on unfractionated heparin drips in the pediatric intensive care unit at Hoops Family Children's Hospital. Subjects were identified by a query of the electronic medical record. Charts were reviewed for demographics, hemoglobin, hematocrit, platelets, anti-Xa, and aPTT levels from initiation of UFH until discontinuation. UFH bolus dose (units/kg) and maintenance dose (units/kg/hour) information was collected. Information regarding blood product or heparin reversal administration was collected as well. Data regarding discontinuation of therapy due to bleeding and/or supratherapeutic level was collected. The average time to therapeutic level, average starting maintenance rate, and average heparin infusion rate to obtain the first therapeutic level were calculated.

Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Discuss the current guideline recommendations regarding appropriate heparin use in the pediatric population

Review primary literature regarding the use of a weight-based heparin nomogram in the pediatric population

### Self Assessment Questions:

Which of the following is most correct regarding the use of unfractionated heparin in the pediatric population?

- A Children greater than 1 year of age require higher initial maintenance
- B: Children less than 1 year of age require higher initial maintenance
- C: It is never recommended to give an initial bolus in pediatric patient
- D: Heparin use should be avoided in pediatric patients

Based on current literature, in what way will utilization of a weight-based heparin nomogram effect the time to first therapeutic level?

- A Increase the time to first therapeutic level
- B Decrease the time to first therapeutic level
- C Not effect the time to first therapeutic level
- D Time to therapeutic level was not studied in current literature

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## AMINOGLYCOSIDE PHARMACOKINETIC COMPARISON BETWEEN CRITICALLY ILL TRAUMA AND NON-TRAUMA PATIENTS

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Critically ill trauma patients experience sudden injuries that can evoke lasting physiologic alterations with the potential to affect drug therapy pharmacokinetic (PK) and pharmacodynamics (PD). The PK alterations present in critically ill trauma patients may negatively impact therapeutic concentration attainment that may compromise efficacy and promote microbial resistance. While no direct comparisons have been conducted to date between critically ill trauma and non-trauma surgical patients, available literature suggests that population PK algorithms should be used cautiously in young trauma patients with high creatinine clearance. There currently exists a gap within the literature addressing the effectiveness, safety, and appropriateness of aminoglycoside (AG) dosing among critically ill, trauma patients.

The primary objective of this retrospective, cohort study is to compare AG dose (mg/kg) required to achieve extrapolated peak concentration above 20 mg/L between critically ill trauma and non-trauma patients. Along with other PK parameter ( $C_{max}$ ,  $V_d$ ,  $K_e$ , half-life, clearance, DFI) comparisons, this study will also investigate risk factors associated with subtherapeutic AG concentrations within the critically ill trauma population.

Adult patients admitted to the surgical or neuroscience ICU who receive IV aminoglycosides with two subsequent detectable concentrations were included for analysis. Data points collected included baseline demographics, severity of illness markers, and AG utilization (drug, dose, concentrations, and duration). Multivariate logistic regression was performed to assess risk factors associated with subtherapeutic peak AG concentrations within the critically ill trauma patient population. Continuous data was analyzed using t-test or Wilcoxon Rank Sum, whereas categorical data was analyzed using Chi-squared or Fisher's exact test, as appropriate. Data analysis and results are pending.

### Learning Objectives:

Review epidemiology, pathophysiology, and clinical impact of trauma mediated pharmacokinetic alterations

Describe aminoglycoside pharmacokinetic differences between critically ill trauma and non-trauma patients

### Self Assessment Questions:

What risk factor has been consistently implicated in the development of augmented renal clearance?

- A Older age
- B: Higher illness severity
- C: Polytrauma
- D: Female sex

What pharmacokinetic alteration should be considered when dosing antimicrobials for in critically ill trauma patients?

- A Increased volume of distribution
- B Decreased volume of distribution
- C Decreased drug metabolism
- D Decreased drug clearance

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## FLUID RESUSCITATION IN SEPTIC PATIENTS WITH HEART FAILURE AND REDUCED EJECTION FRACTION

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Purpose: Sepsis is life-threatening organ dysfunction caused by a dysregulated host response to infection. The Surviving Sepsis Guidelines recommend providing 30 mL/kg of fluid within the first three hours of presentation in order to improve tissue hypoperfusion and hypotension. Despite guideline recommendations, there is little literature to support the exact volume recommendation of 30 mL/kg fluid for all patients with sepsis. There are currently no published studies examining if this same resuscitation strategy should be utilized in patients with heart failure with reduced ejection fraction (HFrEF) presenting with sepsis. The objective of this study was to determine whether a difference in efficacy or safety outcomes exists in patients with HFrEF receiving either <30 mL/kg or ≥30 mL/kg of fluid resuscitation in sepsis.

Methods: This study was a retrospective chart review of adult patients with HFrEF presenting with suspected sepsis from July 1, 2010 to July 31, 2018. Reduced left ventricular ejection fraction was defined as an ejection fraction <40% within the previous year prior to hospitalization. The primary efficacy outcome of this study was a composite outcome of the addition of intravenous vasopressors within 24 hours of presentation and in-hospital mortality. The primary safety outcome of this study was a composite outcome of the need for BiPAP or intubation within 24 hours, addition of intravenous inotropes within 48 hours, and need for initiation of renal replacement therapy within seven days of presentation.

Results and Conclusion: Data collection is ongoing and final results will be presented at the 2019 Great Lakes Pharmacy Resident Conference. Results of this study may provide data regarding utilization and outcomes associated with a volume resuscitation strategy of greater or less than 30 mL/kg in patients with HFrEF and suspected sepsis in order to have optimal efficacy and safety outcomes.

### Learning Objectives:

Review fluid resuscitation recommendations and rationale per the 2016 Surviving Sepsis Guidelines for patients presenting with sepsis

Recognize the efficacy and safety endpoints of over and under-resuscitation in patients with HFrEF and sepsis

### Self Assessment Questions:

1. What is the recommended weight-based fluid amount to administer within three hours of hospital presentation to patients with sepsis per the 2016 Surviving Sepsis Guidelines?

- A 20 mL/kg
- B: 25 mL/kg
- C: 30 mL/kg
- D: 25 mL/kg

Which of the following could result from under-resuscitation in a patient with HFrEF and sepsis?

- A Need for renal replacement therapy following fluid resuscitation
- B Need for intravenous inotropes
- C Need for intravenous vasopressors
- D Need for intubation following fluid resuscitation

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF RISK STRATIFICATION AND MANAGEMENT OF FEBRILE NEUTROPENIA IN PATIENTS WITH SOLID TUMORS

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**Purpose:** Febrile neutropenia (FN) is a life-threatening complication of chemotherapy. Historically, the standard of care for FN was hospitalization for parenteral antibiotics. However, studies suggest that patients with FN may be stratified as low- or high- risk, according to expected duration of neutropenia and other factors. Many studies have evaluated alternative treatment strategies for low-risk patients who are likely to have few medical complications and low risk for death. The Multinational Association of Supportive Care in Cancer (MASCC) Risk Index was developed to identify low-risk patients who may be candidates for oral antibiotics and/or outpatient management, which may reduce exposure to nosocomial pathogens, improve quality of life, and provide cost savings. Improved quality of life and cost savings are relevant in today's healthcare environment as CMS develops new payment and delivery models. The Oncology Care Model (OCM) is one example, which aims to improve the effectiveness and efficiency of cancer care. In relation to OCM, this investigation will evaluate the management of FT to identify coordination of care and cost savings opportunities. The primary objective of this study is to compare the proportion of high- and low-risk FN admissions for traditional Medicare beneficiaries and non-beneficiaries. Secondary outcomes include rates of microbiologically and clinically documented infections and cost estimations for various treatment strategies.

**Methods:** This single-health system, retrospective, cohort study includes adult patients 18 years or older with the diagnosis of a solid tumor who present to the emergency department with documented or self-reported fever on admission in the setting of neutropenia. Vulnerable populations and patients with hematologic malignancies, history of hematopoietic stem cell transplant, and lymphoma will be excluded. A multivariate logistic regression will be employed to evaluate high-risk characteristics at presentation.

**Results:** Data collection and analysis are currently on going.

### Learning Objectives:

Recognize high-risk characteristics of patients presenting with febrile neutropenia.

Discuss appropriate empiric therapy for febrile neutropenia based on risk stratification using the MASCC risk index.

### Self Assessment Questions:

Which of the following criteria is not considered in the MASCC Risk Index?

- A: Blood pressure
- B: Age
- C: History of COPD
- D: Chemotherapy regimen

According to IDSA, ASCO/NCCN, and ESMO guidelines, which oral regimen is recommended for appropriate low-risk febrile neutropenia patients?

- A: Levofloxacin 500 mg PO daily
- B: Ciprofloxacin 500 mg PO twice daily + amoxicillin-clavulanate 500
- C: Cefdinir 300 mg by mouth twice daily and azithromycin 500 mg by
- D: Doxycycline 200 mg by mouth twice daily

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE IMPACT OF A MULTIFACETED STEWARDSHIP INTERVENTION ON DURATION OF THERAPY ON ASSOCIATED CLOSTRIDIUM DIFFICILE IN PATIENTS WITH PNEUMONIA AND URINARY TRACT INFECTIONS

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Pneumonia and urinary tract infections (UTI) are commonly encountered infections in hospitalized patients that drive a significant amount of antimicrobial prescription. There are multiple practice guidelines that provide recommendations about optimal duration of therapy for both pneumonia and UTI. These evidence-based treatment durations are shorter than what is often encountered in clinical practice.

Various antimicrobial stewardship interventions described in the medical literature have shown success in decreasing duration of therapy of both pneumonia and UTI. However, these studies analyzed single infectious diseases such as community acquired pneumonia or uncomplicated urinary tract infections which could limit the ability to demonstrate a clinical impact on outcomes such as Clostridium difficile infection (CDI). The goal of this study is to implement a multi-faceted stewardship approach to optimize duration of therapy for community acquired pneumonia, hospital and ventilator associated pneumonia, uncomplicated and complicated urinary tract infections, and catheter-associated urinary tract infections to demonstrate the impact on incidence of CDI.

A single-center, pre-, post-quasi-experimental study of patients admitted to Froedtert Hospital meeting inclusion/exclusion criteria is underway using a historic group from November 2016 through February 2017 and an intervention group from December 2018 to present. The antimicrobial stewardship team is utilizing a multifaceted approach to promote appropriate duration of therapy for patients with pneumonia and UTI. Patients are being identified using diagnosis codes (HAP/CAP) and/or positive urine culture (UTI) and evaluated daily for study inclusion. Recommendations are made to the provider on the medicine service Monday through Friday during normal work hours. Interventions are being documented within the electronic health record.

The primary outcome is the incidence of C. difficile infection within 30 days of discontinuing antibiotics. Secondary outcomes include duration of antimicrobial therapy, incidence of appropriate duration of antimicrobial therapy, hospital length of stay, 30-day all-cause mortality, 30-day readmission for recurrence of index infection and 30-day index infection recurrence.

### Learning Objectives:

Identify Identify high risk antibiotics which have been shown to be associated with Clostridium difficile infection.

Describe Describe the recommended duration of antimicrobial therapy for pneumonia and urinary tract infection.

### Self Assessment Questions:

Which of the following are high risk antibiotics and associated with Clostridium difficile infection?

- A: First generation cephalosporins
- B: Fluoroquinolones
- C: Macrolides
- D: Sulfonamides

Which of the following diagnoses is paired with the appropriate minimum duration of therapy?

- A: Uncomplicated cystitis = 1 days
- B: Hospital acquired pneumonia = 10 days
- C: Pyelonephritis = 14 days
- D: Community acquired pneumonia = 7 days

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF MULTIDISCIPLINARY REVIEW ON APPROPRIATENESS OF CLOSTRIDIODES DIFFICILE TESTING

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**Purpose:** Minimizing health care facility onset (HO-CDI) *C. difficile* infections is an important patient safety goal as *C. difficile* infections (CDI) have been attributed directly to 15,000 deaths annually in the United States. A DNA amplification assay will return positive for both colonization and active infection of *C. difficile*, so appropriate testing is paramount to obtaining accurate reporting rates and starting proper treatment for HO-CDI. In June of 2018, the infection prevention group at St. Elizabeth's Hospital began reviewing all *C. difficile* tests for their appropriateness and initiate discussions with the attending physicians to cancel tests that were ordered on patients with no signs or symptoms of CDI. The primary objective of this study is to look at the appropriateness of *C. difficile* tests pre and post implantation of multidisciplinary review. Secondary objectives include evaluating HO-CDI rates and cost analysis

**Methods:** This is a single center retrospective review of patients  $\geq 18$  years old who had *C. difficile* tests ordered from November 4, 2017 to February 28, 2019. A review of the electronic medical record of patients who meet the inclusion criteria will be conducted to assess appropriateness of the test based on factors including past *C. difficile* infections, recent antibiotic use, infection status, recent laxative use, and tube feeding status. Data will be analyzed using descriptive and bivariate statistics pre and post implementation of manual review of *C. difficile* tests.

**Results and Summary:** Project is ongoing; results will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review Review criteria used to measure appropriateness of *C. difficile* test

Discuss Infectious Disease Society of America (IDSA) guideline recommendations regarding *C. difficile* testing

### Self Assessment Questions:

1. EB is a 45 year old male is an inpatient scheduled for a colonoscopy tomorrow morning. He has been on polyethylene glycol in preparation for the procedure, with the latest intake at midnight. WBC

- A: Yes, order test. Patient meets criteria for *C. difficile* testing with 3
- B: No, do NOT order test. Patient does not meet criteria for *C. difficile*
- C: All of the above
- D: None of the above

2. JT is an 83 year old female from a nursing home and is under observation for chest pain on the hospital floor. Her temperature is 99.0 F and she has had 4 unformed stools in the last 5 hours. Wh

- A: Nursing home resident
- B: Temperature of 99.0° F
- C: 4 unformed stools in 5 hours
- D: None of the above

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CHARACTERIZATION OF RISK FACTORS FOR GENITOURINARY INFECTIONS WITH SODIUM-GLUCOSE COTRANSPORTER-2 INHIBITORS (CORGI-SGLT2I)

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**Purpose:** Sodium-glucose cotransporter-2 inhibitor (SGLT2i) use improves glycemic control by reducing the reabsorption of filtered glucose and increasing glucose excretion through the urine. SGLT2i therapies are associated with an increased risk of genitourinary infections (GUI); however, it is unknown which factors may predispose patients to an increased risk of developing a GUI. This retrospective cohort analysis aims to evaluate which factors may predispose a patient to GUI when using SGLT2i therapy. The primary objective of this study is to evaluate whether the severity of uncontrolled A1c prior to SGLT2i initiation and within three months of GUI is a predictor of increased risk of developing a GUI in patients with type 2 diabetes mellitus (T2DM). A secondary objective is to identify whether additional factors such as age, body mass index (BMI), eGFR, fasting plasma glucose, and serum creatinine, sodium or potassium levels are indicators of increased risk of developing GUI with SGLT2i use.

**Methods:** Patients prescribed a SGLT2i were identified from an electronic medical record - generated report listing patients at Advocate Medical Group - South Center. Subjects were included if they had T2DM and completed therapy for at least seven days. Patients were excluded if they did not have an A1c laboratory value within one year of SGLT2i therapy initiation, a history of GUI prior to SGLT2i therapy, or contraindications to SGLT2i use (pregnancy, severe renal impairment, or end stage renal disease). Findings will provide insight to the factors that contribute to the risk of developing GUI with SGLT2i therapy while also identifying which patients may benefit from the use of an SGLT2i to improve glycemic control.

### Learning Objectives:

Discuss the role of sodium-glucose cotransporter-2 inhibitor (SGLT2i) therapy in the care of patients with type 2 diabetes mellitus based on the 2019 ADA Standards of Care and EASD/ADA Consensus Report State potential adverse effects associated with the use of SGLT2i

### Self Assessment Questions:

In the 2019 American Diabetes Association Standards of Care sodium-glucose cotransporter-2 inhibitors are recommended as second line therapy after metformin in patients with type 2 diabetes mellitus i

- A: Patients with a BMI greater than 18.5 kg/m<sup>2</sup>
- B: Patients unable to afford their medications
- C: Patients on intensive insulin therapy
- D: Patients with heart failure reduced ejection fraction

Which of the following adverse effects is most common in patients taking a sodium-glucose cotransporter-2 inhibitor?

- A: Nephrolithiasis
- B: Genitourinary infection
- C: Hypoglycemia
- D: Reduction in LDL cholesterol

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **DETERMINING 5-DAY URINE CONCENTRATIONS AFTER A SINGLE INTRAVENOUS HIGH-DOSE AMIKACIN ADMINISTRATION: A CARBAPENEM-SPARING OPTION FOR ESBL UTIS**

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**Purpose:** The prevalence of extended-spectrum B-lactamase (ESBL)-producing Enterobacteriaceae is on the rise with limited treatment options. As a result, the Infectious Diseases Society of America has targeted ESBL infections in urgent need of new therapy. Like carbapenems, amikacin also retains susceptibility for most ESBL-producing Enterobacteriaceae. Studies have demonstrated a clinical success rate of 97.2% for amikacin against susceptible ESBL-producers and determined it to be a feasible treatment option for mild to moderate non-bacteremic UTIs. From an antimicrobial stewardship perspective, aminoglycosides may be advantageous as a substitute for carbapenems. Judging from prior studies, a single high-dose of amikacin may be sufficient to treat lower UTIs without risk for toxicity. However, initial pharmacokinetic (PK) evaluations of amikacin in the urine are needed to assess its place in therapy. The primary purpose of this study is to determine if a single high-dose amikacin will achieve and maintain urine concentrations above the established MIC breakpoint of 16mcg/mL for Enterobacteriaceae during the 5-days post-dose in patients with normal renal function.

**Methods:** This is a single-center, prospective PK study conducted at Northwestern Memorial Hospital (NMH). Patient demographics and specimen collection will take place between February 1, 2019 and February 1, 2020. Patients will be recruited after a "pharmacist to dose amikacin" alert is entered by a provider in EPIC as part of standard clinical care. Two amikacin blood levels will be collected (~2 hours and ± 12 hours post-dose) in accordance with standard of care. Patients meeting inclusion criteria will be consented and urine samples will be collected twice daily for a total of 5 days post-dose. Urine samples will be transferred to Midwestern University for PK analysis. The primary endpoint will be to measure amikacin urine concentrations for 5 days post-dose.

### **Learning Objectives:**

Recognize the prevalence of ESBL UTIs and opportunities for carbapenem-sparing treatment approaches.

Discuss the PK/PD findings of a single high-dose amikacin in the urine.

### **Self Assessment Questions:**

Which of the following is true regarding ESBL-producing Enterobacteriaceae infections?

- A: Prevalence is on the rise with limited treatment options
- B: Carbapenems are frequently used as first-line therapy
- C: Amikacin usually remains susceptible
- D: All of the above are true

What percentage of IV amikacin is excreted unchanged in the urine?

- A: >90%
- B: 60%
- C: 40%
- D: <10%

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## **ACCESS DENIED: IMPACT OF INSURANCE DENIALS FOR HIGH-COST OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY**

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**Purpose:** Outpatient parenteral antimicrobial therapy (OPAT) enables safe and effective treatment for patients who require prolonged intravenous (IV) antimicrobial therapy. Several high-cost antibiotics are advantageous for OPAT due to dosing frequency, side effects, and monitoring. The OPAT process at this institution requires Infectious Diseases consultation and care coordination with pharmacy and case management to obtain insurance prior authorization. According to the American Medical Association, prior authorization can cause treatment and discharge delays and treatment abandonment. While these barriers are well documented for chronic medications, the impact of insurance prior authorization for short-term IV medications. This study aimed to characterize discharge barriers and delays associated with high-cost OPAT antimicrobials.

**Methods:** This was an IRB-approved study of adult patients who were discharged home or to another healthcare facility with IV antibiotics from January to December 2017. Antibiotics were selected for this study based on frequency of OPAT use and cost greater than \$100 per day of therapy, which included: daptomycin, ceftaroline, ertapenem, ceftazidim avibactam, ceftolozone-tazobactam, and meropenem-vaborbactam. Data was collected for patient demographics, antibiotic therapy, disposition, and insurance authorizations. Prior authorization delay was defined as insurance authorization ≥1 day after submission, and discharge delay was defined as admission for ≥ 1 day after the date the patient was medically stable for discharge. Patients will be compared based on whether or not they experience a prior authorization delay for their OPAT antibiotic. Safety outcomes included: 30-day mortality or readmission, treatment-related adverse drug events, line-related complications and subsequent infection with a multidrug resistant organism. Post-intervention results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe the benefits of outpatient parenteral antimicrobial therapy  
Recognize potential barriers to insurance authorization for OPAT antibiotics

### **Self Assessment Questions:**

Which of the following is a potential benefit from OPAT?

- A: More ambulatory care visits
- B: Decreased length of hospitalization
- C: Shorter total duration of therapy
- D: Decreased line complications

What antibiotic characteristic may contribute to discharge delays due to insurance prior authorization?

- A: Once-daily dosing
- B: Long half-life
- C: Cost
- D: Broad-spectrum coverage

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING DIRECT ORAL ANTICOAGULANT PRESCRIBING PRACTICES AND IMPACT ON PATIENT OUTCOMES

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**Purpose:** About 32% of DOAC prescriptions are inappropriately dosed per the FANTASIA registry. Inappropriate dosing compromises efficacy and safety increasing thrombotic or bleeding risk. Objective of this study is to ensure compliance with package inserts and American College of Chest Physician guideline recommendations.

**Methods:** This Institutional Review Board approved, two-phase retrospective pre guideline implementation and prospective post guideline implementation study was conducted at a community teaching hospital. Study subjects included non-pregnant patients over 18 years that received any dose of rivaroxaban or apixaban with a maximum of 200 subjects per phase. A Pharmacy & Therapeutics Committee approved DOAC guideline was implemented in October 2018 which provided dosing and drug-drug interaction recommendations and authorized pharmacists to make renal dose adjustments for atrial fibrillation. Primary outcome measured the rate of appropriate prescribing. Secondary outcomes included number of: thrombotic or bleeding events, dosing interventions made by pharmacists, patients re-admitted for bleeds/thromboembolisms, patients with end stage renal disease, and number of patients with concurrent contraindicated inducers or inhibitors of CYP3A4 & P-glycoprotein.

**Results:** DOACs were appropriately dosed in 87% (175/200) versus 93% (171/183) of patients pre and post guideline implementation respectively. Bleeding events decreased from seven to four in the apixaban and four to zero in rivaroxaban groups. No patients were readmitted for bleeds in either phase. In the pre group, one rivaroxaban patient was readmitted for a venous thromboembolism. A similar number of renal dose adjustment interventions were made with four versus six per phase, majority targeting apixaban. Patients with end stage renal disease was similar at 11 versus 12 in the apixaban group and none with rivaroxaban. No contraindicated drug-drug interactions were found.

**Conclusions:** Post guideline implementation results show improved appropriate DOAC prescribing. Further provider education is needed to prevent underdosing of apixaban, especially when home doses are continued upon admission.

### Learning Objectives:

Review dosing recommendations of direct oral anticoagulants (DOACs) for non-valvular atrial fibrillation, treatment of venous thromboembolism, and orthopedic venous thromboembolism prophylaxis.

Identify opportunities for pharmacists to optimize DOAC prescribing and monitoring practices in a community teaching hospital

### Self Assessment Questions:

A 60 year old patient with non-valvular atrial fibrillation is taking apixaban 2.5 mg twice daily. She weighs 80 kilograms, her serum creatinine is 1.5 mg/dL. Patient is not on hemodialysis and does not

- A: Continue Apixaban 2.5 mg twice daily
- B: Recommend Apixaban 5 mg twice daily
- C: Recommend Apixaban 10 mg twice daily
- D: Recommend Apixaban 10 mg twice daily for 7 days followed by 5 mg

What opportunities are present for pharmacists to ensure appropriateness of DOAC therapy?

- A: Identify potential drug-drug interactions and make dosing recommendations
- B: Verify appropriateness in dosing based on indication, age, weight,
- C: Create a hospital DOAC guideline and endorse pharmacy led renal
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THROMBOELASTOGRAPHY (TEG) OPTIMIZED BLOOD PRODUCT AND FACTOR USAGE IN CARDIAC SURGERY

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Viscoelastic homeostatic assays, such as thromboelastography (TEG), have the potential to impact coagulation management and transfusion practice in cardiac surgery. Despite advances in peri-procedural coagulopathy management, cardiac surgery continues to be associated with excessive blood loss, leading to blood and factor replacement, and transfusion-related complications. The purpose of this project is to implement a TEG based algorithm for intra-operative use in cardiac surgery that will optimize blood product and factor use.

This is a single-center study of blood product and factor use in patients undergoing cardiac surgery following implementation of an intraoperative TEG based algorithm. Pre-implementation blood product and factor use was internally generated from the Society of Thoracic Surgeons Adult Cardiac Database, a national repository of clinical outcomes of cardiac surgery procedure records. This report identified all cardiac cases between September 2016 and August 2018 at the University of Wisconsin Hospital, a 505-bed, tertiary care facility. This report also generated total units of blood product divided into the following subcategories: plasma, platelets, and cryoprecipitate. A separate report identified total hemostatic treatment utilization. Post-implementation blood and factor use will be identified by intra-operative administration data taken from the electronic health record.

From September 2016 to August 2018 there were a total of 1,030 cardiac surgeries performed at UW Health. The average number of units per case for red blood cells, plasma, platelets and cryoprecipitate were 3.30, 3.06, 2.25 and 2.56, respectively. Factor VIIa and prothrombin complex concentrates (PCC) were rarely used. Data analysis and results post-TEG implementation are pending.

The results of this study will provide quantitative measures of blood product and factor use that can be used to inform the growing body of evidence of TEG in cardiac surgery.

### Learning Objectives:

Review factors that contribute to excessive blood loss and coagulopathy in cardiac surgery

Recognize the potential role of TEG-guided algorithms to optimize blood and factor product use in cardiac surgery

### Self Assessment Questions:

1. Which of the following explains why cardiopulmonary bypass (CPB) is associated with excessive blood loss and coagulopathy?

- A: CPB alters hemostasis
- B: Hyperthermia during CPB has deleterious effects on platelet function
- C: Anticoagulation for the prevention of clots within the CPB circuit causes
- D: Permanent platelet dysfunction occurs in all patients undergoing CPB

What is the role of point-of-care testing such as thromboelastography (TEG) in cardiac surgery?

- A: To help guide blood transfusion and hemostatic management intra-operatively
- B: Assess risk of development of venous thrombotic events post-operatively
- C: Predict coagulation status of hemophilic patients
- D: Replaces standard coagulation assays

Q1 Answer: A      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DESIGN AND IMPLEMENTATION OF AN ANTICIPATORY MEDIUM-RISK COMPOUNDING PROGRAM AT A CONSOLIDATED SERVICES CENTER

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**Purpose:** UW Health's consolidated services center was built to centralize and optimize pharmacy services. A key component that supported the business case for the consolidated services center was cost avoidance through insourcing of anticipatory medium-risk compounded sterile products. The purpose of this project was to establish compliant workflows for anticipatory medium-risk sterile compounding and to validate the financial impact of insourcing these services.

**Methods:** A committee was established with key operational stakeholders to analyze medications by cost to compound, availability of commercial alternatives, and utilization to determine which products would be tested for extended beyond use dates. In order to ensure compliance and standardization within the new sterile compounding area, new workflows were designed and implemented. Master formulation and compounding records were integrated into a sterile product workflow and remote verification software. This software utilizes photo capture functionalities to validate the set-up process, dilution steps, labeling and management of quarantine process. A quarantine workflow was designed and implemented to sequester inventory until sterility was validated for all products where extended dating was used. Third party laboratory vendors were assessed for contracting of initial and ongoing product validation studies. Post-implementation workload metrics will be assessed for labor costs associated with the insourcing program. All costs associated with the insourcing of these products will be assessed for financial impact including labor, supplies, waste, drug, and associated laboratory fees.

**Conclusions:** To be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the value of insourcing medium-risk anticipatory compounding services

Review inventory management strategies for sterile products within a consolidated services center

### Self Assessment Questions:

What considerations were made when determining which products to test for extended beyond use dates?

- A Cost to compound
- B: Availability of commercial alternatives
- C: Utilization
- D: All of the above

What inventory management strategy was developed and utilized for the batched sterile products?

- A MAX: 4 weeks & PAR: 2 week
- B MAX: 14 days & PAR: 7 days
- C Batch sizes were based on the inventory required to increase PAR
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A STANDARDIZED ADHERENCE ASSESSMENT TOOL ACROSS AN ACADEMIC HEALTH SYSTEM

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**Purpose:** Medication non-adherence is a multi-factorial healthcare issue that can lead to increased healthcare costs, hospital readmissions and decreased medication efficacy. Currently at Froedtert there is no standardized approach to documenting and assessing medication adherence. The purpose of this project is to identify and communicate medication non-adherence across an academic health system.

Secondarily, the adherence tool will serve as a medium to provide metrics for future pharmacy service development related to improving medication adherence. **Methods:** This quality improvement project includes both ambulatory and acute phases of care with documentation occurring within the electronic health record. Current adherence documentation practices were assessed prior to tool implementation.

The primary objective of the study is to assess the usage of an adherence assessment tool by the end user. Secondary objectives include identifying common barriers for adherence and assessing the utility of an adherence assessment tool. Tool usage will be measured by tracking utilization across inpatient medicine units, ambulatory encounters and a pre-operative clinic. Significant adherence barriers will be documented within the tool. A survey regarding the usability of the adherence assessment tool will be given to pharmacy staff members. A time study will also be conducted to assess efficiency of using the tool. **Results/ Conclusions:** Pre-implementation results showed that adherence was documented 28% of the time within the electronic health record for inpatient encounters (n=60) and 67% of the time for ambulatory encounters (n=40). Adherence documentation occurred in multiple locations within inpatient encounters. Data collection regarding tool utilization, efficiency, user satisfaction and barriers to adherence is ongoing. Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Outline 1. Outline the impact medication adherence has on the health system

Identify 2. Identify common patient barriers to medication adherence.

### Self Assessment Questions:

How many dollars of unnecessary healthcare spending can be attributed to medication non adherence

- A \$1-\$10 billion
- B: \$30-\$50 billion
- C: \$100-\$300 billion
- D: \$300-\$500 billion

A patient has trouble being adherent to medications due to having to make multiple trips to the pharmacy multiple times per month. What categorization of adherence barriers does this most represent?

- A System
- B Motivation
- C Recall
- D Financial

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF TWO DOSING REGIMENS OF VALGANCICLOVIR FOR CYTOMEGALOVIRUS PROPHYLAXIS IN HIGH-RISK LIVER TRANSPLANT RECIPIENTS

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**Purpose:** Significant controversy surrounds the optimal dose and duration of valganciclovir (VGCV) to prevent CMV in high-risk (D+/R-) liver transplant (LT) recipients. High doses cause leukopenia leading to premature discontinuation. Underdosing raises concerns for breakthrough CMV infection and ganciclovir resistance. The purpose of this study was to compare the safety and efficacy of two VGCV regimens for CMV prophylaxis in high-risk LT recipients.

**Methods:** This was a single-center retrospective review of CMV high-risk adult LT recipients who received prophylaxis with VGCV 450 mg/day for 90 days and transplanted between January 2010 to December 2013 (Group 1) vs those who received VGCV 900 mg/day for 180 days and transplanted between August 2014 to July 2017 (Group 2). Patients were excluded if death <30 days of transplant or multi-organ transplant recipients. The primary outcome was incidence of CMV disease at 1 year. Secondary outcomes included rates of CMV syndrome, end-organ disease, breakthrough infection, and resistance. Neutropenia, early discontinuation of VGCV, growth colony stimulating factors use, biopsy-proven rejection, graft loss, and death at 1 year were analyzed.

**Results:** There was no difference in baseline characteristics (n=96). Although no difference in rates of CMV disease (26% vs 23%, p=0.71), Group 1 had a higher incidence of CMV end-organ disease (12/16 vs 3/8, p=0.60). Significantly more patients in Group 2 developed neutropenia during prophylaxis with VGCV (8% vs 60%, p<0.001). Consequently, 37% of Group 2 required early discontinuation of VGCV. Group 1 and 2 had similar rates of BPAR (16% vs 14%), graft loss (5% vs 3%), and death (3% vs 3%) at 1 year.

**Conclusions:** Although VGCV 900 mg/day for 180 days was poorly tolerated with higher rates of hematologic adverse effects, it may be preferred due to less CMV end-organ disease. Further evaluation into cytopenia management is warranted to ensure optimization of CMV prophylaxis.

### Learning Objectives:

Discuss the risks and benefits of using high dose (900 mg/day) valganciclovir in CMV high-risk liver transplant recipients.

Describe the differences in efficacy between valganciclovir 450 mg/day for 90 days vs 900 mg/day for 180 days.

### Self Assessment Questions:

Which of the following would you expect when using valganciclovir 900 mg/day instead of 450 mg/day in CMV high-risk liver transplant recipients:

- A Higher rates of CMV end-organ disease
- B: Higher rates of CMV disease
- C: Higher rates of neutropenia
- D: More cases of ganciclovir-resistant CMV disease

Based on these results, which of the following would you expect when using valganciclovir 450 mg/day instead of 900 mg/day in CMV high-risk liver transplant recipients:

- A Higher rates of CMV end-organ disease
- B Higher rates of CMV disease
- C Less cases of ganciclovir-resistant CMV disease
- D High rates of valganciclovir discontinuation

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## AN EVALUATION OF ANTICOAGULATION USE AND THE SAFETY IMPLICATIONS OF ULTRASOUND-FACILITATED THROMBOLYSIS PATIENTS DIAGNOSED WITH MASSIVE OR SUBMASSIVE PULMONARY EMBOLISM

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**Purpose:** Pulmonary embolism (PE) is a major cause of morbidity and mortality. Massive, the most fatal, is defined as an acute PE with sustained hypotension, pulselessness, or persistent profound bradycardia. Submassive is defined as an acute PE without hypotension but with either RV dysfunction or myocardial necrosis. The traditional anticoagulation treatment for patients diagnosed with pulmonary embolism includes heparin, enoxaparin, or fondaparinux. Due to the risk of intracranial bleeding associated with systemic thrombolysis its role in treating submassive patients remains controversial. Ultrasound-facilitated catheter-directed thrombolysis (USCDT) is an emerging option for targeted treatment in massive or submassive PE. There is limited data on clinical endpoints including mortality and long-term safety data; however, USCDT allows for smaller doses of fibrinolytics to be used which limits the risk of intracranial hemorrhage. Advocate Lutheran General Hospital (ALGH) has utilized USCDT in patients with massive or submassive PE since August 2015. A major complication found at ALGH was bleeding at the femoral access site of the procedure. Currently, the anticoagulation regimen selected including enoxaparin or heparin infusions pre- or post-USCDT and dose of alteplase is based upon provider preference. The purpose of this study is to evaluate the anticoagulation strategy selected, the efficacy, and to determine if there is any association or contribution to bleeding events.

**Methods:** A single-center, retrospective chart review was conducted of patients admitted to ALGH with a diagnosis of submassive or massive PE who received USCDT from August 2015 to December 2018. The primary objective is to evaluate the selection of anticoagulation pre- and post-USCDT. Secondary objectives include major bleeds as defined by GUSTO bleeding criteria, efficacy of pharmacist-driven heparin nomograms, oral anticoagulant at discharge, duration of ICU and hospital admission, and hospital mortality. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review current CHEST guidelines recommendations and literature for use of ultrasound-facilitated, catheter-directed thrombolysis.

Discuss the dosing of thrombolytic in USCDT and dosing of anticoagulation in those with pulmonary embolism.

### Self Assessment Questions:

According to the CHEST guidelines, what is the recommended use of USCDT?

- A All patients with diagnosis of pulmonary embolism (PE)
- B: Acute PE with hemodynamic instability and are at high risk of bleed
- C: Patients diagnosed with chronic thromboembolic pulmonary hyper
- D: USCDT is not recommended per CHEST guidelines

Which of the following is appropriate anticoagulation to utilize based on the literature for patients going to receive USCDT with submassive pulmonary embolism?

- A Unfractionated heparin 80 units/kg IV bolus, followed by 18 units/kg
- B Enoxaparin 1 mg/kg subcutaneously every 12 hours dose adjustec
- C Fondaparinux: < 50 kg=5 mg/day, 50-100 kg=7.5 mg/day, > 100 kg
- D Either A or B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## LEVERAGING ADVANCED PREPARATION CHEMOTHERAPY (APC) AND ROBOTICS TO DECREASE TURN-AROUND-TIME IN AN OUTPATIENT INFUSION CENTER

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### Purpose:

It is estimated that 1.7 million new cases of cancer will be diagnosed in the United States and over 600,000 people will die from the disease in 2018. Over the past few decades, oncology treatments have transitioned from being given primarily inpatient to many being provided in the outpatient setting in hospital-based infusion centers. In the outpatient setting, patient access and convenience are key drivers for their satisfaction. Many studies have shown that excessive patient wait time for chemotherapy is a primary source of patient dissatisfaction. In March 2017, the Cleveland Clinic opened a new cancer center which increased overall infusion chair capacity. The goal of the pharmacy team in the new space is to consistently improve the turn-around time (TAT) of infusion medications to maximize productivity while balancing safety for patients. One of the new modalities to accomplish this goal is to prepare infusion medications in advance to ensure their availability when the patient has arrived.

### Methods:

The study is a quality improvement, pre/post intervention, descriptive study. Implementation of advanced preparation of chemotherapy (APC) has three distinct phases. Phase 1 targets manually prepared low cost, high utilization medications. Phase 2 targets low cost, high utilization medications that are compounded in the sterile compounding robot. Phase 3 targets high cost, high utilization medications that are compounded in the sterile compounding robot. Data collected includes: TAT (drug release to delivery of prepared product), drug waste, infusion medication preparation volume, robot activity time, and percentage of compounding completed outside of peak times. Primary and secondary objectives will be analyzed using descriptive statistics. TAT for each unique phase and all phases combined will be compared by two sample t-test or Wilcoxon signed rank sum, as appropriate.

### Results & Conclusions:

Data analysis is currently ongoing

### Learning Objectives:

Describe importance of improving turnaround-time of infusion medications delivered within an infusion center

Identify potential impact of advancing preparation of chemotherapy products on workload distribution

### Self Assessment Questions:

What can a decrease in turn-around time lead to in an infusion center?

- A: Increase in patient satisfaction
- B: Decrease in patient wait times
- C: Increase infusion chair availability
- D: All of the above

What beyond use date (BUD) would be inappropriate for a product being prepared in advance?

- A: 72 hours
- B: 4 hours
- C: 48 hours
- D: All of the above

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF PERIPROCEDURAL SYSTEMIC ANTIBIOTICS ON THE INCIDENCE OF INFECTION FOLLOWING EXTERNAL VENTRICULAR DRAIN (EVD) PLACEMENT

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**Purpose:** While the use of antibiotic-impregnated catheters (AIC) is recommended to reduce the rate of ventriculostomy-related infection (VRI), the role of systemic antibiotics remains controversial. This controversy is further complicated by the paucity of data comparing these prevention strategies. The 2016 Neurocritical Care Society consensus statement suggests single antibiotic doses pre-procedurally for prophylaxis, but current practice varies widely by institution. The purpose of this study was to compare the incidence of VRI in patients receiving or not receiving periprocedural systemic antibiotics.

**Methods:** A retrospective chart review was performed evaluating patients with an EVD placed between January 1, 2014 and December 31, 2018. Patients receiving periprocedural antibiotics were assigned to the intervention group. Patients who did not receive periprocedural antibiotics were assigned to the control group. The primary outcome was the incidence of VRI, as indicated by a positive cerebrospinal fluid (CSF) or intraoperative wound culture, within the duration of the catheter and up to 7 days after catheter removal. Secondary outcomes included total number of antibiotic doses, frequency of specific antibiotic use, and characterization of infection.

Baseline characteristics included age and gender, admission diagnosis, EVD indication, intensive care unit (ICU) length of stay (LOS), total LOS and death from any cause. Student T-test and Mann-Whitney U were used to analyze descriptive data. Chi-squared models were used to analyze the primary outcome.

**Results and Conclusions:** Data collection and analysis is on-going. Full results will be presented at the Great Lakes Pharmacy Resident Conference in April 2019.

### Learning Objectives:

Recall the evidence for prevention of external ventricular drain (EVD)-related infections.

Discuss current recommendations regarding EVD management and infection prevention.

### Self Assessment Questions:

Which of the following is TRUE with regards to prevention of VRI?

- A: AICs reduce incidence of infection but only when in combination with systemic antibiotics
- B: Data support the use of cephalosporins as first line agents for prophylaxis
- C: Periprocedural antibiotics have been shown to be superior to PSAI
- D: PSAP may increase the incidence of antibiotic-resistant VRI

The patient is a 28yoM, unrestrained driver, admitted to the intensive care unit with a traumatic brain injury following a motor vehicle accident. The team would like to place an EVD in order to monitor intracranial pressure.

- A: Antibiotic impregnated catheter alone
- B: Antibiotic impregnated catheter + duration therapy with systemic antibiotic
- C: Antibiotic impregnated catheter + single dose of systemic antibiotic
- D: Standard catheter + duration therapy with systemic antibiotic

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACIST-LED OUTPATIENT ANTIBIOTIC REVIEW OF POSITIVE CULTURES IN THE EMERGENCY DEPARTMENT

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**Purpose:** In 2009, the Centers for Disease Control and Prevention (CDC) recognized the need for appropriate antibiotic utilization in acute care hospitals to reduce development of multi-drug resistant organisms. By 2014 the CDC recommended implementing antimicrobial stewardship programs (ASPs) to ensure patients receive “the right antibiotic, at the right dose, at the right time, and for the right duration.” Historically, ASPs have been implemented primarily within inpatient hospital settings. More recently, ASPs have been expanded to include emergency departments (EDs) to reduce antimicrobial resistance and improve community antibiotic susceptibility rates. The purpose of this study is to evaluate the impact of adding a pharmacist review and subsequent interventions to the ED discharge culture review process; interventions were based on evidence-based medicine, aiming to improve antimicrobial stewardship and the continuity of patient care post-discharge.

**Methods:** We performed a prospective, descriptive study of patients discharged from the ED. Daily reports of positive cultures within 48 hours of discharge were generated and reviewed Monday through Friday for 4 consecutive weeks. Each positive culture was assessed for drug-bug mismatches, antimicrobial regimen (e.g., dose, frequency, renal adjustments, duration), and drug-drug interactions. Patients were excluded if they were pregnant, <18 years of age, a prisoner, admitted inpatient, refused treatment, or were transferred to another facility for treatment. Therapeutic recommendations were discussed with the designated ED culture follow-up physician. Any changes to therapy were communicated by the pharmacist to the patient and/or pharmacy, and the patient was subsequently counseled. Outcomes include number of pharmacists-identified interventions, recommendations made, recommendation acceptance rates, and total pharmacist time spent identifying and making recommendations.

**Results/Conclusion:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the impact on antibiotic utilization in a community-based emergency department from implementing pharmacist-led post discharge positive culture review and follow-up.

Identify pharmacy interventions in patients who require post-culture discharge review.

### Self Assessment Questions:

Pharmacists can be beneficial to the ED post-culture review process by:

- A: Assessing compliance with evidence-based medicine and education
- B: Prescribing an appropriate antibiotic when there are drug-bug mismatches
- C: Communicating and counseling treatment therapy changes to the patient
- D: A and C

Potential pharmacist interventions for a patient with positive cultures identified/ finalized after discharge include:

- A: Adjusting an antibiotic regimen based on renal dysfunction
- B: Increasing or decreasing duration of antibiotic therapy based on evidence
- C: Recommending a change in antibiotic based on organism identification
- D: All the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A RAPID, FUNGAL DETECTION PANEL FOR THE DIAGNOSIS AND MANAGEMENT OF CANDIDEMIA AND INVASIVE CANDIDIASIS AT AN ACADEMIC HEALTH CENTER

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**Purpose:** Candidemia and invasive candidiasis remain difficult to diagnose despite current methods (i.e. fungal culture and Candida Score). The T2 Candida Panel is a rapid, fungal detection diagnostic test utilizing nano-magnetic resonance technology to identify Candida species directly from blood samples, which could enhance identification of patients with invasive Candida infections. The purpose of this study is to assess the utility of the T2 Candida panel across an academic health center and identify areas for diagnostic optimization. **Methods:** A retrospective chart review was conducted on patients with a T2 Candida Panel and mycolytic blood culture collected during hospitalizations from February 2017 through March 2018 at Indiana University Health – Adult Academic Health Center hospitals. Patients were included if a T2 Candida Panel and aerobic, anaerobic, or mycolytic blood culture pair were drawn within the same 24-hour period. Patient charts with discordant panel and culture results were reviewed to determine potential reasons for conflicting results. For those with a positive T2 Candida Panel result and negative mycolytic culture, an evaluation of possible signs and/or symptoms of invasive candidiasis occurred. Additionally, the charts of patients with standard blood cultures with growth of a Candida species was assessed to see if a T2 Candida Panel was also drawn but failed to detect a Candida species. Data collection points included date and time of specimen collection of the panel and mycolytic culture, results of the panel and mycolytic culture, and diagnosis of invasive candidiasis. The primary outcome of this study was to determine the reliability and utility of the T2 Candida Panel at the Indiana University Health – Adult Academic Health Center. **Results and Conclusions:** Data collection and analysis is currently in progress. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference in April 2018.

### Learning Objectives:

Discuss similarities and differences of the T2 Candida Panel compared to alternative invasive candidiasis diagnostic tools.

Identify the role of the T2 Candida Panel in the diagnosis of candidemia and invasive candidiasis.

### Self Assessment Questions:

Which of the following statements describe differences between the T2 Candida Panel and Candida QuickFISH species identification technology?

- A: The T2 Candida Panel offers susceptibility information while the QuickFISH does not.
- B: The T2 Candida Panel identifies 5 Candida species and the QuickFISH identifies 3.
- C: T2 Candida Panel results rely on an initial positive culture while QuickFISH does not.
- D: The T2 Candida panel pairs *C. albicans* and *tropicalis* together and QuickFISH does not.

What must clinicians be cognizant of when interpreting results of the T2 Candida Panel?

- A: Beta-lactam antibiotics can interfere with results of the panel.
- B: Gadolinium-based contrast may cause unreliable results if given near the time of the panel.
- C: The T2 Candida Panel requires a culture to be set up so results will be available.
- D: *Aspergillus niger* may be falsely identified as *Candida parapsilosis*.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

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**Learning Objectives:**

**Self Assessment Questions:**

- A
- B:
- C:
- D:

- A
- B
- C
- D

Q1 Answer:            Q2 Answer:

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

**SURGICAL INTENSIVE CARE UNIT PAIN MANAGEMENT IN THE ERA OF INTRAVENOUS OPIOID SHORTAGES**

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Purpose: Fentanyl is the most widely used medication for the treatment of pain in mechanically ventilated (MV) intensive care unit (ICU) patients. Recently, the national shortage of fentanyl forced hospitals to utilize other medications to control pain in MV patients. There is limited data evaluating current pain management strategies and their efficacy in the setting of continuous intravenous infusion (CIVI) fentanyl shortages. This study compared pain control in MV patients before and during CIVI fentanyl shortages. Methods: This was a multi-center, IRB approved, retrospective quasi-experimental study evaluating pain treatment and efficacy in MV surgical ICU patients. The pre-group included patients prior to CIVI fentanyl shortages (4/2017-9/2017) and the post-group was during CIVI fentanyl shortages (4/2018-9/2018). Patients were included in this study if they received CIVI fentanyl in the pre-group, ≥ 18 years of age, admitted to an ICU after a procedure or trauma, and mechanically ventilated for ≥ 24 hours. Patients were excluded if they received CIVI fentanyl in the post-group, admitted for a neurologic or cardiac surgery, have less than an average of 4 pain scores per day during the first 7 days of MV, transferred from an outside hospital or from another ICU service, or excluded from the hospital pain, agitation, delirium protocol. The primary outcome was the percentage of Critical-Care Pain Observation Tool (CPOT) scores within goal (CPOT 0-2). Secondary endpoints include the percentage of Richmond Agitation-Sedation Scale within goal, time to CPOT goal, morphine milligram equivalents, ventilator days, and ICU length of stay. Descriptive data was evaluated using measures of central tendency or variability, nominal data using chi squared or Fisher's exact test, and continuous data using the Mann Whitney U test, as appropriate. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Identify appropriate pain control in mechanically ventilated patients utilizing CPOT  
Select an appropriate combination of medications for multimodal pain control

**Self Assessment Questions:**

Which CPOT score indicates adequate pain control in a mechanically ventilated patient?

- A Cpot 3
- B: Cpot -1
- C: Cpot 1
- D: Cpot 10

MK is a 60 year old male who was admitted to the surgical ICU post bowel resection after gunshot wound to abdomen. He is mechanically ventilated and sedated on fentanyl and propofol. On rounds the phy

- A ibuprofen, acetaminophen, methocarbamol
- B heparin, dexmedetomidine, oxycodone
- C aspirin, atorvastatin, chlorhexidine
- D morphine, midazolam, acetaminophen

Q1 Answer: C    Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

## CREATION, IMPLEMENTATION, AND EVALUATION OF PHARMACIST-LED MEDICARE PART D OPEN ENROLLMENT EVENTS

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**Purpose:** Medicare Part D Plans (including original Medicare Part D and Medicare Advantage Plans) can change overall costs each year without warning patients. As a result, the majority of Medicare patients are not enrolled in the most cost-effective plan. Previous studies support pharmacist involvement in lowering patients' out-of-pocket costs via Medicare Part D plan optimization in various community settings, including mobile clinics, outreach centers, and pharmacies. This research project aims to assess the impact of pharmacist-led Medicare Part D enrollment events on potential out-of-pocket costs and patient satisfaction in a hospital-based outpatient clinic setting.

**Methods:** This prospective pilot study was conducted at two hospital-based outpatient clinics during the Medicare Open Enrollment Period in 2018. Pharmacists and volunteers (who were trained by the Michigan Medicare and Medicaid Assistance Program) provided eligible patients assistance in comparing Medicare plans. Pharmacists also reviewed the patient's medications and clinical information to identify lower-cost therapeutic interchanges and duplicative or unnecessary drug therapies. To assess estimated annual cost (EAC) reduction, the EAC of the patient's current Medicare Part D plan was compared to the EAC of other plans for the upcoming year. A post-appointment survey was conducted to evaluate patient satisfaction with the enrollment events.

**Results:** Of the 39 patients that were assisted in Medicare Part D plan optimization, 33 (85%) could save money (average \$3,406) by switching plans for the upcoming year. Five patients were identified as potentially eligible for low-income subsidies. In total, patients could save \$135,362 in out-of-pocket costs from team interventions. Out of the 35 patients that completed the post-appointment survey, 28 (80%) patients reported that they plan to attend a Medicare Part D Open enrollment event in the upcoming year.

**Conclusions:** Pharmacists can effectively provide Medicare Part D plan optimization services in the hospital-based outpatient clinic setting to ultimately decrease out-of-pocket costs.

### Learning Objectives:

Discuss the importance for Medicare patients to annually re-evaluate their Medicare plans.

Describe the pharmacist-led Medicare Part D enrollment service at Beaumont Health.

### Self Assessment Questions:

Medicare insurance plans can change which of the following costs without warning beneficiary members:

- A Monthly premium
- B: Annual deductible
- C: Copayments
- D: All of the above

The pharmacist-led Medicare Part D Enrollment service at Beaumont Health includes all of the following EXCEPT:

- A A brief medication review
- B A discussion of cost-savings ideas
- C Enrollment in supplemental dental and vision plans
- D An evaluation of Medicare plan options

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PROJECT EVADE (EDUCATING VETERANS AFTER DISCHARGE): EVALUATING THE EFFECTS OF A PHARMACIST-RUN TRANSITIONS OF CARE CLINIC ON HOSPITAL READMISSIONS

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**Purpose:** To determine if high-risk patients seen in a transitions of care (ToC) clinic have decreased 30-day hospital readmission rates compared to those transitioning directly back to primary care through the initiation of a pilot, pharmacist-managed ToC clinic.

**Methods:** A retrospective chart review was conducted for patients on Patient Aligned Care Teams (PACT) Yellow and Purple seen in the ToC clinic between October 1, 2017 and March 30, 2018 at the Central Ohio Veterans Affairs (VA) Healthcare System. Inclusion criteria were: aged 18-100, Care Assessment Needs score  $\geq 90$ , and discharge from a non-VA inpatient service within 14 days. The control group included matched randomized patients from PACT Orange and Green. The primary outcome was comparison of 30-day readmission rates of ToC clinic versus control group patients. Secondary outcomes included number and type of medication-related recommendations and care coordination referrals made and accepted by a provider. For the primary outcome, 70 patients would yield 80% power to detect a difference of 0.33 between groups.

**Results:** A total of 46 patient charts were analyzed, with 23 from each group. For the primary outcome, 3 patients (13%) seen in the ToC clinic were readmitted to the hospital within 30 days of discharge, compared to 6 patients (26.1%) in the control group ( $p=0.265$ ). For secondary outcomes in patients seen in the ToC clinic, 23 (32.9%) of 70 medication related recommendations were accepted. In addition, 9 (47.4%) of 19 laboratory blood work recommendations and 18 (48.6%) of 37 care coordination referrals were accepted by providers.

**Conclusion:** Fewer patients were readmitted within 30 days in the ToC clinic group compared to the control group. This suggests that closer follow-up post-discharge may decrease readmission rates, with pharmacists serving as key factors in continuity of care. Larger studies that achieve power are needed to confirm these results.

### Learning Objectives:

Describe the purpose of a transitions of care clinic

Explain the potential benefits for patients utilizing a transitions of care clinic

### Self Assessment Questions:

What is the purpose of a ToC clinic?

- A To transition patients back to the medication regimen they were on
- B: To ensure continuity of care, decrease medication errors, and prevent hospitalizations
- C: To give physicians more time before they need to see their patient
- D: To hand-off a difficult patient to another facility to see if their care can be improved

JB is a 68-year-old female who presents to your outpatient ambulatory care facility for enrollment. She states she was discharged from the hospital 2 days ago after a heart failure exacerbation. What

- A Optimization of her heart failure medication regimen
- B Assessment and ordering of necessary follow-up laboratory blood work
- C Referral to a specialty care provider (ie. Cardiologist)
- D All the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACIST IMPACT ON CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN A TRANSITIONS OF CARE PILOT PROGRAM

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### Purpose:

Kentucky has one of the highest percentages of individuals with diagnosed chronic obstructive pulmonary disease (COPD), COPD hospital readmissions, and COPD mortality in the United States. Through the Hospital Readmission Reduction Program, the Centers for Medicare and Medicaid Services reduce payment and reimbursement to hospitals with excess COPD readmissions. As medications are a mainstay of COPD management, pharmacist interventions may play a key role in decreasing COPD readmission rates and improving overall patient outcomes. The purpose of this study is to assess pharmacist impact on COPD management in a transitions of care (TOC) pilot program.

### Methods:

A pharmacy resident-run TOC pilot program was established in November 2017. This service consisted of discharge medication reconciliation and education, 72-hour telephone follow-up, and a 7 to 14-day face-to-face clinic visit for patients with a primary or secondary diagnosis of COPD being discharged home. The following data was collected over a 12-month period: patient age, gender, ethnicity, number of medications at each point of TOC patient contact, emergency department visits and hospital readmission within 30 days of discharge, and medication discrepancies discovered at TOC points of patient contact. The primary outcome of this study was hospital readmission within 30 days of discharge to home for COPD patients. The secondary outcomes of this study were 30-day emergency department visits and pharmacist-identified medication discrepancies. These results were compared against the 30-day readmission rates and 30-day emergency department visits for all COPD patients admitted to the University of Louisville Hospital during the 12-month period who were eligible, but not enrolled in the pilot program.

### Results and conclusions:

Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the most commonly cited causes of hospital readmission in relation to transitions of care

Outline the pharmacy resident-led transitions of care pilot program at the University of Louisville Hospital

### Self Assessment Questions:

Which of the following is a common preventable cause of hospital readmissions in relation to transitions of care?

- A Medication errors
- B: Effective communication
- C: Early provider follow-up
- D: Appropriate discharge education

The University of Louisville Hospital pharmacy resident-run transitions of care pilot program includes which of the following components?

- A A pharmacist phone call within 7 days of hospital discharge
- B A physician visit within 7 days of hospital discharge
- C A physician phone call within 5 days of hospital discharge
- D A pharmacist visit within 14 days of hospital discharge

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE IMPACT OF ADVANCED PHARMACY PRACTICE EXPERIENCE (APPE) STUDENTS PROVIDING MEDICATION THERAPY MANAGEMENT (MTM) SERVICES WITHIN AN AMBULATORY CARE ROTATION

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**Purpose:** Advance pharmacy practice experience (APPE) students participating in an ambulatory care rotation located at a family medicine residency clinic are providing medication therapy management (MTM) services through an online platform for at least four hours once a week. The purpose of this study is to evaluate the student development, patient impact, and financial benefits associated with integrating MTM services within an existing four week ambulatory care rotation. **Methods:** APPE students complete both online and in-person training on how to provide MTM services. Their development will be evaluated through pre-questionnaires and post-questionnaires that have been de-identified to maintain confidentiality. These questionnaires have been designed to estimate the students' growth in confidence related to developing pharmacotherapeutic knowledge, contacting new patients, and recommending therapy changes to other healthcare professionals. In addition, students will self-reflect on their change in perceived value associated with providing MTM services at the site. Patient impact will be determined by analyzing the completed documentation related to each interaction performed by study participants. The financial benefits will be determined by collecting the total reimbursements received on the MTM services provided by study participants. **Results and Conclusion:** This study is ongoing; thus, data collection and analysis are in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain how the MTM service is incorporated within a four-week ambulatory care rotation.

Identify and describe potential MTM service claims the APPE students will have the opportunity to complete when participating in this study.

### Self Assessment Questions:

At a minimum, how many hours of MTM service will the APPE students complete in four-weeks?

- A 4 hours
- B: 8 hours
- C: 16 hours
- D: 20 hours

Which service requires the MTM provider to assign a severity level?

- A Targeted Interventions (TIPS)
- B Pharmacist Initiated Actions
- C Comprehensive Medication Reconciliation (CMR)
- D Medication Reconciliation (MedRecs)

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A PIPERACILLIN-TAZOBACTAM LOADING DOSE FOLLOWED BY EXTENDED INFUSIONS PROTOCOL

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Compared to traditional 30-minute infusions of piperacillin-tazobactam (PTZ), literature demonstrates improved outcomes with prolonged administration times; serum concentrations are maintained above the minimum inhibitory concentration (MIC) for longer periods of the dosing interval. However, 30-minute infusions have been shown to rapidly increase serum concentrations above the MIC, whereas an initial extended infusion takes approximately 90 minutes to achieve the same concentration. Little evidence is available reviewing the clinical effect of a loading dose prior to extended infusions. This study seeks to determine differences in outcomes between patients treated with PTZ who receive their first dose over 30 or 240 minutes. A retrospective chart review is being conducted comparing outcomes of two treatment strategies of PTZ for indications of sepsis or pneumonia. The control group consists of patients who received all PTZ doses as an extended infusion. The intervention group consists of patients who received an initial 30-minute infusion of PTZ followed by subsequent doses given over 4 hours.

Patients included are eighteen years of age or older, are admitted with full inpatient status and have culture-negative status or positive cultures for susceptible gram negative or anaerobic pathogens. Exclusion criteria include PTZ use for any other indication, confirmed gram positive or resistant gram negative isolates, and pregnant and/or breastfeeding patients. The primary outcome is all-cause inpatient mortality, and secondary outcomes are length of stay and total duration of antibiotic therapy. A sample size of 226 patients is necessary to provide 80% power. Data collection and analysis is ongoing, and preliminary results will be presented.

### Learning Objectives:

State the time it takes for serum concentrations of PTZ to reach therapeutic concentrations when administered as either traditional or extended infusions

Recall in which disease states a PTZ loading dose would have the greatest impact.

### Self Assessment Questions:

How much time does it take for serum concentrations to exceed the MIC when administering an extended infusion of PTZ?

- A: 10 minutes
- B: 30 minutes
- C: 60 minutes
- D: 90 minutes

A loading dose of PTZ would have the greatest impact on which of the following infectious processes?

- A: Osteomyelitis
- B: Sepsis
- C: Cellulitis
- D: Pyelonephritis

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE EFFECT OF PLATELET TRANSFUSION ON FUNCTIONAL OUTCOMES IN PATIENTS WITH INTRACEREBRAL HEMORRHAGE

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Intracerebral hemorrhage (ICH) is associated with significant morbidity and mortality. The risk of hematoma expansion highlights the necessity for prompt medical management and reduction in hematoma growth. The effect of antiplatelet use or platelet dysfunction on ICH expansion and neurologic outcome remains controversial. Platelet transfusion in the treatment of ICH secondary to antiplatelet use or platelet dysfunction also has conflicting data. The PATCH Trial found increased odds of death or dependence in the platelet transfusion group (OR 2.05 [95% CI 1.18-3.56]; p=0.0114). The Neurocritical Care nor the AHA/ASA clinical practice guidelines have strong recommendations for the utility of platelet transfusion in ICH. At the University of Cincinnati Medical Center (UCMC), despite available evidence, platelet transfusion in ICH still occurs.

This retrospective, single-center, cohort study will include patients admitted to UCMC with ICH between January 2016 and February 2019. The primary objective is to compare functional outcomes, defined by modified Rankin Scale, after ICH between patients with and without platelet transfusion. The second objective will evaluate the effect of reduced platelet activity, assessed via a platelet function assay (PFA; VerifyNow®, Accriva Diagnostics, San Diego, CA), on functional outcomes between platelet and non-platelet transfusion groups. The third objective will compare functional outcomes between patients with and without desmopressin administration who did not receive platelet transfusion. Categorical data will be evaluated using chi-square or Fisher's exact test, as appropriate. Ordinal data will be analyzed via Wilcoxon rank sum test. Ordinal logistic regression analysis of the shift of all categories of the mRS at follow up will be performed. Based on an expected poor outcome event rate of 70% in the platelet transfusion group, 752 patients need to be enrolled to detect an expected difference of 10%, with an alpha of 0.05 and 80% power.

Data collection and analysis are ongoing.

### Learning Objectives:

Describe the current literature surrounding the effect of prior antiplatelet use or baseline platelet dysfunction on intracerebral hemorrhage initial volume, expansion, and clinical outcome.

Discuss existing literature surrounding the use of platelet transfusion in the treatment of intracerebral hemorrhage.

### Self Assessment Questions:

What trial published in 2016 demonstrated increased odds of death or dependence in patients receiving platelet transfusion compared to standard of care in patients presenting with intracerebral hemorrhage?

- A: Atch ii
- B: Interact 2
- C: Ninds
- D: Patch

The 2015 AHA/ASA Clinical Practice Guidelines for the Management of Spontaneous Intracerebral Hemorrhage recommend platelet transfusion in which of the following situations?

- A: Platelet transfusion therapy should be given to all patients experiencing ICH
- B: Platelet transfusion therapy should be given to all patients experiencing ICH
- C: Platelet transfusion therapy should not be given to any patients presenting with ICH
- D: The usefulness of platelet transfusion therapy in patients presenting with ICH is unclear

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IDENTIFICATION OF HEPARIN RESISTANCE RISK FACTORS IN A CRITICALLY-ILL PATIENT POPULATION

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**Purpose:** Patients admitted to the medical intensive care unit (MICU) often require continuous intravenous unfractionated heparin therapy (CI-UFH) for therapeutic anticoagulation for a variety of clinical indications. A subset of these patients fail to reach therapeutic anticoagulation or require excessively high doses of heparin use to do so, a phenomenon classified as heparin resistance (HR). Risk factors predisposing patients to HR have been primarily studied in patients undergoing cardiopulmonary bypass (CPB) and in patients with anti-thrombin III deficiencies. HR, however, is not just limited to these patient population and has been identified in ICU patients undergoing CI-UFH therapy. To date, there is a paucity of data describing risk factors for the development of HR in the intensive care unit patient population. The objective of this study is to identify HR risk factors in MICU patients.

**Methods:** This retrospective cohort study was conducted utilizing the electronic health record to identify patients admitted to the MICU on CI-UFH at Northwestern Memorial Hospital from April 2018 until November 2018. HR was defined using a criterion of  $\geq 35,000$  units heparin per 24-hour period to achieve therapeutic anticoagulation or failure to do, consistent with literature definition. Patients included for analysis were those  $\geq 18$  years old with literature defined HR. Patients excluded were those with any cardiac surgery within three months, concurrent use of extracorporeal membrane oxygenation (ECMO), and use of CI-UFH for cardiac bypass surgery. Variables for analysis included baseline demographics, complete blood counts, anticoagulation indication, recent anticoagulation use, sequential organ failure assessment (SOFA) scoring, hepatic and renal function, duration of heparin, and presence of fever and infection. Odds ratio calculations were performed to compare the risk of development of HR attributable to each independent variable.

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

### Learning Objectives:

Identify risk factors for heparin resistance (HR) in a MICU patient population.  
Discuss the relationship of study outcomes to previously identified HR risk factors.

### Self Assessment Questions:

Which of the following is not an identified mechanism of heparin resistance (HR)?

- A: Anti-thrombin III (ATIII) deficiency
- B: Elevation in factor VIII
- C: Increased heparin clearance
- D: Decrease in heparin binding proteins

2. Current guidelines define heparin resistance (HR) as  $\geq 35,000$  units of heparin per 24-hour period in order to achieve therapeutic anticoagulation. Which of the following patients meets criteria for

- A: 53kg male at therapeutic anticoagulation on 18 units/kg/hr of hepa
- B: 72kg female at therapeutic anticoagulation on 22 units/kg/hr of hepa
- C: 60kg female at therapeutic anticoagulation on 20 units/kg/hr of hepa
- D: 85kg male at therapeutic anticoagulation on 12 units/kg/hr of hepa

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DISCORDANCE OF RENAL DRUG DOSING USING THE COCKCROFT-GAULT OR 8-HOUR URINE CREATININE CLEARANCE IN HOSPITALIZED ADULTS

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Assessment of kidney function is fundamental to maximize efficacy and minimize adverse effects of medications. Due to potential limitations of the original Cockcroft-Gault (CG) study, the 8-hour urine creatinine clearance (CrCL8h) has been proposed as an alternative estimation of kidney function. The purpose of this study was to determine if there is a difference in renal drug dosing by CG creatinine clearance (CrCLCG) versus CrCL8h in adult hospitalized patients.

Adult patients admitted between March 2018 and September 2018 with an 8-hour urine collection were included in this single-center, observational, retrospective cohort study. Renal function was estimated using the CrCLCG and CrCL8h for dosing of selected renally eliminated antimicrobial, anticonvulsant, anticoagulant, and antiarrhythmic medications actively ordered for the study patients. The primary outcome was discordance defined as the number of patients with a different dose using the CrCLCG divided by the total number of 8-hour urine collection: multiplied by 100. Statistical analysis was performed by Fisher's Exact Test, Mann Whitney U-test, and Pearson correlation. Outliers were determined using a cut-off at +20%. Data are presented as median [25% 75% Interquartile range] or percent.

A total of 100 urine collections (85 unique patients, 51% male, median age 55 [41-70] years) were analyzed. The median height was 67 [63-71] inches and median admission weight was 84.2 [69.9-102.1] kg. The median serum creatinine was 0.76 [0.52-1.06] mg/dL and median BUN was 20 [14-28] mg/dL. The median CrCLCG was 99.7 [56.5-166.9] mL/min and CrCL8h was 86.2 [43.5-140.3] mL/min with a correlation of 0.76 ( $p < 0.001$ ). Outliers were common at 69% with CrCLCG higher in 51% and CrCL8h higher in 18%. Drug dosing discordance was 24% ( $p < 0.004$ ).

The use of the CrCLCG for estimating kidney function was associated with a significant drug dosing discordance compared to CrCL8h in hospitalized adults. Further studies assessing clinical impact are warranted.

### Learning Objectives:

Recognize the limitations of the original Cockcroft-Gault study for estimation of creatinine clearance

Identify patients who would potentially benefit from an 8-hour urine collection

### Self Assessment Questions:

Which of the following is true about the original Cockcroft-Gault study?

- A: The study subjects primarily had renal insufficiency
- B: The Cockcroft-Gault equation was originally validated using 8-hour
- C: The 0.85 correction factor used for females was derived from a su
- D: 96% of the study subjects were male

Which of the following patients would have the most benefit from an 8-hour urine collection to assess renal function?

- A: A floor patient receiving their home levetiracetam
- B: A patient on famotidine for stress ulcer prophylaxis
- C: A patient on cefepime for a gram negative bacteremia
- D: A post-op patient having their home gabapentin restarted after a p

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING THE CORRELATION OF COMMUNITY ORAL CARE HABITS IN PATIENTS WITH TRACHEOSTOMIES AND RESPIRATORY INFECTIONS

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Medically complex children have tracheostomies placed for a variety of indications, including to bypass an upper airway obstruction, to allow for suctioning of the trachea in children with poor secretion control, and to allow invasive mechanical ventilation. A tracheostomy facilitates direct access for pathogens to enter the trachea placing these patients at high risk for frequent respiratory infections. One source of potential pathogens is the oral cavity, and quality initiatives that focus on standardizing oral care in acute care settings have shown decreased rates of respiratory infections. Oral care is often difficult in these medically complex patients, and little is known about what types of oral care is done in the outpatient setting. Minimal research has assessed how outpatient oral care habits affect the frequency of respiratory infections and antibiotic exposure in patients with tracheostomies.

This study is a prospective survey evaluation given to caregivers of patients with tracheostomies presenting for a routine visit to an outpatient clinic within a large, academic freestanding pediatric hospital. Survey data is currently being collected on a tablet using Research Electronic Data Capture (REDCap). A retrospective chart review of patients whose caregivers completed the survey will evaluate pertinent information, including the date of tracheostomy placement, number of past inpatient stays, length of inpatient stay, antibiotics prescribed, and days of antibiotic exposure. Variables that are associated with oral hygiene will be included in a multivariate analysis. A one-sided two sample t-test will be used to compare the respiratory infection rates between different oral hygiene groups. Logistic regressions will be used for multivariate analysis. All analyses will be conducted in SAS 9.4 (SAS Institute, Cary, NC).

Data collection and analysis are ongoing. Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify oral care habits, barriers, and opportunities for improvement in an outpatient pediatric population with tracheostomies  
Recognize the incidence of respiratory infections and antibiotic exposure in these patients

### Self Assessment Questions:

For which of the following reasons may a child need a tracheostomy?

- A To decrease the frequency of foot infections
- B: To bypass an upper airway obstruction
- C: To decrease fasting blood glucose
- D: To bypass kidney filtration

How did the hospital define the presence of multi-drug resistant organisms?

- A Microorganisms that are resistant to one or more classes of antimicrobials
- B Microorganisms that are resistant to two or more classes of antimicrobials
- C Microorganisms that are resistant to three or more classes of antimicrobials
- D Microorganisms that are resistant to four or more classes of antimicrobials

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THERAPEUTIC ENOXAPARIN IN HIGH-RISK PATIENTS: AN EVALUATION OF A PHARMACIST-DRIVEN ANTI-XA MONITORING AND DOSE ADJUSTMENT PROTOCOL

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Purpose: Therapeutic drug monitoring of enoxaparin is not routinely recommended in the general population due to predictable pharmacokinetics. However, anti-Xa level monitoring may be performed to ensure the safety and efficacy of therapeutic enoxaparin in certain high-risk patient populations. Available literature suggests that patients with both high and low body weight, impaired renal function, and elderly patients may warrant increased monitoring to ensure safety and efficacy of therapeutic enoxaparin. Norton Healthcare recently implemented a pharmacist-driven anti-Xa monitoring and dose adjustment protocol for patients receiving therapeutic enoxaparin with identified risk factors that affect pharmacokinetics. The purpose of this study is to evaluate the utilization of the protocol and to identify opportunities for protocol improvement.

Methods: The study is an IRB approved, retrospective, non-interventional, medical chart review of patients receiving therapeutic enoxaparin during the first 8 weeks after protocol implementation. Included adult patients meet one (or more) of four pre-specified, high-risk categories: (1) Weight  $\leq$  45 kg, (2) Weight  $\geq$  140 kg or BMI  $\geq$  40 kg/m<sup>2</sup>, (3) CrCl  $\leq$  30 ml/min or receiving renal replacement therapy and (4) Age  $\geq$  65 years of age AND CrCl  $<$  60 ml/min. Exclusion criteria include being  $<$  18 years old, receiving  $<$  3 consecutive doses of therapeutic enoxaparin administered and not having an anti-Xa level collected. The primary outcome of the study is to determine the percentage of patients that require an enoxaparin dose adjustment, based on initial peak anti-Xa levels, in accordance with the protocol. Secondary outcomes include time to achieve therapeutic anti-Xa levels, mean dose of therapeutic enoxaparin (mg/kg) required to achieve a therapeutic peak anti-Xa level, sample collection-time accuracy, pharmacist adherence to the protocol, and thrombotic and bleeding events. Results and conclusions to be presented at Great Lakes

### Learning Objectives:

Identify Identify patient populations that may require anti-Xa monitoring while receiving therapeutic enoxaparin to ensure safety and efficacy.  
Select Select an appropriate anti-Xa monitoring schedule for therapeutic enoxaparin.

### Self Assessment Questions:

Which of the following patients may benefit from anti-Xa monitoring while receiving therapeutic enoxaparin due to variable kinetic parameters?

- A Patient weighing 65 kg
- B: Patient with a CrCl of 102 mL/min
- C: Patient with a BMI of 55 kg/m<sup>2</sup>
- D: Patient that is 50 years old

Which of the following is an appropriate monitoring schedule for therapeutic enoxaparin?

- A Peak anti-Xa level drawn 2 hours after the 3rd dose
- B Peak anti-Xa level drawn 4 hours after the 3rd dose
- C Peak anti-Xa level drawn 6 hours after the 4th dose
- D Peak anti-Xa level drawn 4 hours after the 6th dose

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DO YOU HAVE THE KNACK FOR DOSING E-NAC?

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In 2016, acetaminophen either alone or in combination with other agents accounted for 112,967 exposures reported to U.S. Poison Centers and is a leading cause of significant morbidity and mortality. In 2016, the FDA approved a new effervescent tablet to help with the palatability of NAC. This product comes in two tablet sizes that dissolve in various amounts of water. The package insert offers a table for users to help dose the e-NAC based on number of tablets and weight. There is concern that practitioners may use traditional dosing without consulting this formulation specific dosing chart leading to improper dosing of this product. The objective of this study is to assess the ability of healthcare providers on dosing of the new effervescent NAC product based on the package insert.

The study will be an educational test distributed electronically to UIH physicians, nurses and pharmacists who will be asked to anonymously complete 3 timed scenarios for dosing of e-NAC. Participants will receive an email outlining the study along with a link to the Qualtrics survey. The primary outcome of the study is the accuracy of effervescent NAC dosing using the package insert. Secondary outcomes include time to completion of the first scenario and accuracy of effervescent NAC dosing using tertiary literature. A total of 120 participants will be recruited (60 pharmacists and 60 non-pharmacists) split into two study arms. Both arms will receive the same 3 scenarios in a random order along with the recommended dosing from either the package insert or a tertiary drug reference. All participants will have 20 minutes to complete the assessment. Analysis will include descriptive statistics along with comparison of the two groups. Results are pending data collection and analysis.

### Learning Objectives:

Discuss the importance of N-acetyl-cysteine in acetaminophen toxicity  
Identify the need for an educational survey study on proper dosing of effervescent N-acetyl-cysteine

### Self Assessment Questions:

Which of the following is the approved oral dosing regimen for NAC?

- A 140 mg/kg IV x1 followed by 70 mg/kg IV every 4 hours for 17 doses
- B: 150 mg/kg PO over 60 min followed by 50 mg/kg PO over 4 hours
- C: 150 mg/kg PO over 60 min followed by 50 mg/kg PO over 4 hours
- D: 140 mg/kg PO x1 followed by 70 mg/kg PO every 4 hours for 17 doses

What was the reasoning behind approval of e-NAC?

- A easier administration
- B better palatability
- C cheaper oral option
- D better efficacy

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING OUTCOMES IN CONGESTIVE HEART FAILURE PATIENTS PRESENTING WITH SEPTIC SHOCK RECEIVING STANDARD VERSUS REDUCED INITIAL FLUID RESUSCITATION VOLUME

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In septic patients who have a predisposition to fluid overload, such as those with congestive heart failure, prescribing fluid resuscitation with the same volume as a patient with a baseline neutral fluid balance may lead to sub-optimal outcomes. There is not strong evidence available in the literature to provide guidance for this clinical scenario. The purpose of this study is to determine if guideline-directed fluid resuscitation (i.e., greater than or equal to 30 mL/kg) increases hospital length of stay compared with more conservative fluid resuscitation in congestive heart failure patients who present to the emergency department with severe sepsis or septic shock.

This retrospective, single-center, cohort study takes place in a 433-bed community hospital in Lexington, KY with an average of 650 sepsis admissions annually. The electronic health record will be used to identify patients with a history of congestive heart failure who meet the Centers for Medicare and Medicaid Services case definition of sepsis and who experience at least one episode of hypotension within 6 hours of presentation. Baseline demographics and other markers of clinical status will be used to compare the study cohorts. The primary endpoint is total hospital length of stay. Secondary endpoints include all-cause mortality, intensive care unit length of stay, need for vasopressors and duration of therapy, normalization of mean arterial pressure within 6 hours of hypotension onset, need to give diuresis secondary to fluid overload, thirty-day readmission rate, total cost of hospital stay, and average change in pro-BNP from baseline within 72 hours of presentation. Data will be analyzed using an independent samples t-test, Mann Whitney U, chi-square, or Fischer's exact test, as appropriate. P-values of less than 0.05 will be considered statistically significant.

### Learning Objectives:

Describe sepsis and classify patients into severe sepsis or septic shock per Centers for Medicare and Medicaid Services SEP-1 definitions.  
Discuss the available literature demonstrating a correlation between negative patient outcomes and a sustained positive fluid balance in the ICU.

### Self Assessment Questions:

Which of the following, in addition to a suspected source of infection, identifies a patient with septic shock?

- A Systolic blood pressure of 81 mmHg after adequate fluid resuscitation
- B: Heart rate of 101 bpm after adequate fluid resuscitation
- C: Initial lactate of 4.5
- D: A and C

What are the potential causes for higher rates of multi-organ failure and mortality in patients who have a sustained positive fluid balance in the ICU?

- A Worsening edema
- B Capillary leak
- C Low albumin
- D A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**Learning Objectives:**

**Self Assessment Questions:**

- A
- B:
- C:
- D:

- A
- B
- C
- D

Q1 Answer:            Q2 Answer:

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

**EVALUATION OF FEVER, NEUTROPENIA, AND SEPSIS  
PROPHYLAXIS IN OUTPATIENT CHEMOTHERAPY PATIENTS WITH  
EMERGENCY DEPARTMENT AND HOSPITAL ADMISSIONS**

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**Purpose:** Patients that receive chemotherapy can develop serious complications that lead to emergency department (ED) visits or admissions to the hospital. Many of these complications stem from conditions that can be prevented with appropriate measures in the outpatient setting. Of these conditions, febrile neutropenia and sepsis have been shown to be serious complications that often result in hospitalization, an increased risk of mortality, and increased costs for healthcare facilities. The objective of this study is to evaluate antimicrobial prophylaxis in outpatient chemotherapy patients with ED visits or hospital admissions for fever, neutropenia, or sepsis. This information will be used to determine if these admissions could be decreased by properly initiating antimicrobial prophylaxis in the outpatient setting according to National Comprehensive Cancer Network guidelines.

**Methods:** Eligible patients include adult chemotherapy patients with an emergency department visit or hospital admission for fever, neutropenia or sepsis within 30 days of receiving chemotherapy. These admissions will be identified utilizing ICD-10 diagnosis codes. Chemotherapy must be received at one of the ambulatory oncology clinics between October 2015 and June 2018. Data collected will include age, gender, ethnicity, cancer type, chemotherapy regimen, days between chemotherapy regimen and admission, overall infection risk, overall febrile neutropenia risk, prophylaxis medication regimen, and clinical criteria at presentation. The primary outcome will be incidence of outpatient chemotherapy patients on appropriate prophylaxis medication regimens admitted to the emergency department or hospital for fever, neutropenia, or sepsis. Secondary outcomes include incidence of fever, neutropenia, or sepsis stratified by cancer type; incidence of fever, neutropenia, or sepsis stratified by chemotherapy regimen; percentage of emergency department visits versus hospital admissions; length of stay; curative versus palliative intent of chemotherapy.

**Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Recognize potential and serious complications of chemotherapy that can lead to hospitalization  
Identify evidence-based guidelines that can be utilized to assess appropriate antimicrobial prophylaxis in oncology patients

**Self Assessment Questions:**

Which of the following is a serious, life-threatening complication of chemotherapy?

- A Pain
- B: Sepsis
- C: Nausea
- D: Temperature of 100.0°F

What National Comprehensive Cancer Network Supportive Care guidelines should be utilized when assessing if an oncology patient is receiving appropriate antimicrobial prophylaxis?

- A Cancer-Related Fatigue
- B Management of Immuno-Related Toxicities
- C Prevention and Treatment of Cancer-Related Infections
- D Antiemesis

Q1 Answer: B        Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF VANCOMYCIN DURATION ON RISK OF ACUTE KIDNEY INJURY IN VETERANS TREATED FOR PNEUMONIA WITH CONCOMITANT EXTENDED-INFUSION PIPERACILLIN/TAZOBACTAM

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**Purpose:** Concomitant use of piperacillin-tazobactam (PT) and vancomycin frequently occurs in hospitalized patients as these antibiotics have a complementary spectrum of activity against methicillin resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa*. However, increased incidence of acute kidney injury (AKI) has been reported with combination vancomycin and PT therapy compared to vancomycin use with other beta-lactam antibiotics or alone. At present, no studies have evaluated the impact of early discontinuation of vancomycin on the incidence of AKI when used in conjunction with PT. Our study aims to determine the incidence of AKI in veterans with pneumonia on concomitant PT and vancomycin when vancomycin is discontinued within 120 hours of initiation (short-course vancomycin group) compared to vancomycin discontinuation after 120 hours (long-course vancomycin group).

**Methods:** A retrospective chart review will be performed of veterans  $\geq 18$  years old admitted to the Jesse Brown Veterans Affairs Medical Center from April 1st, 2011 to March 31st, 2018. Subjects prescribed PT for 120 hours or longer with at least one dose of vancomycin will be included. Incidence of AKI will be compared between the short-course vancomycin group and the long-course vancomycin group. Secondary outcomes of in-hospital mortality, 30-day mortality and hospital length of stay will also be assessed. Finally, subgroup analysis will be performed in various groups at high-risk of AKI.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the evidence supporting an association between acute kidney injury and the use of concomitant vancomycin and piperacillin-tazobactam.

Discuss the role of MRSA nasal swabs in directing treatment decisions for hospital-acquired pneumonia.

### Self Assessment Questions:

Concomitant use of piperacillin-tazobactam (PT) and vancomycin:

- A: Has been associated with an increased risk of acute kidney injury
- B: Provides activity against methicillin-resistant *Staphylococcus aureus*
- C: Is used for empiric treatment of hospital-acquired pneumonia.
- D: Both A and C.

Which of the following is true regarding MRSA nasal swabs?

- A: They have poor predictive value for MRSA pneumonia.
- B: They may allow for earlier discontinuation of vancomycin in empiric
- C: They are not practical to obtain in most patients.
- D: Results are often not available before microbiologic culture finaliza

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## NALOXONE UTILIZATION BY FIRST RESPONDERS, EMERGENCY MEDICAL SERVICES, AND EMERGENCY DEPARTMENT PERSONNEL IN OPIOID OVERDOSE PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT

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**Purpose:**

According to the United States Centers for Disease Control and Prevention and the World Health Organization (WHO), the drug overdose mortality rate nearly tripled from 1999 to 2014. The 2017 WHO World Drug Report revealed record-breaking levels of drug-related deaths occurring in North America in 2015. An opioid antagonist, naloxone, can be administered out-of-hospital by laypeople, first responders, or Emergency Medical Services (EMS); however, dosing varies widely. This study aims to describe naloxone utilization in patient presenting to the emergency department (ED) over a six-month period at a community hospital and identify potential for increased naloxone prescribing at ED discharge.

**Methods:**

This single-center, retrospective chart review was approved by the Institutional Review Board. Patients were identified through reports containing naloxone dispensed from ED Automated Medication Dispensing Machines. Inclusion criteria were age 18 years or older, primary diagnosis of opioid overdose, and naloxone administered by Illinois EMS Region 1, a first responder, or ED personnel between February 22 and July 22, 2018. Exclusion criteria were co-ingestion of a non-opioid, failed response to naloxone, continuous naloxone infusion, and prison inmate status. Medical records were abstracted for age, gender, overdose-inducing substances, services administering naloxone routes and doses administered, sedative doses administered, disposition, and prescriptions for naloxone provided at discharge. The primary endpoints are the average total dose of naloxone administered and the proportion of patients who received a prescription for naloxone at discharge. Secondary endpoints included average naloxone dose administered by EMS or first responders versus ED personnel, proportion of patients receiving a sedative medication after naloxone administration, and proportion of patients who left against medical advice.

**Results/Conclusions:**

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe barriers to patients receiving and/or filling naloxone prescriptions

Recall recommendations for initial naloxone dosing in the setting of opioid overdose

### Self Assessment Questions:

Which of the following is a barrier to a patient receiving and/or filling a prescription for naloxone?

- A: Very few states have standing orders for pharmacies to dispense
- B: Most states with standing naloxone dispensing protocols require d
- C: No additional training is required for registered pharmacists who di
- D: No time is required to train patients on use of the naloxone device

The acceptable initial naloxone dose and route of administration for opioid overdose is

- A: 0.4 mg intravenous
- B: 2 mg intravenous
- C: 2 mg intramuscular
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## USE OF A STUDENT-DRIVEN CENTRALIZED SERVICE TO IMPROVE MEDICATION ADHERENCE RATES

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**Purpose:** For many chronic disease states, a lack of adherence can lead to worsening of the associated condition, increased morbidity and mortality, and increased overall healthcare spending. Additionally, adherence is one of the factors affecting reimbursement rates from the Center for Medicare and Medicaid Services (CMS) and commercial payers. CMS provides Star Ratings based on both the overall and individual scores that represent quality and performance, with higher ratings being associated with higher rates of reimbursement. As such, there is both a patient care and financial incentive for a healthcare network to improve medication adherence rates. The objective of this study is to evaluate the impact of a student-driven centralized adherence call service on patient care, adherence rates, star ratings, reimbursement, and pharmacist workflow. **Methods:** A prospective study will determine the impact of a student-driven adherence call service by pharmacy students on ambulatory care rotations with Community Health Network. Patients are included in the study if they are identified by payers as being overdue for a refill on a medication measured by the CMS Star Ratings system (i.e. hypertension, diabetes, and statin medications). Students will make calls from patient lists provided weekly by payers, tracking their outreach and number of interventions made to show the impact on patient care. They will also track the hours made making calls. Adherence rates are generated by payers and are shared with the network. These rates as well as the final Star Ratings will be compared and matched from the year prior to initiation of call service to the months after the initiation of the service. **Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the importance of medication adherence and how it relates to Medicare Star Ratings

Discuss how a student-driven service can be implemented to improve adherence rates and Star Ratings

### Self Assessment Questions:

Non-adherence to prescribed medications has been associated with which of the following:

- A Improved quality of life
- B: Poor clinical outcomes
- C: Decreased healthcare utilization
- D: Cost savings

Which of the following medication classes is counted toward CMS Star Ratings for adherence?

- A Thiazide diuretics
- B Anti-epileptics
- C Statins
- D Inhaled steroids

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTING A PHARMACIST-LED BENZODIAZEPINE DEPRESCRIBING PROTOCOL IN AN OUTPATIENT PRIMARY CARE CLINIC

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### PURPOSE:

Benzodiazepines (BZDs) have high potential for abuse and dependence and have notable consequences with long-term use. Data show that BZD use in the United States is increasing, and a majority of BZD prescriptions are written by primary care providers. The investigators have developed a provider-initiated benzodiazepine deprescribing protocol which allows pharmacists embedded in outpatient primary care clinics to taper BZDs and monitor for withdrawal.

### METHODS:

The objective of this study is to develop and implement a protocol which will be used to aid in benzodiazepine deprescribing. In order to describe the characteristics of the population to which the protocol will be applied a sample of 100 patients was randomly selected from those currently receiving a BZD prescription from three outpatient primary care clinics in the Indiana University Health Southern Indiana Physicians (IUHSIP) network. Patient records were reviewed by the investigator(s) for the following data: age, gender, alcohol use, indication for BZD, BZD(s) used, dose(s), duration of use, and history of falls or impairment. Upon approval of the protocol by IUHSIP providers, patients can be referred for the protocol and will meet with a clinical pharmacist to guide BZD deprescribing. Patients' current BZD therapy will be converted to an equivalent diazepam or clonazepam prescription. Doses will be reduced over several months and will be based on patient response to tapering. BZD withdrawal symptoms will be assessed using a modified Clinical Institute Withdrawal Assessment for Benzodiazepines (CIWA-B) screening tool. Recommendations for adjunctive medications will be made to the referring provider to minimize withdrawal symptoms.

### RESULTS & CONCLUSIONS:

Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference in 2019.

### Learning Objectives:

Discuss appropriate use of benzodiazepines and clinical consequences associated with use outside of those populations.

Identify monitoring parameters and clinical screening tools used to monitor patients at risk for benzodiazepine withdrawal.

### Self Assessment Questions:

In which of the following patients would the continued use of a benzodiazepine be most inappropriate?

- A 21 yo F with recent onset of panic attacks
- B: 45 yo M whose outpatient prescription fill history includes regular p
- C: 71 yo F with diagnosis of generalized anxiety disorder
- D: B and C

The Clinical Institute Withdrawal Assessment for Benzodiazepines (CIWA-B) screening tool includes which of the following monitoring parameters?

- A Oxygen saturation
- B Basic metabolic panel
- C Heart rate
- D Liver function tests

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## FIXED-DOSE VERSUS WEIGHT-BASED 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE DOSING FOR REVERSAL OF WARFARIN-RELATED BLEEDING

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### Purpose:

Four-factor prothrombin complex concentrate (4F-PCC) is used for the reversal of warfarin in adult patients with acute major bleeding. Thromboembolic complications are a risk with 4F-PCC administration and optimal dosing of 4F-PCC is unclear. Recent studies have investigated the safety and efficacy of fixed doses of 4F-PCC for the reversal of warfarin. In September 2018, Bronson Healthcare Group implemented a fixed-dose 4F-PCC protocol for the reversal of severe warfarin-related bleeding. The purpose of this study is to analyze the impact on safety and efficacy of the implementation of a fixed-dose 4F-PCC protocol for reversal of severe warfarin-related bleeding.

### Methods:

Data will be collected retrospectively from an existing electronic medical record report. The study will include patients aged 18 years old or greater who receive 4F-PCC for reversal of warfarin-related bleeding during the study period (January 1, 2018 to March 31, 2019). The study group will encompass patients included from September 4, 2018 to March 31, 2019, after the fixed-dose protocol's implementation; the comparator group will consist of patients included in the study from January 1, 2018 to September 3, 2018, before the fixed-dose protocol's implementation. Patients receiving 4F-PCC for an indication other than the reversal of warfarin-related bleeding will be excluded. The primary outcome for this study is the percentage of patients achieving an International Normalized Ratio (INR) value less than 1.7 after initial dose of 4F-PCC. Secondary outcomes include all-cause mortality at 30 days, thrombotic events up to 30 days after administration of 4F-PCC, hematoma expansion (if intracerebral hemorrhage), discharge disposition, additional doses of 4F-PCC administered, concomitant use of intravenous vitamin K, and cost per patient of 4F-PCC doses given.

### Results/Conclusions:

Data collection and analysis are in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recall the differences between standard weight-based dosing and low, fixed-dosing of 4F-PCC for the reversal of warfarin-related bleeding.

Recognize medications that should be administered concomitantly with 4F-PCC for reversal of warfarin-related bleeding in order to maintain anticoagulation reversal once the effects of 4F-PCC have diminished.

### Self Assessment Questions:

Which of the following patient factors is required to calculate the weight-based dose of 4F-PCC for reversal of warfarin-related bleeding?

- A: Site of bleed
- B: Patient's INR
- C: Platelet count
- D: Most recent warfarin dose

Which of the following should be administered concomitantly with 4F-PCC for reversal of warfarin-related bleeding in order to maintain anticoagulation reversal once the effects of 4F-PCC have diminished?

- A: Fresh frozen plasma
- B: Protamine sulfate
- C: Vitamin K (phytonadione)
- D: Desmopressin

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING THE FEASIBILITY OF A STATEWIDE DRUG SHORTAGE RESOURCE

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Drug shortages significantly impact patient care and safety. Current resources of new, ongoing, and resolved drug shortages include databases updated by the United States Food and Drug Administration and the American Society of Health-System Pharmacists. These resources include affected products, therapeutic alternatives, and guidelines for drug shortage management. While these resources may be used in some capacity, institutions report challenges with obtaining real-time data, availability of actual product that could be shared, and coordinating information between resources. Because drug shortages have considerable implications on quality of care, medication safety, clinical outcomes, ethics, and financial burden, there is a need for some type of organized effort to better manage drug shortages. This study will be completed in three main phases: (1) preliminary qualitative interviews (2) statewide surveys, and (3) platform implementation. Hospitals will be contacted based on the following demographic information: hospital name, type, setting, critical access designation, religious affiliation, bed number, not-for-profit versus for-profit, trauma designation, teaching designation, and affiliation within a larger health-system. Qualitative interviews will primarily investigate institutions' experiences with drug shortages, approaches to drug shortages, current resources, and interest in a statewide resource. This information will be digitally transcribed to determine the content for the statewide surveys, which will be sent out to all hospitals in the state of Michigan (except those meeting exclusion criteria). Finally, the survey responses will help guide the creation of a statewide drug shortage platform. Preliminary results from the qualitative interviews and survey questions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss methods and challenges institutions are facing related to drug shortage management

Discuss considerations for development of a statewide resource

### Self Assessment Questions:

Which of the following may be a cause of a drug shortage?

- A: Raw material surplus
- B: Manufacturing difficulties
- C: Expedited shipping methods
- D: Increases in hospital expenditure

What could be a potential barrier to creating a statewide drug shortage resource?

- A: User participation
- B: Drug Supply Chain Security Act (DSCSA)
- C: Cost
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF UNPLANNED 30-DAY EMERGENCY DEPARTMENT VISITS AND HOSPITAL READMISSIONS OF POST-CHEMOTHERAPY TREATED PATIENTS IN A COMMUNITY TEACHING HOSPITAL

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**Purpose:** Under the recently developed claims-based outcome measure that evaluates the 30-Day Risk-Standardized Admission Rate (RSAR) and Risk-Standardized ED visit Rate (RSEDR) for chemotherapy patients, the Centers for Medicare & Medicaid Services (CMS) will have the ability to deny claims as these readmissions and ED visits may imply poor clinical decision making or quality of care. Thus, it is important for us to identify potentially preventable factors and propose possible strategies to mitigate them in the outpatient departments of a community teaching hospital.

**Method:** The electronic medical records of patients treated with chemotherapy, covered by Medicare that have had an unplanned 30-day readmission or ED visit from index outpatient chemotherapy between June 2017 and June 2018 will be reviewed. The following data will be collected: patient specific factors (age, gender, palliative, and hospice status), cancer specific factors (diagnosis and stage of disease) chemotherapy received (name, time from administration until event), measures taken before the actual readmission or ED visit (phone calls to clinic, appropriateness of response), readmission related data (length of stay, primary oncologist consult), reason for ED visit or readmission (anemia, dehydration, diarrhea, emesis, fever, nausea, neutropenia, pain, pneumonia, sepsis, or other), and financial information (total cost and total charge). Data will be analyzed using descriptive statistics and logistic regression to identify the most common factors of unplanned 30-day readmissions and ED visits.

**Results:** Pending

**Conclusion:** Pending

### Learning Objectives:

Explain the new CMS quality measure of the unplanned 30-day emergency department (ED) visits/ hospital re-admissions (events) in cancer patients after receiving chemotherapy and why it is important  
Identify the most common causes of these unplanned events in a community teaching hospital setting

### Self Assessment Questions:

Which of the following reasons for admissions will be considered as potentially preventable causes of unplanned 30-day ED visits/ hospital readmissions in cancer patient receiving chemotherapy by CMS

- A Bone fracture, constipation, dehydration, nausea
- B: Pain, emesis, thrombocytopenia, neutropenia
- C: Anemia, dehydration, diarrhea, emesis
- D: Nausea, emesis, cardiac arrest, anemia

Which of the following will be considered as qualifying events of unplanned 30-day ED visits/ hospital readmissions for cancer patients receiving chemotherapy due to potentially preventable causes of

- A The hospital admission due to sepsis 25 days after patient receive
- B The hospital admission due to sepsis 2 days after patient being dis
- C The hospital admission for bone marrow transplant for a leukemia
- D The hospital admission due to fatigue/ anemia 25 days after patier

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF LABORATORY CESSATION OF EXTENDED-SPECTRUM BETA-LACTAMASE (ESBL) REPORTING ON MINIMUM INHIBITORY CONCENTRATION (MIC) DISTRIBUTION TRENDS AND ASSOCIATED CLINICAL OUTCOMES

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**Purpose:** Extended-spectrum beta-lactamase- (ESBL) Enterobacteriaceae infections are considered a global health threat. Given the higher mortality rates associated with this type of resistance, ESBL confirmator testing was routinely done historically based on the organism's minimum inhibitory concentration (MIC) distribution and susceptibility profile.

However, the Clinical and Laboratory Standards Institute (CLSI) recommended to lower the MIC breakpoints of various beta-lactams to improve detection of resistance among Enterobacteriaceae. Per CLSI, routine ESBL screening was not warranted as appropriate treatment decisions can be determined through MICs, allowing for improved laboratory workflow efficiency by eliminating the additional confirmatory testing.

In June 2015, our institution applied the new breakpoints to align with CLSI's recommendations. These changes can influence antimicrobial stewardship outcomes. Increased reporting of resistant organisms may lead to higher utilization of broad-spectrum antimicrobials, which may lead to a shift in the MIC distribution. Providers may choose suboptimal therapy if relying solely on susceptibility interpretation. This study assesses the impact on the MIC distribution of beta-lactams, prescribing trends, and associated clinical outcomes pre- and post- implementation of CLSI recommendations on ESBL testing.

### Methods:

This is a retrospective study including adult inpatients with positive blood cultures for *Escherichia coli*, *Klebsiella pneumoniae*, *K. oxytoca*, or *Proteus mirabilis* from June 2012 to June 2018. The primary outcome is MIC distribution of ceftriaxone, ceftazidime, cefepime, piperacillin/tazobactam, fluoroquinolones, and carbapenems. Secondary outcomes include appropriateness of antimicrobial therapy, documented microbiological clearance, 30-day all-cause mortality rate and source control, if applicable. Descriptive statistics will be used to analyze the data. Paired t-test or Mann-Whitney U test will be used for continuous data, as appropriate. Nominal data will be analyzed with Chi-square test or Fisher's exact test, as appropriate.

### Results and Conclusions:

Data collection and analysis are ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize treatment options for ESBL

Discuss potential impacts from laboratory cessation of ESBL reporting

### Self Assessment Questions:

What is the standard of care for treating ESBL?

- A 3rd generation cephalosporin
- B: Carbapenem
- C: Piperacillin/Tazobactam
- D: Vancomycin

What are potential downstream effects from lack of confirmatory testing for ESBL?

- A Increased utilization of broad spectrum antibiotics
- B Higher MIC distribution among certain antibiotics
- C Inappropriate antimicrobial therapy
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## AN ORGANIZATIONAL APPROACH TO INCREASING INTERNAL PRESCRIPTION CAPTURE WITHIN HEALTH SYSTEM CLINICS

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### Purpose:

The purpose of this study is to develop, implement, and measure strategies for increasing internal prescription capture within health system clinics

### Methods:

A proposal for an organizational initiative to enhance internal prescription capture was presented to the CEO and other senior leaders to generate support. A steering committee was formed with representation from physician leaders, clinic operations, finance, pharmacy, marketing, and pharmacy benefit management partners. The committee provided guidance on a global marketing strategy to advertise the organization's pharmacies and drive referral for clinic patients. A variety of marketing messaging and materials were developed and implemented in partnership with the marketing department to promote pharmacy services to internal and external stakeholders. The investigator worked with a pharmacy analyst to analyze prescription capture rate, prescription volume, and the potential financial impact of capturing additional prescriptions for a given clinic. Written prescription data from the EMR were combined with dispensed prescription data from the outpatient pharmacy dispensing software to complete the analysis. The steering committee utilized this information to select pilot clinics across specialty and primary care services. Two task forces were formed, one specialty and one primary care, consisting of clinic and pharmacy leadership to determine strategies to drive prescription capture within the pilot clinics. Education, training and workflows were developed and implemented for front-line clinic staff (including nurses and medical assistants) to refer patients to internal pharmacies in three specialty clinics and two urgent care clinics. The impact of these interventions on prescription capture, patient capture, as well as the volume of outside prescriptions transferred as a result of patient capture was assessed.

### Results and Conclusions:

To be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Review strategies that can be implemented to enhance patient referral to internal pharmacies

Describe strategies for marketing organizational pharmacies to internal and external stakeholders

### Self Assessment Questions:

Which of the following are strategies that can be utilized to improve capture rate in clinics?

- A Front line staff scripting
- B: Educational sessions for internal stakeholders
- C: Marketing and promotional materials
- D: All of the above

Which of the following is true regarding the development of marketing strategies for internal and external stakeholders?

- A Strategies for messaging to stakeholders should focus on cost, cost
- B Marketing methods should focus on the time and place where a patient
- C Identification of what is most important to the audience and tailor in
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF A PHARMACIST-LED INTERDISCIPLINARY DIETARY SODIUM EDUCATION INTERVENTION ON BLOOD PRESSURE, SODIUM KNOWLEDGE, AND SELF-EFFICACY IN PATIENTS WITH STAGE 3 AND 4 CHRONIC KIDNEY DISEASE

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Hypertension is both a cause and a result of chronic kidney disease (CKD). Excessive sodium intake may contribute to suboptimal blood pressure control and lower renin-angiotensin-aldosterone system (RAAS) inhibitor efficacy. However, many patients do not receive education on the link between dietary sodium restriction and medication efficacy and any education received may be fragmented or provide mixed messages. A collaborative, interdisciplinary intervention delivered by a dietician and clinical pharmacist is anticipated to reinforce the link between dietary sodium restriction and medication efficacy. This study will evaluate a pharmacist-led, interdisciplinary intervention on blood pressure, sodium knowledge, and self-efficacy.

This prospective cohort study aims to include thirty adult patients receiving care in a multidisciplinary chronic kidney disease clinic at a large, academic medical center. It has been approved by our institutional review board. Eligibility criteria include Stage 3 or 4 CKD, hypertension with systolic blood pressure of 130-150 mmHg, and current RAAS inhibitor and/or diuretic use. Patients unable to manage or self-administer their own medications, read or understand English, unwilling/unable to utilize an electronic patient health portal (ePHP), or who are not responsible for making meal/sodium choices will be excluded. Demographic information, laboratory data, blood pressure, and responses to validated instruments including the Newest Vital Sign, Patient-Reported Outcomes Measurement Information System, Medication Adherence Self-Efficacy Scale, and Short Sodium Knowledge Survey will be collected. Survey instruments will be administered on Study Day 1, followed by sodium education. Additional multimedia sodium education will be provided biweekly for twelve weeks using the ePHP. Survey instruments will be re-administered at study end. Impact of the educational intervention will be assessed by change in blood pressure, sodium knowledge scores, and self-efficacy. Outcomes will undergo bivariate analysis followed by paired sample t-test and Chi-squared tests for intraparticipant comparisons. Preliminary results will be presented at the Great Lakes Pharmacy Residency

### Learning Objectives:

State the current dietary sodium recommendations for lowering blood pressure in patients with chronic kidney disease.

Describe the impact of excessive sodium intake on renin-angiotensin-aldosterone system (RAAS) inhibitor efficacy.

### Self Assessment Questions:

According to the Kidney Disease Improving Global Outcomes (KDIGO) guideline, what is the recommended daily amount of dietary sodium for CKD patients?

- A Less than 1.5 grams/day
- B: Less than 2 grams/day
- C: Less than 2.3 grams/day
- D: Less than 3.4 grams/day

Excessive dietary sodium intake can decrease the efficacy of RAAS inhibitors by:

- A Lowering tissue ACE production
- B Lowering the rise in angiotensin I
- C Inducing inflammation
- D Decreasing intracerebral RAAS activation

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DESIGN, IMPLEMENTATION, AND ASSESSMENT OF AN ADVERSE EVENT MONITORING PROGRAM WITHIN A SELF-ADMINISTERED PRESCRIPTION DRUG PLAN

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**PURPOSE:** Although employer-sponsored prescription drug plans are responsible for the management and oversight of pharmacy benefit utilization, a plan's ability to prospectively monitor and track clinical outcomes from prescription drug use is typically limited. Proactively monitoring adverse event metrics in near real-time can potentially help plan administrators support the rational and cost-effective use of drugs in the plan's member population thereby improving health outcomes. This proof-of-concept pilot program study aims to conceptualize, develop, and implement an adverse event monitoring program with prescription drug claims, medical claims, and coverage requests at the University of Michigan Prescription Drug Plan (UM PDP). **METHODS:** We will evaluate the feasibility of utilizing health plan data for identifying potential adverse events and determine a framework for storing, tracking, and presenting results through a literature search, environmental scan, and assessment of available organization resources. Adverse event metrics will be identified for inclusion from internal databases following a review of various sources, including event surveillance systems implemented at other organizations, Michigan Medicine directives and initiatives, National Quality Forum measures, journal articles, and input from health system providers, pharmacists, and other stakeholders. A dashboard template will be developed to trend and visually display imported data for identified adverse event metrics. Data analysis will be completed following implementation of the program and a final report will be written with comprehensive results and conclusions. **PRELIMINARY RESULTS/CONCLUSIONS:** Various adverse event metrics were determined and grouped into five major buckets: Drug-Drug Interactions Adherence, Overutilization, Prior Authorizations, and Beers Criteria. Standard Operating Procedures for the program were developed in a Policies & Procedures document for UM PDP. A dashboard template was created and data for identified metrics were imported. Data analysis is ongoing and comprehensive results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the purpose of an adverse event monitoring program within a prescription drug plan

Identify different adverse event metrics which may be measured using health plan claims data

### Self Assessment Questions:

Which of the following is a reason for monitoring adverse event metrics within a prescription drug plan?

- A To prevent members from obtaining prescribed medications
- B To identify opportunities for cost-savings to the plan
- C To support the rational use of prescription drugs and track improve
- D To predict future adverse events in the plan's member population

Pharmacy claims data may be used to potentially identify which of the following?

- A Drug interactions with OTC supplements
- B Dispensing error rates
- C Drug-drug interactions via HCPCS codes
- D Potentially inappropriate prescribing patterns

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE EFFECT OF ROFLUMILAST VERSUS CHRONIC AZITHROMYCIN ON CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN A VETERAN POPULATION

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**Purpose:** Chronic Obstructive Pulmonary Disease (COPD) is a highly prevalent, preventable, and progressive respiratory disease associated with significant morbidity and mortality. Goals of management include symptom control and exacerbation risk reduction as higher frequency and severity of exacerbations are correlated with poorer prognosis. In symptomatic patients at high risk for exacerbations despite optimal inhaled therapy, current guidelines suggest the addition of roflumilast or long-term azithromycin. In randomized clinical trials, both agents have shown efficacy in reducing moderate to severe COPD exacerbations. However, risk-benefit profiles must be considered as both agents had higher incidences of reported adverse events when compared to placebo. As no previous trials have studied the comparative effectiveness of these agents, the purpose of this study is to evaluate and compare healthcare utilization associated with COPD exacerbations between patients treated with roflumilast versus chronic azithromycin at Jesse Brown VA Medical Center (JBVAMC).

**Methods:** This study is a retrospective, electronic chart review of patients with COPD who were newly initiated on roflumilast or chronic azithromycin at JBVAMC between March 1, 2011 and October 1, 2017. The primary endpoint includes the composite number of Emergency Department (ED), Urgent Care (UC), Acute Care (AC) visits and/or hospitalizations associated with COPD exacerbations 1 year before and after roflumilast versus chronic azithromycin treatment in patients with > 75% medication adherence. Secondary endpoints include time to first exacerbation, number of ED, UC, and/or AC visits associated with COPD exacerbations, number of hospitalizations associated with COPD exacerbations, number of oral or parenteral steroid prescriptions associated with COPD exacerbations, number of antibiotic prescriptions associated with COPD exacerbations, changes in COPD therapy after roflumilast or chronic azithromycin initiation, rates and reasons for discontinuation, reported adverse drug reactions, and all-cause mortality

**Results/Conclusions:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify appropriate COPD medication regimens based on 2019 GOLD guidelines.

Discuss the indications and use of roflumilast and chronic macrolides in patients with COPD.

### Self Assessment Questions:

Current 2019 GOLD guidelines recommend the use of roflumilast in patients with which of the following characteristics:

- A Chronic bronchitis, FEV1 > 50%, on LABA/LAMA therapy
- B Chronic bronchitis, FEV1 < 50%, on ICS/LABA/LAMA therapy
- C Former smoker, FEV1 < 50%, on ICS/LABA therapy
- D Former smoker, FEV1 > 50%, on ICS/LABA/LAMA therapy

A patient presents with persistent exacerbations despite optimized inhaled therapy, daily adherence, and smoking cessation. The provider would like to initiate chronic azithromycin. Which patient fact

- A Listed allergy to penicillin
- B Former smoker status
- C QTc = 510
- D No previous trial of roflumilast

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INTERVENTIONS TO IMPROVE WORK EFFICACY AND DECREASE BURNOUT OF AMBULATORY CARE PHARMACISTS

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### Purpose:

As healthcare moves towards a quality based system and career burnout is a growing concern for employers, quality improvement becomes essential to ensure a high level of productivity with appropriate work-life balance. Provider burnout in primary care has been associated with medical errors, absenteeism, decrease in quality of patient care, and poor patient satisfaction. In current literature, evaluation of workflow is mainly completed with observation and interviews. These methods provide detailed information, but have limitations due to their time-consuming nature, human error, and bias. The objective of this study is to identify interventions to support ambulatory care pharmacists' (ACP) workflow and productivity through a survey, electronic medical record (EMR) system usage data, and value stream mapping, in order to improve patient care and decrease burnout.

### Methods:

A baseline survey will be provided to Community Health Network primary care ACP to assess personal perceptions of productivity, work-life balance, and burnout. Questions are rated using a 5-point Likert scale, multiple choice, or open-ended responses. One month of system usage data from a standardized EMR report will be used to evaluate baseline ACP workflow and time spent in the EMR to complete tasks. ACP will be provided their baseline system usage data and the average system usage data of their peers to encourage self-reflection and improvement of practice. ACP will be randomly selected for direct observation during a clinic day in order to create a current-state value stream map. The value stream mapping of ACP daily activities, survey results, and baseline system usage data will be utilized to identify interventions. Pharmacists in specialty clinics, pharmacy residents, and study authors will be excluded from evaluation. Intervention efficacy will be assessed through follow-up surveys and system usage data change from baseline.

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify outcomes associated with provider burnout.

Describe methods used in literature to evaluate workflow in the healthcare setting.

### Self Assessment Questions:

Provider burnout in primary care has been associated with which of the following:

- A Decrease in referrals to specialists
- B: Decrease in career advancement
- C: Increase in medical errors
- D: Increase in patient turnover

Which of the following is a limitation to direct observation for workflow analysis?

- A Detailed information
- B Human accuracy
- C Poor usability
- D Time consuming nature

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT OF BIOLOGIC UTILIZATION IN VETERANS WITH PSORIASIS OR PSORIATIC ARTHRITIS

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Purpose: Biologic treatments for psoriasis and psoriatic arthritis have rapidly changed in recent years. These therapies are associated with difficult adherence and a large financial burden. Furthermore, these issues greatly impact care and costs when switching between biologics. Due to the high starting and maintenance costs, undefined treatment goals, time to switch biologics, and poor adherence, there is a need to assess the proper utilization of biologic medications. The objective of this study is to assess the utilization and prescribing patterns of biologic therapies in the treatment of psoriasis and psoriatic arthritis at a Veterans Affairs medical center.

Methods: This quality improvement retrospective chart review assessed biologic use for psoriasis and psoriatic arthritis in patients 18 years or older prescribed adalimumab, etanercept, certolizumab, infliximab, ixekizumab, secukinumab, or ustekinumab from September 1, 2017 to September 1, 2018 at a Veterans Affairs medical center. Patients who received medical care for psoriasis or psoriatic arthritis outside of the medical center were excluded. The electronic medical record was used to obtain all data including: demographics, indication, biologic medication, consistency of dose with package insert, start date and duration of the active and most recently discontinued biologic medications, reason for switching medications, systemic medication use monitoring parameters for tuberculosis and Hepatitis B and C, body surface area involvement, presence of specific location of skin involvement, and presence of various adverse prognostic factors for psoriatic arthritis. Medication adherence was assessed using the proportion of days covered (PDC). The findings will be identified, trended, and have the potential to lead to positive changes in clinic flow, prescribing/monitoring behavior, and/or pharmacist involvement.

Results and conclusion: Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the treatment guidelines for psoriasis and psoriatic arthritis.

Identify when biologic therapy is appropriate for a patient with psoriasis or psoriatic arthritis.

### Self Assessment Questions:

According to the British Association of Dermatologists treatment guidelines, which of the following is the most appropriate first line biologic treatment option for a patient with psoriasis?

- A Ixekizumab
- B: Secukinumab
- C: Etanercept
- D: Infliximab

Which of the following is not a contraindication or concern for using biologics?

- A Active Tuberculosis Infection
- B Hepatitis C
- C Chronic Kidney Disease
- D Heart Failure

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF THE DIAGNOSIS AND MANAGEMENT OF URINARY TRACT INFECTIONS AT UNIVERSITY OF KENTUCKY HEALTHCARE

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**Purpose:** Urinary tract infections (UTIs) are among the most common bacterial infections. However, UTIs are also known to be prone to misdiagnosis and mismanagement. Asymptomatic bacteriuria is defined as the presence of bacteria in the urine with no urinary symptoms present in the patient. Per IDSA guidelines, patients with asymptomatic bacteriuria should not receive antibiotic treatment unless they are pregnant or have a scheduled genitourinary procedure. However, it's estimated that as many as 41-74.5% of patients treated for UTIs actually have asymptomatic bacteriuria. Inappropriate antibiotic selection and treatment duration are other frequent sources of UTI mismanagement. The purpose of this study was to evaluate the diagnosis and management of UTIs at our institution prior to the implementation of an institutional guideline.

**Methods:** This retrospective, IRB-approved chart review included patients who were treated for urinary tract infections at University of Kentucky HealthCare from September to November 2017. Included patients were at least 18 years of age, had a urinalysis ordered, and received at least one dose of antibiotics for which "urinary tract infection" was the selected indication at order entry. Patients were excluded if antibiotics were not for a UTI or if they were diagnosed with a UTI at an outside hospital. The primary outcome of this study is the percent of patients with appropriate antibiotic use. Secondary outcomes include percent of patients whose UA was not indicated, 90-day mortality, and 90-day readmission rate.

**Results/Discussion:** Data collection and analysis are ongoing. Preliminary results and conclusions will be presented at the 2019 Great Lakes Residency Conference.

### Learning Objectives:

Define asymptomatic bacteriuria and discuss when it warrants antibiotic treatment.

Identify common sources of misdiagnosis/mismanagement of urinary tract infections.

### Self Assessment Questions:

Which of the following patients should receive antibiotic treatment for their asymptomatic bacteriuria?

- A: A 29-year old female who is 30 weeks pregnant
- B: A 21-year old male who recently completed treatment for endocarditis
- C: A 43-year old female with reported history of urinary tract infection
- D: A 33-year old female with no significant past medical history

Which of the following is a common source of urinary tract infection mismanagement?

- A: Inappropriate antibiotic duration
- B: Inability of microbiology lab to identify the bug
- C: Lack of clarity in IDSA guidelines
- D: Poor sensitivity/specificity in urinalysis kits

Q1 Answer: A      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A PHARMACIST-MANAGED TRANSITIONS OF CARE TOOL – PART 1

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The Richard L. Roudebush VA Medical Center implemented a pharmacist-based quality improvement project focused on care transitions. The pilot project showed a trend towards decreased readmissions, emergency department (ED) visit rates, and significant ambulatory care medication interventions by pharmacists. The goals of the second phase were to build upon the trend of positive outcomes and overcome barriers encountered in the pilot project through streamlining the referral process, enhancing education to staff, and expanding clinical pharmacy services.

Standard discharge roles of acute care pharmacists include a complete medication reconciliation on every patient prior to discharge. During this process, at-risk patients were identified by the pharmacist. Information was entered into a hand-off tool by the pharmacist to document concern upon referral. The ambulatory care pharmacist conducted a phone appointment to perform medication reconciliation, assess adherence, address acute concerns, and triage to determine if patients need to be seen in clinic. Phase two of this project involved identification and overcoming barriers discovered in the pilot study. Interventions included focused education for inpatient and outpatient pharmacists, better-defined referral processes, inclusion of patients receiving primary care at a community based outpatient clinics (CBOCs), and embedding referral prompts into the standard pharmacy discharge note template. Primary outcomes were overall and index 30-day readmission and ED visit rates, adverse events, and all-cause mortality. Secondary outcomes evaluated changes made to overcome barriers in the pilot study. These included percentage of overall discharges referred to the program, number of patients referred by pharmacists, number and type of medication discrepancies found, referrals back to primary care provider, follow-up within seven days post-discharge, and patients added to pharmacist panel for further management. Conclusions to be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List patient characteristics that are considered high-risk for adverse events or readmission

Identify the importance of having pharmacist involvement in transition of care programs

### Self Assessment Questions:

Which of the following patient characteristics is considered high-risk for hospital readmission?

- A: Younger age
- B: Increased number of medications
- C: Strong social support
- D: High health literacy

Which of the following is a benefit of including a pharmacist in transition of care programs?

- A: Increased readmission rates following discharge
- B: Decreased need for long-term care at discharge
- C: Increased medication discrepancies at discharge
- D: Decreased preventable adverse drug events

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## GABAPENTIN USE IN ACUTE ALCOHOL WITHDRAWAL MANAGEMENT

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**Purpose:** Benzodiazepines (BZD) are the standard treatment alcohol withdrawal syndrome (AWS). They provide effective symptomatic relief and prevent withdrawal complications. However, BZD use is complicated by unfavorable adverse effects, abuse potential, and altered pharmacokinetics in hepatic disease. As a result, other therapies such as gabapentin have been explored as alternatives to BZD therapy. This study will evaluate the impact of gabapentin on AWS outcomes.

**Methods:** Patients admitted to IU Health Methodist Hospital between January 1, 2017 and December 31, 2017 who were treated for alcohol withdrawal will be reviewed for inclusion in this retrospective cohort study. Patients with known seizure disorders and those with concurrent or outpatient use of BZD, gabapentin, pregabalin, or anti-epileptics will be excluded. All included patients will be grouped into BZD only or BZD plus gabapentin arms. The primary outcome is cumulative BZD dose while on a withdrawal protocol. Secondary outcomes will include length of stay, incidence of seizure while on the withdrawal protocol, and days to a withdrawal score of less than 2. Baseline characteristics and outcomes will be assessed using descriptive statistics including the Chi-square test for categorical variables and the Student T-test for continuous variables.

**Results/Conclusions:** Data collection is ongoing and results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the pathophysiology of alcohol use and acute alcohol withdrawal. Describe challenges with standard alcohol withdrawal management.

### Self Assessment Questions:

Which of the following mechanisms best describes the physiological changes which contribute to acute alcohol withdrawal?

- A: Abrupt decrease in GABA and NMDA stimulation
- B: Abrupt decrease in GABA stimulation and unopposed NMDA activation
- C: Abrupt increase in GABA and NMDA stimulation
- D: Abrupt decrease in NMDA stimulation and unopposed GABA activation

Which of the following is a proposed advantage of using gabapentin for alcohol withdrawal?

- A: Lack of need for dosage adjustment in organ dysfunction
- B: Cost as compared to standard therapy
- C: Less potential for adverse effects as compared to standard therapy
- D: Use of a tapering dose

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## CONCOMITANT PRESCRIBING OF OPIOIDS AND BENZODIAZEPINES AND THE RISK OF INJURY IN DOCUMENTED FALLS

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### Background

In 2012, the United States spent \$30.3 billion in direct medical costs that accounted for more than 3.2 million nonfatal fall-related injuries. Previous studies have also shown that elderly patients with a history of falls have increased morbidity and mortality. Given the overall expense and mortality associated with falls, it is important to identify modifiable risk factors outlined in clinical practice guidelines. It is clearly documented that opioids and benzodiazepines increase the risk for falls, both in the inpatient and outpatient settings. However, to our knowledge, no previous studies have assessed the combination of opioids-benzodiazepines and severity of patient falls in the inpatient setting. The purpose of this study was to investigate the impact that concomitant opioid and benzodiazepine administration has on injury in hospitalized patients who experience a fall. Secondary objectives include determining if the total number of falls-risk medications increase the risk of falling and length of stay.

### Methods:

This single-center, retrospective cohort study will evaluate inpatient adults ages 18 years and older with a reported fall at Northwestern Memorial Hospital from March 3, 2018 to September 30, 2018. Data will be collected from the Northwestern Event Tracking System and the Enterprise Data Warehouse. Patients will be categorized into 1 of 4 groups: opioid-benzodiazepine (OPD-BZD), opioid (OPD), benzodiazepine (BZD), or neither. The NDNQI Injury Falls Measure will be used to determine if an injury occurred in these patients, and they will be further subdivided into no injury, minor injury, and major injury to determine the severity of injury. Falls-risk medications will be identified using the American Geriatric Society Beers Criteria list and compared to patient's overall length of stay.

### Results/Conclusion:

Data analysis is currently being investigated. Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the literature regarding inpatient falls and medication use to determine if any gaps exist. Discuss the intrinsic and extrinsic risk factors associated with inpatient falls.

### Self Assessment Questions:

Which of the following is a NOT modifiable risk factor associated with inpatient falls?

- A: Medication use/polypharmacy
- B: Environmental hazards
- C: Elderly physiological changes
- D: Low levels of nursing care

2. Which of the following is/are true statement(s) regarding inpatient falls in hospital settings? I. The American Geriatric Society Beers Criteria list provides recommendations for falls prevention b

- A: I and IV only
- B: I, II, and IV only
- C: I, III, and IV only
- D: All of the Above

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**A RETROSPECTIVE ANALYSIS INVESTIGATING THE EFFECTIVENESS OF VARIOUS INSULIN REGIMENS ON HEMOGLOBIN A1C LOWERING IN PHARMACIST LED OUTPATIENT CLINICS IN SUBJECTS WITH TYPE 2 DIABETES MELLITUS WITHIN TH**

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**Purpose:** Insulin products are used frequently at the Hershel "Woody" Williams Veterans Affairs Medical Center (HWWVAMC) Center to provide blood glucose control for patients with type 2 diabetes mellitus. Based off the duration of action, insulin glargine is typically dosed once daily and insulin NPH is twice daily. Certain patients have been identified as candidates to receive insulin glargine twice daily to help avoid hypoglycemia, increase absorption of insulin, or to allow for more units of insulin to be given throughout the day (i.e. in patients exceeding single injections larger than syringe/pen volume). The purpose of this study is to analyze the differences between utilizing twice daily insulin glargine dosing regimen against the more traditional insulin dosing regimens of insulin glargine once daily and insulin NPH twice daily. **Methods:** A retrospective chart review to evaluate the efficacy of twice daily insulin glargine, once daily insulin glargine, and twice-daily insulin NPH will be conducted. Specific events for evaluation include: change in hgbA1c, incidence of hypoglycemia, compliance, change of average fasting blood glucose levels, and amount of insulin (in units) required for each given dosing strategy. Patients with at least two accurately timed hgbA1c values will be analyzed. **Results & Conclusions:** Results and conclusions are currently pending and will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Review guideline recommendations regarding insulin titration and converting between insulin NPH and insulin glargine  
Discuss the safety and efficacy of utilizing Insulin NPH twice daily, Insulin Glargine once daily, and Insulin Glargine twice daily in a pharmacist-led outpatient clinic

**Self Assessment Questions:**

What is one benefit of utilizing a pharmacist-led outpatient clinic for the management of type-2 diabetes?

- A Ability for quicker follow-ups, monitoring, and titration of medication
- B: Increase in the amount of burden upon physicians
- C: Decrease collaboration between pharmacists and physicians
- D: No obvious benefits are currently present

A 65-year-old patient, TY, presents to your clinic for a type-2 diabetes appointment. His goal A1c is <7%, and his A1c upon presenting to your clinic is 8.2%. He is currently taking Insulin Glargine 9

- A Leave his medication dosage the same, since he is experiencing l
- B Increase Insulin Glargine to 95 units qHS and counsel patient on n
- C Change Insulin Glargine to 45 units BID, assess tolerability of twic
- D Decrease Insulin Glargine to 80 units qHS, and start him on Saxa

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**EVALUATION OF A PHARMACY-MANAGED SMOKING CESSATION OUTPATIENT CLINIC IN SOUTHEASTERN KENTUCKY**

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**Purpose:** Smoking has been known to be linked with multiple adverse health outcomes including cardiovascular disease, chronic obstructive pulmonary disease, and various cancer types leading to a nationwide promotion for smoking cessation. Pharmacists have become critical health care providers in recent years, having to utilize their scope of practice to educate and provide medication management to patients in conjunction with the rest of the healthcare team. To aide with smoking cessation, the Kentucky Board of Pharmacy created protocols in order to extend the pharmacist's role in the community. The purpose of this study is to determine the impact of the smoking cessation clinic at Baptist Health Corbin.

**Methods:** The pharmacy-managed smoking cessation clinic utilizes the Kentucky Board of Pharmacy's approved protocol. Pharmacists within the clinic perform the five A's, along with the five R's techniques, in order to motivate the patient to quit smoking and gauge the patient's willingness to quit. The pharmacist will obtain a past medical history, assess medication history, and determine the appropriate smoking cessation regimen for the patient. Patients will set a quit date and schedule follow-up in 4 weeks to re-assess effectiveness of the regimen. Patients eligible for the clinic are those who are currently using tobacco products, referred to the clinic by providers, who have signed the collaborative care agreement. Patients are excluded if they are pregnant. A retrospective chart review of patients enrolled in the clinic from December 2018 – March 2019 will be conducted to collect demographics, appointments, medication regimens, and outcomes. Primary outcomes will compare patients who have successfully quit smoking compared to those who have not. Secondary outcomes include the change in amount of tobacco products used and the medications utilized. Study pending approval through Institutional Review Board. **Results and Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Discuss the Kentucky board of Pharmacy approved protocol for smoking cessation.  
Describe the smoking cessation pharmacy-managed outpatient clinic at Baptist Health Corbin (BHC).

**Self Assessment Questions:**

Which medication is permitted to be used based upon the Kentucky Board of Pharmacy board approved protocol?

- A Nicotine replacement therapy
- B: Chantix
- C: Bupropion SR
- D: all of the above

The pharmacy-managed smoking cessation clinic at Baptist Health Corbin includes which of the following components?

- A Patient does not need to follow-up after first clinic visit.
- B Patient will schedule follow-up appointment in 4 weeks.
- C Patient does not need to have a quit date.
- D Patient will schedule follow-up appointment in 8 weeks.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF DIGOXIN ON RIGHT VENTRICULAR FUNCTION IN PATIENTS WITH LEFT VENTRICULAR ASSIST DEVICES

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**Purpose:** Patients who develop right ventricular (RV) failure after left ventricular assist device (LVAD) implantation show increased peri-operative mortality, reduced survival to transplantation, and reduced long term survival. Inotropic agents have a theoretical benefit in patients with RV failure to help increase RV contractility. Digoxin has historically been used in heart failure for its inotropic benefits. It has shown positive effects on left ventricular hemodynamics, but less is known about its effect on RV hemodynamics. The objective of this project is to determine the impact of digoxin on late RV failure and RV hemodynamics in LVAD patients. **Methods:** This is a retrospective cohort analysis of patients implanted with LVADs (Heart Mate II, Heart Mate III, or HeartWare) from 2006-2018 that were discharged on digoxin at time of implantation. Inotrope dependent patients or those with right ventricular assist devices are excluded. Patients are assigned to one of four groups based on serum digoxin concentration (SDC): <0.5 ng/mL, 0.5-0.8 ng/mL, 0.9-1.1 ng/mL, and >1.2 ng/mL. SDC will be determined based on an area under the curve calculation of all available SDCs throughout the study period. The primary outcome is development of late onset RV failure defined as initiation of inotrope or heart failure hospitalization at least 30 days post-LVAD implantation. Secondary outcomes include newly diagnosed ventricular arrhythmias, overall mortality, and changes in RV hemodynamics or function as assessed by right heart catheterization and echocardiogram reports. Assuming a 30% incidence of late RV failure, a sample size of 112 patients per group will have 80% power to detect a significant difference in the primary outcome between groups. Data collection is ongoing with results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize complications of right ventricular failure after LVAD implantation

Explain the reasoning behind digoxin's potential benefit to prevent right ventricular failure in patients after LVAD implantation

### Self Assessment Questions:

Which of the following are associated with right ventricular failure after LVAD implantation?

- A Reduced survival to transplantation
- B: Increased risk of GI bleeds
- C: Increased peri-operative mortality
- D: Both A and C are correct

Which of the following serum digoxin concentration (SDC) ranges showed improved survival compared to placebo in the post hoc analysis of the DIG trial?

- A <0.5 ng/mL
- B 0.5-0.8 ng/mL
- C 0.9-1.1 ng/mL
- D >1.2 ng/mL

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFICACY OF KETOROLAC FOR TREATMENT OF ACUTE PAIN AMONG ELDERLY PATIENTS IN THE EMERGENCY DEPARTMENT

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**Purpose:** Acute pain is prevalent among elderly patients presenting to the emergency department (ED). Ketorolac is a commonly prescribed non-opioid analgesic used for the treatment of moderate to severe acute pain in this population. A recent study suggests that intravenous (IV) ketorolac dosages greater than 10 mg do not provide additional benefit with respect to pain relief; however, patients over the age of 65 were excluded from this evaluation. A United States Black Box warning for special populations (including age 65 and older) recommends dose reduction due to increased risk of adverse events. Despite this recommendation, dosing variability still exists among prescribers. The purpose of this study is to compare the efficacy of two dosing strategies of ketorolac in patients 65 years and older.

**Methods:** This was a retrospective cohort study of patients 65 years and older receiving a one-time IV ketorolac dose in the ED at the University of Louisville Hospital between April 2016 and January 2019. The analgesic efficacy was compared between patients receiving IV ketorolac doses of greater than 15 mg and 15 mg or less. Efficacy was measured by patient self-report using a 1-10 Likert scale, with one being no pain and 10 being severe pain. Pain scores were recorded before administration of ketorolac and 30 minutes after administration. Individuals receiving an alternative analgesic before or within 30 minutes of ketorolac and the absence of baseline or follow-up pain scores were excluded. The primary outcome was difference in pain scores before and after the administration of IV ketorolac compared between the two dosage groups. Secondary endpoints included the incidence of adverse effects, frequency of rescue analgesia and gastrointestinal medications within six hours of ketorolac administration.

**Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss issues treating acute pain in the emergency department among elderly patients

Identify appropriate treatment options for elderly patients experiencing acute pain.

### Self Assessment Questions:

Adults age 65 years and older are up to \_\_\_\_ less likely to receive treatment for acute pain than younger patients.

- A 5%
- B: 20%
- C: 40%
- D: 60%

The maximum intravenous dose of ketorolac recommended for adults 65 years and older is \_\_\_\_.

- A 10 mg
- B 15 mg
- C 30 mg
- D 60 mg

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING THE IMPACT OF PATIENT-CONTROLLED ANALGESIA IN THE CLINICAL DECISION UNIT FOR SICKLE CELL PAIN CRISIS ON LENGTH OF STAY

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**Purpose:** Patients with sickle cell disease vaso-occlusive crisis (SCD VOC) commonly seek pain management in emergency department (ED) settings if an outpatient pain management center is not readily available. However, patients and health care professionals have reported pain control may not be adequately managed in the ED setting due to a lack of consistency and standardization. Patient-controlled analgesia (PCA) is a delivery system option to improve pain management for patients with SCD VOC. At Eskenazi Health, a protocol has been implemented to allow SCD VOC patients to receive PCA pain management and standardized care in the Clinical Decision Unit (CDU), a 23-hour observation unit of the ED. The objective of this study was to evaluate the safety and efficacy of PCA therapy for SCD VOC.

**Methods:** This case-control study was a single center, retrospective chart review on all patients with a sickle cell pain diagnosis. Patients were excluded if they were less than 18 years of age, pregnant, incarcerated, or had a known or documented hypersensitivity reaction to opioids. The primary endpoint of the study was length of stay, including time spent in the CDU, ED, and inpatient unit, after implementation of PCA pain management with the new protocol compared to a historical control. Secondary endpoints included admission rate, time to first opioid dose, and time to PCA initiation compared to a historical control and amount of opioids administered (morphine milligram equivalents), pain scores post intervention, patient satisfaction scores (collected after discharge from the ED/CDU/inpatient unit), overall ED throughput time, hospital length of stay, and nursing familiarity and knowledge with the use of PCA pumps. Safety was assessed by the number of naloxone doses dispensed.

**Preliminary Results/Conclusion:** Data collection is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify pain complications associated with sickle cell disease

Discuss gaps in the literature regarding the utility of patient-controlled analgesia (PCA) for sickle cell disease vaso-occlusive crisis

### Self Assessment Questions:

Which of the following is a pain complication associated with sickle cell disease?

- A Vaso-occlusive crisis
- B: Phantom pain
- C: Migraine headaches
- D: Limb ischemia

Which of the following is lacking in current data on the use of patient-controlled analgesia therapy for sickle cell disease vaso-occlusive crisis?

- A Safety outcomes
- B Evaluation of use for pediatric patients
- C Effect on length of stay
- D Efficacy outcomes in adults

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMIZATION OF VASOPRESSIN USE BASED ON CURRENT HOSPITAL PRACTICES IN A COMMUNITY HOSPITAL SETTING

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**Purpose:** Vasopressin is FDA approved for use in vasodilatory shock and diabetes insipidus. It is often utilized off-label for various surgical indications and gastrointestinal/variceal bleeding. The primary purpose of this study is to evaluate the cost of vasopressin use based on indication and adherence to recommended dosing parameters.

Secondary outcomes include identification of cost saving measures and implementation of nursing and/or practitioner education to improve adherence to recommended vasopressin prescribing practices.

**Methods:** This study was approved by the Institutional Review Board.

This study was a single center, retrospective chart review. Patients were identified by electronic health record from February 1, 2018 to July 31, 2018. All patients 18 years of age or older who were charged for at least one vial of vasopressin during the study time were included. Any patient less than 18 years of age were excluded. Data collected included: patient demographics, indication for vasopressin use, evaluation of sequential ordering of vasopressors, number of vials of vasopressin charged to patient, number of vials of vasopressin administered to patient, and appropriateness of vasopressin dosing. Descriptive statistics were conducted on the collected data set.

**Results:** Results are based on data collected from 105 patients meeting inclusion and exclusion criteria. The primary indication for the use of vasopressin was septic shock (40%). Vasopressin was ordered as a titratable drip in 49% (n=51) of patients, and inappropriately prescribed first line in 30% of patients. This represents a minimum cost-savings of \$4,255.02 over the study period. Inconsistency in vials dispensed (average of 4 vials) and vials scanned as administered to patients (average of 3 vials) represents an average potential cost difference of \$1,129.19 per patient admission.

**Conclusion:** The preliminary results from this study show that optimizing the use of vasopressin in a community hospital setting represents an area for significant cost-savings.

### Learning Objectives:

Classify FDA approved and common off-label indications for the use of vasopressin.

Identify the role of vasopressin as defined in the 2018 Surviving Sepsis Guidelines.

### Self Assessment Questions:

Which of the following is a FDA approved indication for vasopressin?

- A Intraoperative hypotension
- B: Vasodilatory shock
- C: Gastroesophageal variceal hemorrhage
- D: Cardiogenic shock

What is the fixed dose of vasopressin for use in sepsis?

- A 0.05 U/min
- B 0.3 U/min
- C 0.9 U/min
- D 0.03 U/min

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RETROSPECTIVE REVIEW OF VANCOMYCIN USE AT A RURAL TEACHING HOSPITAL

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**Purpose:** According to the Centers for Disease Control and Prevention (CDC), one in three people are carriers of *Staphylococcus aureus*, however, only two in one hundred people carry methicillin resistant *Staphylococcus aureus* (MRSA). Patients who are admitted with severe infections or hospital acquired infections are likely to be placed on vancomycin therapy until culture results are finalized. The purpose of this study is to review the use of vancomycin in a rural teaching hospital and the corresponding microbiology results to determine if polymerase chain reaction (PCR) testing for MRSA could decrease vancomycin usage.

**Methods:** This is a single-center, retrospective study reviewing the use of vancomycin and the incidence of patients treated with vancomycin that have positive MRSA cultures. Patients 18 years of age and older will be included in the study if they received a dose of vancomycin as documented in the electronic medical record from January 1, 2017 through December 31, 2017. Exclusion criteria include patients not admitted to the hospital and those that do not receive a full dose of their maintenance regimen during their hospital course. Patients who present more than once during the timeframe will only be included once (i.e., their first visit during the time period). Data to be collected includes age, gender, reason for admission, clinical indication for vancomycin, dose of vancomycin, serum creatinine, incidence of acute kidney injury, culture results and duration of vancomycin therapy. Results will be analyzed to determine if PCR testing would be cost-effective in determining if vancomycin treatment is warranted.

**Results/Conclusion:** This study is still in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the prevalence of MRSA infections in the United States.

Explain the benefits of MRSA PCR testing over traditional microbiology results.

### Self Assessment Questions:

What percentage of patients in the United States are MRSA carriers?

- A 20%
- B: 2%
- C: 5%
- D: 10%

What is one benefit of using MRSA PCR testing in patients with suspected MRSA infections?

- A PCR testing takes 48 – 72 hours to result
- B PCR testing is more costly than conventional MRSA testing
- C PCR testing cannot be used to de-escalate antibiotics
- D PCR testing takes 24 hours to result

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PERIPROCEDURAL MANAGEMENT OF WARFARIN PATIENTS REQUIRING PARENTERAL BRIDGING AFTER AN INVASIVE PROCEDURE AT THE HERSHEL "WOODY" WILLIAMS VA MEDICAL CENTER.

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**Purpose:** Anywhere from 15-20% of those receiving OAC will undergo an invasive procedure disrupting this treatment putting them at increased risk for thromboembolism (TE). Interruptions of treatment transiently increase the risk of thromboembolism during this periprocedural period. The 2012 CHEST Guidelines for Perioperative Management of Antithrombotic Therapy provides guidance on who is an appropriate candidate for bridging. The purpose of this study is to evaluate the time needed to achieve a therapeutic INR following a procedure requiring bridging.

**Methods:** This is a retrospective, single-center chart review of patient's  $\geq 18$  years of age being followed by the pharmacist led outpatient clinic for oral anticoagulation with warfarin and whom required management of bridging for an invasive procedure. Data collection including patient demographics, primary endpoint, and secondary endpoints was retrieved via an electronic medical record through review of study subjects' charts. Approximately 300 charts were reviewed from October 1, 2014 to December 11, 2018. Patients with end-stage liver or renal disease, being bridged for active VTE, or requiring inpatient admission for parenteral bridging via heparin infusion were excluded from the study population. The primary endpoint assessed was the average time to therapeutic INR after an invasive procedure stratified by type of procedure. Secondary endpoints for evaluation include incidence of minor and/or major bleeding, clotting complications, and percentage increase in weekly maintenance dose during the initial post procedure period. Rationale for bridging, number of days warfarin was held prior to procedure, and variables hindering achievement of therapeutic INR were also evaluated. The investigators hypothesized that more aggressive boost dosing will reduce the time to therapeutic INR allowing for discontinuation of parenteral anticoagulation thereby reducing bleeding risks.

Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the procedural bleeding risks endorsed by the 2017 ACC Expert Consensus Decision Pathway for Periprocedural Management of Anticoagulation in Patients with Non-valvular Atrial Fibrillation.

Discuss the 2012 CHEST Guidelines for Perioperative Management of Antithrombotic Therapy guideline recommendations for risk stratification for perioperative thromboembolism.

### Self Assessment Questions:

A 76 year old Caucasian male patient on warfarin for atrial fibrillation is found to have new onset reduced ejection fraction. His current medications include Lisinopril 40mg QAM, Carvedilol 25mg BID,

- A 6
- B: 5
- C: 4
- D: 3

A 65 year old patient is on warfarin for oral anticoagulation as indicated for atrial fibrillation. Past medical history is unremarkable besides a history of stroke (CHADS2 score of 2) and a mechanical

- A Low risk
- B Moderate risk
- C High risk
- D Unable to assess

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF AN ANTIMICROBIAL STEWARDSHIP PROGRAM-LED, MULTIFACTORIAL PNEUMONIA DIAGNOSIS AND TREATMENT BUNDLE

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**Purpose:** Pneumonia remains a leading cause of hospital admission and accounts for a significant proportion of antibiotic use in the inpatient setting. Since the introduction of "healthcare-associated pneumonia" by national guidelines, an increase in the use of broad-spectrum antibiotics has been observed. Diagnostic tools, such as procalcitonin, can be used to distinguish bacterial from non-bacterial etiologies as a means to reduce broad-spectrum antibiotic use. Methicillin-resistant *Staphylococcus aureus* (MRSA) surveillance cultures can be used to rule out MRSA pneumonia and reduce exposure to anti-MRSA antibiotics. The purpose of this study is to evaluate the impact of bundled interventions on broad-spectrum antimicrobial use in patients with suspected pneumonia.

**Methods:** This is a pre-post quasi-experimental study conducted at a large academic medical center. During the intervention period (12/1/2018 - 3/30/2019), a member of the antimicrobial stewardship program (ASP) will review all adult ( $\geq 18$  years old) patients admitted to select floor medical services who are started on antibiotics for suspected pneumonia. The ASP member will (1) recommend the use of procalcitonin when clinically appropriate, (2) use institutional guidelines to guide empiric antibiotic selection based on risk factors for drug-resistant pathogens, and (3) order a MRSA surveillance culture in patients started on empiric anti-MRSA therapy. The ASP member will recommend adjustment of antibiotic therapy at each phase of the intervention. Patients will be excluded for the following reasons: (i) admission to the intensive care unit at time of pneumonia diagnosis; (ii) diagnosis of empyema, necrotizing pneumonia, co-infections, or cystic fibrosis; (iii) outpatient encounters; and (iv) outside hospital transfers with incomplete records. The primary endpoint will be the use of broad-spectrum antibiotics measured by days of therapy per 1000 patient-days. Secondary endpoints include length of hospitalization, 30-day all-cause hospital readmission, 30-day all-cause mortality, and hospital-acquired *Clostridioides difficile* infection rate.

**Results and Conclusions:** Will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the effects of historical national guideline recommendations on antimicrobial prescribing practices for the treatment of pneumonia. Identify key diagnostic laboratory testing that can be used to guide de-escalation of empiric antimicrobials in patients with pneumonia.

### Self Assessment Questions:

What effect does the use of "healthcare-associated pneumonia" (HCAP) criteria have on antimicrobial prescribing practices?

- A: Increase the use of antiviral treatment
- B: Decrease the use of empiric broad-spectrum antibiotics
- C: Increase the use of empiric broad-spectrum antibiotics
- D: No effect on antimicrobial prescribing practices

Due to its high negative predictive value ( $>90\%$ ), which of the following diagnostic tools or lab values can be used to guide early discontinuation of empiric broad-spectrum antibiotic coverage for pne

- A: Wbc
- B: Respiratory viral PCR
- C: Fungitell
- D: MRSA Nasal Surveillance Cultures

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## RETROSPECTIVE ASSESSMENT OF ATTAINMENT OF GOAL AREA UNDER THE TIME-CONCENTRATION CURVE TO MINIMUM INHIBITORY CONCENTRATION USING SERUM TROUGH-GUIDED VANCOMYCIN DOSING.

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**Purpose:** The primary objective of this study is to assess therapeutic appropriateness of vancomycin dosing by utilizing patient-specific trough concentrations to extrapolate an area under the time-concentration curve (AUC) to minimum inhibitor concentration (MIC) that is correlated with efficacy and therapeutic outcomes. Supratherapeutic AUC includes any value greater than or equal to 800; therapeutic AUC includes any value greater than or equal to 400; and subtherapeutic AUC includes any value below 400. Secondary outcomes include percent of collected troughs less than 15mcg/mL that resulted in AUC  $\geq 400$  and incidence of kidney injury.

**Methods:** The study was approved by the local Institutional Review Board under exempt status and will be a retrospective analysis of patients who received vancomycin for at least 48 hours at St. Francis Medical Center. Data will be collected from August 1, 2017 to August 1, 2018. Patients were included if they were at least 18 years old, received vancomycin for at least 48 hours, and at least one serum creatinine and one serum trough measured during the course of vancomycin. For patients that received 24 hour interval dosing, they must have received at least 2 doses, not including a loading dose, prior to the trough level. Patients receiving every 8 or 12 hour dosing must have received at least 3 doses, not including a loading dose, prior to the trough level. An AUC was calculated using vancomycin dose, interval, and measured trough level. Patients were excluded if they are under the age of 18 or greater than 90 years old, less than 50kg or greater than 120kg, pregnant, breast-feeding, prisoner, received intermittent or every 48 hour vancomycin dosing, received hemodialysis or peritoneal dialysis at any point during vancomycin therapy, received vancomycin for perioperative prophylaxis, or past medical history of cystic fibrosis or paraplegia.

### Learning Objectives:

Describe the current monitoring for vancomycin in adult patients and the rationale behind these recommendations.

Discuss variations in patient specific factors that may result in alteration in pharmacokinetic monitoring.

### Self Assessment Questions:

According to current Infectious Diseases Society of America guidelines, what monitoring parameters are correlated with therapeutic success?

- A: Trough 10-20 mcg/mL
- B: Trough  $>25$ mcg/mL
- C: AUC  $> 600$
- D: AUC  $<400$

Which of the following factors would NOT impact a patient's calculated AUC:MIC?

- A: vancomycin dose
- B: vancomycin interval
- C: patient age
- D: trough level

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**GUIDELINE ADHERENCE TO HEPATITIS B VIRUS (HBV) SCREENING AND VACCINATION IN PATIENTS PRESCRIBED HUMAN IMMUNODEFICIENCY VIRUS (HIV) PRE-EXPOSURE PROPHYLAXIS (PREP)**

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**Purpose:** The United States Public Health Service published the Pre-Exposure Prophylaxis (PrEP) for the Prevention of Human Immunodeficiency (HIV) Infection guideline in 2014 with an update in 2017. This guideline offers recommendations on screening and vaccination for hepatitis B virus (HBV) to reduce infection risk and ensure safe use of emtricitabine/tenofovir-disoproxil-fumarate. The goal of this study is to determine if PrEP prescribers at two academic medical center-affiliated clinics are adhering to guideline recommendations for screening and vaccinating PrEP patients for HBV. The results of this study have the potential to guide clinics, locally and nationally, in their efforts to provide optimum PrEP care. **Methods:** This study is Institutional Review Board approved. Primary outcomes are: appropriate screening for HBV infection or immunity prior to PrEP and appropriate vaccination for HBV in susceptible patients. Appropriateness will be based on current national guideline recommendations. Secondary outcomes include: initiation and completion of HBV vaccine series, retention in PrEP care, and seroconversion. The study period is from 7/1/2012 to 9/25/2018. Data will be obtained from the electronic medical record. Adults greater than 18 years of age prescribed PrEP at the two academic medical center-affiliated clinics during the study period will be included. Adults found to be pregnant, incarcerated, receiving current HBV treatment, or HIV positive at baseline PrEP screening will be excluded. Data collection points include: age, assigned/current gender, race/ethnicity, renal function, HIV risk factors, clinic type, provider type, and HBV serology, and vaccination history. All data will be recorded without patient identifiers and maintained confidentially. Outcomes will be explored using descriptive statistics. Data analysis is ongoing. Final results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Review Review PrEP therapy and the US Public Health Service PrEP guideline recommendations  
Recognize the importance and purpose of HBV screening and vaccination in HIV PrEP patients

**Self Assessment Questions:**

Guideline recommendations for baseline testing before starting HIV PrEP include(s):

- A: Liver function tests
- B: Hepatitis B serology tests
- C: Blood cultures
- D: G6PD screening

Which of the following is a reason to screen HBV serologies before initiating HIV PrEP therapy?

- A: To help reduce HBV transmission
- B: To ensure appropriate treatment of HBV for active infections
- C: To prevent hepatic flares
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**INTEGRATION OF PHARMACY SERVICES INTO A POPULATION HEALTH POST-DISCHARGE PROCESS**

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**Purpose:** Transitioning from an inpatient hospital stay to home can be a very vulnerable time for patients. Indiana University (IU) Health's population health team has an established transitions of care program available for patients in IU Health's accountable care organization (ACO) and patients with an IU Health insurance plan. High risk patients are identified for involvement in the program, which includes a call within 48 hours of hospital discharge, assessment of the patient, and continued support throughout the first 30 days after discharge. Patient assessment includes home needs, transportation, medication affordability, and follow up. In October of 2018, pharmacy services were added to this program with the intention to identify and help resolve any medication related problems. Pharmacists completed chart review, telephone encounters with the patients, documentation, and care coordination with other members of the health care team. The objective of this project is to evaluate if the addition of pharmacy services into the established post-discharge program will affect the hospital readmission rates or emergency room visits at 30 days post discharge.

**Methods:** This single-center, retrospective analysis compared a group of patients enrolled in the transitions of care service with pharmacist involvement to a similar group without pharmacist involvement. The target population included adult patients participating in the transitions of care service after discharge from an inpatient stay with a primary care provider at one of the three IU Health Physicians West clinics. Data collected included demographic information, discharge date, primary diagnosis, number of medication related problems identified, pharmacist interventions, and readmission rates or emergency department visits within 30 days of discharge. The results of this study will be used to evaluate the value of integrating pharmacy services into the current population health post-discharge process. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Identify common risks that patients experience after discharge from an inpatient hospitalization.  
Describe how pharmacy services improve patient outcomes after a patient is discharged from an inpatient setting.

**Self Assessment Questions:**

What percentage of patients discharged from an urban academic center resulted in an emergency room visit within 30 days?

- A: 5%
- B: 18%
- C: 24%
- D: 37%

Pharmacist involvement in transitions of care for an accountable care organization has been shown to decrease which of the following?

- A: Interventions by providers
- B: Patient satisfaction scores
- C: Resolution of medication related problems
- D: All-cause unplanned readmissions

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DEFINING CYTOMEGALOVIRUS VIREMIA THRESHOLDS FOR CLINICAL SIGNIFICANCE USING A WHO-CALIBRATED CMV-PCR ASSAY AMONG SOLID ORGAN TRANSPLANT RECIPIENTS

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Cytomegalovirus (CMV) infection is a major cause of morbidity and mortality among solid organ transplant (SOT) recipients. Polymerase chain reaction (PCR) is the preferred method to detect and quantify CMV viremia. Because of CMV-PCR interassay variability, there are no universal viral load thresholds to guide clinical decision making. In 12/2017, our institution implemented an FDA-approved CMV-PCR assay (Abbott RealTime) calibrated to the World Health Organization (WHO) international standard with lower limit of quantification (LLOQ) of 50 international units per mL. This study aims to identify CMV viremia thresholds for diagnosis of clinical disease and therapeutic response in SOT recipients.

This study was a single-center, retrospective chart review. Adult kidney, liver, and heart transplant recipients who had at least one plasma CMV-PCR at our institution between 12/1/2017 and 9/30/2018 were screened for inclusion. The following data were collected from electronic medical records: demographics, CMV-PCR results, signs and symptoms of CMV infection, antiviral therapy after detectable CMV-PCR, and clinical outcomes and complications after diagnosis of CMV disease.

Data were analyzed using two-sided Pearson Chi-Squared tests for dichotomous variables, and two-sided Student's t-tests or ANOVA for continuous variables. P-values less than 0.05 were considered statistically significant.

Out of 130 patients with detectable CMV-PCR, 29 patients presented with symptomatic CMV infection. Mean viral loads were not statistically different by CMV symptoms, organ type, or CMV serostatus. Fifteen patients had repeat CMV-PCR tests during and after CMV treatment. Fourteen patients (93%) achieved a viral load below the LLOQ. After completion of CMV treatment, all patients remained asymptomatic. CMV viremia persisted in 14 patients (93%), and was undetectable in 1 patient (7%).

Our sample size was too small to identify viral thresholds for CMV disease and therapeutic response in SOT recipients. This study describes our center's experience with a sensitive WHO-calibrated CMV PCR assay in SOT recipients.

### Learning Objectives:

Discuss concerns associated with CMV-PCR assays, including interassay variability and lack of harmonization.

Describe the CMV viral load kinetics of symptomatic solid organ transplant patients diagnosed and monitored via the Abbott RealTime CMV-PCR assay.

### Self Assessment Questions:

How should solid organ transplant recipients with detectable CMV viremia be initiated on antiviral therapy?

- A: Start antiviral therapy for any level of viremia detected regardless of symptoms
- B: Start antiviral therapy at any level of viremia detected by a high sensitivity assay
- C: Start antiviral therapy in the presence of CMV symptoms, no matter the level of viremia
- D: Start antiviral therapy in the presence of CMV symptoms, but only if the level of viremia is high

When using a WHO-calibrated CMV-PCR assay, which of the following is likely in solid organ transplant recipients who respond to treatment of CMV disease?

- A: Achieve a sustained, undetectable viral load after treatment.
- B: Display a persistent, low-grade, detectable viral load after completion of treatment.
- C: Exhibit rebound viremia to the pre-treatment viral load.
- D: Follow the same viral load pattern of a lower sensitivity, non-WHO calibrated assay.

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF THE CONTINUOUS INFUSION REFILL PROCESS IN A PHARMACY SATELLITE

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Purpose: Past infusion refill process for our cardiovascular surgery ICU relied heavily on pharmacy technicians manually collecting requests from nurses for drip refills prior to pharmacy satellite closure and then compounding the requested infusions. Current process now falls in line with other ICU refill requests within the health system, relying on nursing to request refills at least two hours prior to time new bag is needed. This process improvement project aims to assess the impact of the past change on decreasing medication waste, and further optimize the process to balance timely distribution while continuing to minimize waste. Potential additional interventions that may be implemented and measured include re-education of pharmacy and nursing staff on refill process, and a pilot of Epic TriggeredFill functionality. Epic's TriggeredFill functionality determines information from nurse MAR documentation about when the next infusion bag would be needed and schedules the dispense from the pharmacy. There is currently no published evidence evaluating impact on workload, efficiency, or waste when infusion rates are calculated with TriggeredFill.

Methods: This is a pre- and post-intervention study assessing the impact of changes to the process for determining when a refill of continuous infusion medications are needed for our cardiovascular surgery ICU. The goal is to reduce the ratio of dispenses to administrations towards a 1:1 ratio, without a negative impact on timely availability of refills. Medication waste will be quantified by comparing the number of dispenses vs. administrations. Timely availability will be assessed via our voluntary risk reporting system and pharmacy and nursing staff feedback. Statistical analysis will use a student's t test and descriptive statistics.

Results/Conclusions: Results and conclusions will be presented at Great Lakes Conference.

### Learning Objectives:

Explain the need for an intervention to the current infusion refill process when assessing staff workload and medication waste

Describe the rationale for utilizing Epic functionality to improve the infusion refill process in a pharmacy satellite

### Self Assessment Questions:

What are factors that contributed to pharmacy efforts in optimizing the continuous infusion refill process in the cardiovascular surgery ICU?

- A: Timely distribution of infusion refills
- B: Waste from expired/unused infusions
- C: Increased pharmacy technician workload
- D: All of the above

What Epic enhancement determines information from nurse MAR documentation when the next infusion bag will be needed at pre-defined time?

- A: Compounding and Repackaging
- B: TriggeredFill
- C: DispensePrep
- D: None of the above

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IDENTIFYING ERRORS AND SAFETY CONSIDERATIONS IN PATIENTS UNDERGOING THROMBOLYSIS FOR ACUTE ISCHEMIC STROKE

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**Purpose:** Alteplase is the standard of care for early pharmacologic thrombolysis after acute ischemic stroke. Alteplase is also considered a high-alert medication in the acute-care setting and is fraught with potential for error, with one study referencing as many as 64% of intended uses having prescription or administration errors. The primary objective of this project was the difference in medication error rates in patients receiving alteplase for acute ischemic stroke from referral centers compared to patients receiving alteplase at University of Kentucky Chandler Medical Center. Secondary objectives include comparing mortality, hemorrhagic conversion, Modified Rankin Score (mRS) at discharge, and the level of stroke certification of the transferring facility.

**Methods:** This was a retrospective cohort comparison that included patients who were greater than 18 years old that received intravenous alteplase from June 2015 to June 2018. Several institution-specific databases were utilized to determine and extract pertinent data. A standardized taxonomy was utilized to classify medication errors. Exclusion criteria included patients who received any fibrinolytic other than alteplase or if alteplase was used for a non-stroke indication.

**Results and Conclusions:** A total of 674 patients received alteplase during the analysis. There were 130 (19%) errors identified during the study period. Nine (1.3%) of medication errors occurred at University of Kentucky Chandler Medical Center and 121 (17.9%) occurred at outside hospitals. Of the 130 patients with errors, the most common type of error was an underdose, occurring in 36 (28%) patients. Six (8%) of the 68 patients who died received an overdosage of alteplase. Four (7%) of the 61 patients who experienced hemorrhagic conversion received an overdose of alteplase.

The error rate of alteplase infusion for ischemic stroke is high. Further education and administration safeguards should be implemented to further decrease the amount of medication errors.

### Learning Objectives:

Identify Identify medication errors and contributing factors that lead to incorrect alteplase administration  
Discuss Discuss the implications and outcomes in regards to incorrect alteplase administration

### Self Assessment Questions:

According to the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) standard taxonomy of medication errors, which of the following is a cause of a medication error?

- A: Verbal miscommunication
- B: Knowledge Deficit
- C: Miscalculation of Dosage or Infusion Rate
- D: All of the above

Which of the following may be consequences of incorrect alteplase administration?

- A: Hemorrhage
- B: Mortality
- C: Hypertension
- D: A and B only

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DOES SWITCHING FROM TICAGRELOR TO CLOPIDOGREL INCREASE MAJOR ADVERSE CARDIOVASCULAR EVENTS?

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**Purpose:** Three oral P2Y12 inhibitors, including clopidogrel, ticagrelor, and prasugrel, are available for patients presenting with acute coronary syndrome and for those undergoing percutaneous coronary intervention (PCI). Despite many favorable properties of ticagrelor, patients may be started on ticagrelor and later switched to clopidogrel due to differences in side effects, cost, bleeding risk, drug-drug interactions, or efficacy. This switch has been associated with an increase in platelet reactivity, which could potentially lead to a higher risk of cardiovascular events. This risk is largely due to an interaction between ticagrelor and clopidogrel involving a conformational change at the clopidogrel binding site on the P2Y12 receptor. The SWAP 4 trial showed that loading with clopidogrel at 12 hrs vs 24 hrs after the last ticagrelor dose did not have a significant difference in the pharmacodynamic profile. Based on these results, Northwestern Memorial Hospital (NMH) developed a protocol to guide P2Y12 inhibitor switching. Patients receive a 600 mg dose of clopidogrel 12 hours after the last ticagrelor dose, followed by 75 mg daily. The purpose of this study is to evaluate the incidence of major adverse cardiovascular events (MACE) and the safety of de-escalation from ticagrelor to clopidogrel under this current protocol.

**Methods:** This is a retrospective chart review of patients who were initiated on ticagrelor and switched to clopidogrel following the NMH protocol from February 14, 2017 through November 1, 2018. The primary endpoint consists of MACE events up to 1 year which include cardiovascular death, coronary revascularization, and nonfatal stroke or myocardial infarction. Secondary outcomes include bleeding defined by GUSTO criteria and stent thrombosis.

**Results and conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe Describe the major benefits and limitations of both ticagrelor and clopidogrel and reasons for de-escalation.

Discuss Discuss the pharmacodynamic literature supporting the de-escalation strategy in terms of the appropriate dose and impact of timing of loading dose administration after ticagrelor discontinuation.

### Self Assessment Questions:

Based on the SWAP-4 study by Franchi et al, the effect of a 12 hours vs 24 hr loading dose resulted in the following pharmacodynamic difference

- A: Increase in platelet reactivity units (PRU) within the 12 hour group
- B: No pharmacodynamic differences between the two groups
- C: Both groups had a decrease in platelet reactivity units
- D: The 24 hour group had an increase in platelet reactivity units

Given the pharmacokinetic and pharmacodynamic profile of clopidogrel and ticagrelor, which is a limitation and concern when switching from ticagrelor?

- A: The inhibition of platelet aggregation peak effect with clopidogrel
- B: Clopidogrel is a pro-drug and provides reversible platelet inhibition
- C: Ticagrelor changes the conformation of the binding site for clopidogrel
- D: Clopidogrel provides faster, greater, and more consistent P2Y12 inhibition

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## MEASURING THE IMPACT OF IMPLEMENTING A PHARMACY-FOCUSED, ELECTRONIC HEALTH RECORD-BASED TRACKBOARD ON QUALITY METRICS IN THE EMERGENCY DEPARTMENT

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**Purpose:** Hospital emergency departments (EDs) are unique due to high patient acuity and turnover rate. Interventions made in the ED play a major role in a facility's performance on quality measures, such as early treatment of sepsis, as delineated by the Joint Commission and Centers for Medicare and Medicaid Services (CMS). Integrating pharmacists into ED teams decreases costs, encourages compliance with quality measures, and improves outcomes. Electronic trackboards have been utilized as a tool within the ED and may be customized to provider type to allow for more rapid and relevant decisions and recommendations. The pharmacy informatics team at Froedtert & the Medical College of Wisconsin designed and implemented a pharmacist-specific trackboard available within the electronic health record (EHR). The trackboard includes a list of all patients within the ED and displays an overview of each patient using a variety of categorized symbols indicating abnormalities or important factors.

**Methods:** This quality improvement project utilizes a retrospective, pre-post intervention design evaluating the impact of trackboard implementation within the Froedtert health system to determine its effects on quality-related outcomes. Pre-implementation data is being collected for the year preceding trackboard implementation (July 27, 2016 to July 26, 2017) and post-implementation data collected for the year following implementation (July 27, 2017 to July 26, 2018). Non-pregnant patients who were 18 years or older and registered into the EHR at any Froedtert ED facility will be included. Collected data includes patient demographics, diagnoses, time of presentation to the ED, medication order and administration times while in the ED, and patient disposition. The primary outcome is the effect of the trackboard on early management of sepsis, as determined by time to receipt of IV antibiotics and/or fluid resuscitation.

**Results/Conclusion:** Data analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the value of pharmacists and of electronic trackboards within the emergency department setting.

Describe the impact of a pharmacist-specific electronic trackboard use on quality related outcomes.

### Self Assessment Questions:

Incorporating pharmacists into ED teams

- A Results in increased incidence of medication errors
- B Encourages compliance with quality measures
- C Increases total cost of care
- D Is likely to result in adverse outcomes

Electronic emergency department trackboards

- A Do not have the potential to improve patient outcomes
- B Do not have any effect on quality outcomes
- C May be used as a mechanism for prioritizing patients
- D Are static and difficult to update in real-time

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INDIANA COMMUNITY PHARMACIST PRECEPTORS' KNOWLEDGE AND PERCEPTIONS OF MEDICATION-ASSISTED TREATMENT

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**Purpose:** The United States is experiencing an ongoing opioid epidemic. It is vital that patients with opioid use disorder (OUD) receive treatment to prevent overdose and death; one component of this treatment is medication-assisted treatment (MAT). The primary objective of this study is to characterize Indiana community pharmacist preceptors' knowledge, perceptions and desired resources on MAT for OUD. The secondary objective will be to model the association between MAT knowledge, pharmacist demographics, and perceptions.

**Methods:** The 38-item survey was developed using the social cognitive theory as conceptual framework which explains how people start and continue behaviors by emphasizing the relationship between people, their behavior, and their environments. Survey questions were adapted from previously published surveys with permission from study investigators. The study protocol was submitted to Purdue University Institutional Review Board, and data collection will begin upon approval. Study participants will include pharmacists who are at least 18 years of age or older, speak English, maintain an active Indiana pharmacist license, have been in their current community pharmacy practice setting for at least six consecutive months, and are active preceptors for Indiana-based colleges of pharmacy. Experiential education directors at all Indiana colleges of pharmacy will recruit eligible participants, and an email invitation including the survey link will be sent to these individuals. Reminder emails will be sent every two weeks over a six-week period. Data collection will occur through a web-based survey tool. Survey questions will assess pharmacist knowledge, perceptions, and desired educational resources on MAT. To characterize the study population, participant demographics will be collected. Appropriate descriptive statistics will be used to describe preceptor knowledge, perceptions, and desired MAT resources. Regression analysis will be used to model the association between knowledge survey items, pharmacist demographics and perceptions.

**Results/Conclusion:** To be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review Review medication-assisted treatment (MAT) FDA-approved for management of opioid use disorder (OUD).

List List elements of the social cognitive theory.

### Self Assessment Questions:

Which MAT product FDA-approved for OUD can be prescribed by any licensed practitioner and dispensed through any pharmacy?

- A Acamprosate
- B Buprenorphine
- C Methadone
- D Naltrexone

Which is an element of social cognitive theory?

- A Behavior
- B Cues to Action
- C Perceived Barriers
- D Perceived Susceptibility

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A PHARMACIST-MANAGED TRANSITIONS OF CARE TOOL – PART 2

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The Richard L. Roudebush VA Medical Center implemented a pharmacist-based quality improvement project focused on care transitions. The pilot project showed a trend towards decreased readmissions, emergency department (ED) visit rates, and significant ambulatory care medication interventions by pharmacists. The goals of the second phase were to build upon the trend of positive outcomes and overcome barriers encountered in the pilot project through streamlining the referral process, enhancing education to staff, and expanding clinical pharmacy services.

Standard discharge roles of acute care pharmacists include a complete medication reconciliation on every patient prior to discharge. During this process, at-risk patients were identified by the pharmacist. Information was entered into a hand-off tool by the pharmacist to document concern upon referral. The ambulatory care pharmacist conducted a phone appointment to perform medication reconciliation, assess adherence, address acute concerns, and triage to determine if patients need to be seen in clinic. Phase two of this project involved identification and overcoming barriers discovered in the pilot study. Interventions included focused education for inpatient and outpatient pharmacists, better-defined referral processes, inclusion of patients receiving primary care at a community based outpatient clinics (CBOCs), and embedding referral prompts into the standard pharmacy discharge note template. Primary outcomes were overall and index 30-day readmission and ED visit rates, adverse events, and all-cause mortality. Secondary outcomes evaluated changes made to overcome barriers in the pilot study. These included percentage of overall discharges referred to the program, number of patients referred by pharmacists, number and type of medication discrepancies found, referrals back to primary care provider, follow-up within seven days post-discharge, and patients added to pharmacist panel for further management. Conclusions to be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List ambulatory care sensitive conditions that can be managed by pharmacists to prevent hospital re-admissions  
Identify the role of ambulatory care pharmacists in transitions of care

### Self Assessment Questions:

Which of the following is an ambulatory care sensitive condition?

- A: Copd
- B: Tobacco use
- C: Suicidal ideation
- D: Endocarditis

2. Which of the following is the primary purpose of involving ambulatory care pharmacists in transitions of care?

- A: To increase the number of patients managed by the pharmacists
- B: To prevent adverse effects of medications
- C: To decrease drug budget spending
- D: To prevent hospital re-admission due to mis-management of medication

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## APTT VS ANTI-XA MONITORING OF HEPARINIZED PATIENTS WITH LEFT VENTRICULAR ASSIST DEVICES (LVADs)

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**Purpose:** The emergence of LVADs has drastically improved survival in patients with late stage heart failure. In order to maintain adequate function of the device and prevent thrombotic complications, anticoagulation is critical. ISHLT guidelines recommend antiplatelet therapy and warfarin for long term management of these patients, with heparin being the drug of choice when bridging to warfarin. Monitoring of heparin utilizing aPTT levels have classically been described in LVAD literature, with goals varying between institutions and LVAD prototypes. Anti-Xa levels have been replacing aPTT for monitoring of heparin therapy due to standardization of reagents, less physiologic variability, and faster onset to therapeutic goal. Furthermore, emerging data has suggested a significant discordance between anti-Xa levels and aPTT in LVAD patients. This has prompted further investigation to evaluate which parameter should be utilized to optimize monitoring of patients with LVADs who are initiated on heparin. The purpose of this study is to evaluate aPTT vs. anti-Xa monitoring of heparin for patients with LVADs and determine if there is a difference in time in therapeutic range and bleeding events.

**Methods:** A single center retrospective chart review will be conducted on LVAD patients who were initiated on a heparin drip when admitted to Northwestern Memorial Hospital. Data will be collected from two time periods: September 3rd, 2017 to March 2nd, 2018, and March 3rd 2018 to September 3rd 2018. Patients will be included if they are 18 years of age or older, have an LVAD, and have 3 consecutive aPTT or anti-Xa levels drawn while admitted. Patients will be excluded if they are pregnant, on any anticoagulant other than heparin or warfarin, diagnosed with advanced liver disease, or have an identified hypercoagulable state. The primary endpoint will be time in therapeutic range. Secondary endpoints will be bleeding events and time to therapeutic range.

**Results/Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Describe the rationale for using anti-Xa vs. aPTT levels in monitoring heparin drips for LVAD patients  
Discuss complications that can arise in patients with LVADs when anticoagulation is not properly managed

### Self Assessment Questions:

Which statement is true regarding anti-Xa levels when compared to aPTT?

- A: Anti-Xa levels are cheaper than aPTT
- B: There is less variability among reagents when using anti-Xa assay
- C: No physiological factors can influence the result of aPTT levels
- D: Anti-Xa levels are widely available at all medical institutions

What is the most common complication seen in LVAD patients 3 months post implantation?

- A: Stroke
- B: Myocardial Infarction
- C: Bleeding
- D: Hepatic dysfunction

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE SAFETY AND EFFICACY OF SLEEP MEDICATIONS IN PEDIATRICS

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### Purpose:

Sleep disorders in children can lead to cognitive, behavioral, and mental health related issues throughout childhood and into adulthood. Despite the negative impacts of sleep deficiency in children and adolescents, there has been limited research conducted on the safety and efficacy of sleep medications commonly used in the pediatric population. The purpose of this study was to evaluate the safety and efficacy of pediatric sleep medications and characterize their use

### Methods:

This study was a retrospective observational cohort study evaluating the efficacy and safety of sleep disorder medications in pediatric patients. Data was collected for patients aged six months to 18 years old, during the period of 7/2017 to 07/2018. Sleep Disorders were defined as a diagnosed sleep disorder as documented in patient's medical record. The primary outcome was efficacy of sleep medication prescribed, defined as: discontinuation of prescribed sleep medication at subsequent follow up visits or addition of additional sleep medication required. The secondary outcome was the safety of sleep medications defined as: reported adverse drug event or side effect of initial sleep medication.

Using an approximate mean value of one follow-up visit to discontinuation or addition of further pharmacological agent when using behavioral therapy alone, with a standard deviation +/- one visit, versus an expected mean value of three follow-up visits to discontinuation or addition of further pharmacological management when using pharmacological treatment, an approximate sample size of four patients was required for 80% power in this study. Alpha was set a priori 0.05

### Results & Conclusion:

Pending and will be presented at the Great Lakes Resident Conference

### Learning Objectives:

Describe •Describe the impact of decreased sleep and sleep disorders in the pediatric population  
Discuss •Discuss the clinical utility of sleep medications in pediatric comorbidities

### Self Assessment Questions:

Daniel is a 13 year old boy recently diagnosed with insomnia who has had issues falling asleep in school. Mom & Dad report he has never had a "normal" sleep schedule and will usually stay up all night

- A Cognitive Delay
- B: Anxiety
- C: Depressed Mood
- D: Cardiovascular Disease

Matt is a 28 day old boy with insomnia seen at a Sleep Center for improved sleep control. Mother has tried melatonin in the past with no noted improvement and wants to know if diphenhydramine would be

- A Diphenhydramine 0.5 mg/kg/day
- B Diphenhydramine 1 mg/kg/day
- C Diphenhydramine 5 mg/kg /day
- D Diphenhydramine should not be recommended

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RESULTS AND EFFICACY OF ANTIRETROVIRAL REGIMENS CONTAINING ABACAVIR/DOLUTEGRAVIR/LAMIVUDINE PLUS TENOFOVIR IN PATIENTS HARBORING THE M184V/I MUTATION (REVAMP)

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Purpose: The M184V/I mutation is a single amino acid substitution in HIV reverse transcriptase (RT) that confers resistance to lamivudine (3TC) and emtricitabine (FTC) and impacts functionality of the RT enzyme itself. The mutation has been shown to decrease viral fitness and viral replicative capacity, and also increase the fidelity of RT, making further mutations less likely. Due to the inclusion of 3TC/FTC in many first-line regimens, M184V/I is a common mutation associated with virologic failure, and studies regarding treatment outcomes in patients harboring the M184V/I mutation are limited. A regimen of abacavir/dolutegravir/lamivudine plus tenofovir (ABC/DTG/3TC + TFV) has been employed by practitioners at our institution to treat HIV-infected adults harboring this mutation. The objective of this study is to evaluate the incidence of virologic suppression in HIV-infected adults harboring the M184V/I mutation on ABC/DTG/3TC + TFV versus a protease-inhibitor (PI)-based regimen. This data will be used to provide additional insight into potential antiretroviral regimen options for HIV-infected adults harboring the M184V/I mutation.

Methods: An IRB-approved, single-center, retrospective chart review will be conducted from 1/1/2007 to 9/30/2018. This study will be analyzing adult patients with HIV who have  $\geq 1$  HIV RNA viral load (VL) at  $\geq 24$  weeks following treatment initiation subsequent to identification of the M184V/I mutation. Baseline HIV RNA VL prior to study regimen initiation HIV RNA VL at  $\geq 24$  weeks, HIV RNA VL at last measurement while on regimen, and treatment duration will be collected for the primary analysis. The primary outcome is to determine the incidence of virologic suppression (HIV RNA  $< 200$  copies/mL) at the first HIV RNA VL measurement  $\geq 24$  weeks after starting ABC/DTG/3TC + TFV versus a PI-based regimen.

Results and Conclusions: Data collection is ongoing, and results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the impact of the M184V/I mutation on antiretroviral targets in the human immunodeficiency virus (HIV) replication cycle.  
Identify which antiretroviral agents are affected by the M184V/I mutation

### Self Assessment Questions:

The M184V/I mutation occurs at position 184 in which of the following proteins?

- A Reverse transcriptase
- B: Integrase
- C: Protease
- D: Cysteine-cysteine chemokine receptor 5 (CCR5)

The M184V/I mutation causes resistance to which of the following antiretrovirals?

- A Darunavir
- B Emtricitabine
- C Tenofovir
- D Dolutegravir

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF LOW LEVEL CMV DNAEMIA OFF PROPHYLAXIS AND RISK FOR DEVELOPING CMV DISEASE IN LUNG TRANSPLANT RECIPIENTS

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**Purpose:** Quantitative nucleic acid testing (QNAT) is the preferred method for monitoring cytomegalovirus (CMV) DNAemia. Various QNAT threshold values for initiation of CMV treatment have been described in the literature but no consensus has been reached. Guidelines recommend that each transplant center determine their own threshold value for initiating CMV treatment. With this lack of consensus, there is concern that increasing sensitivity of QNAT testing could lead to overtreatment of virus that would otherwise clear on its own. We aim to determine the influence of treatment on the progression of low level CMV DNAemia.

**Methods:** A single center, retrospective chart review of lung transplant recipients transplanted between January 2014 and June 2017 who experienced low level DNAemia (defined as <1,000 IU/mL) after completion of prophylaxis. The primary outcome of this study is the incidence of CMV disease in patients that received treatment for low level DNAemia compared to those who did not receive treatment for low level DNAemia. Secondary endpoints will be time from prophylaxis discontinuation to initial low level CMV QNAT and rate of increase in CMV DNAemia QNAT values. Descriptive data will be reported using medians and interquartile ranges. Non-parametric data will be analyzed using Mann Whitney and chi-square tests. This study was approved by the Indiana University Health Institutional Review board.

**Results and Conclusion:** Data analysis is ongoing and results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define CMV disease and CMV infection  
Identify risk factors for the development of CMV disease

### Self Assessment Questions:

What is the definition of CMV disease?

- A: CMV DNAemia WITH symptoms
- B: CMV DNAemia WITHOUT symptoms
- C: Positive CMV QNAT value alone
- D: CMV QNAT  $\geq$ 1,000 IU/mL

Which of the following is correlated with increased risk of development of CMV disease?

- A: Fewer episodes of rejection
- B: D+/R- serostatus
- C: D-/R- serostatus
- D: Kidney transplantation

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF CLINICAL GUIDELINE IMPLEMENTATION OF ADULT KETAMINE DOSING IN THE EMERGENCY DEPARTMENT

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**Purpose:** Ketamine is administered for a variety of indications in the emergency department (ED), including rapid sequence intubation, procedural sedation, pain, agitated delirium, and status asthmaticus. With a variety of indication-specific dosing coupled with the potential for adverse effects, the use of ketamine presents a patient safety risk if an inappropriate dose is administered. This study evaluated appropriate dose utilization and patient outcomes following the implementation of an adult ketamine order set in the ED. This study also evaluated physician, pharmacist, and nursing comfort level with ketamine use before and after pharmacy provided education.

**Methods:** This study was approved by the Institutional Review Board at Parkview Health. This study consists of two components: a retrospective multi-site chart review of patient outcomes and a survey regarding physician, pharmacist, and nursing comfort level. Adult patients who received ketamine for any indication in the ED were eligible for inclusion, as well as ED physicians, ED nurses, and pharmacists. In order to maximize patient outcomes and prevent patient harm, an adult ketamine order set was implemented in the ED with dosing for each indication. During this time, education regarding ketamine use and the order set was offered. A survey regarding comfort level of ketamine use was administered before and after education. Patient data was analyzed before and after implementation of the order set. Staff comfort level was analyzed before and after education. The primary outcome was the percentage of patients who received an appropriate dose in milligrams per kilogram of ketamine based on indication before and after education. Secondary outcomes included the incidence of adverse effects of ketamine and change in comfort level of physicians, pharmacists, and nurses.

**Results & Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recall indications for ketamine use  
Select the appropriate dose of ketamine based on indication

### Self Assessment Questions:

1. Subdissociative dosing of ketamine is utilized for which off-label indication?

- A: Pain
- B: Procedural Sedation
- C: Rapid Sequence Intubation
- D: Agitated Delirium

What is the most appropriate dose of ketamine for status asthmaticus?

- A: 0.3 mg/kg IV push
- B: 1 mg/kg IV push
- C: 2 mg/kg PO
- D: 5 mg/kg IM

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF DIRECT THROMBIN INHIBITORS AND UNFRACTIONATED HEPARIN FOR THERAPEUTIC ANTICOAGULATION IN VA ECMO

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**Background:** anticoagulation for patients with indications for VA ECMO is imperative for circuit maintenance prevention of thrombotic events during extracorporeal support. Although heparin coating of components of the circuit may mitigate the risk of thrombotic events, patients may require systemic anticoagulant medications to prevent thrombotic events from occurring. Unfractionated heparin is commonly used for systemic anticoagulation, but may not be optimal for patients with heparin-induced thrombocytopenia, heparin resistance, or if patient comorbidities preclude proper monitoring. Direct thrombin inhibitors are alternative anticoagulants which have been used in patients on VA ECMO, however lack of a specific antidote may preclude its widespread use. Laboratory monitoring for anticoagulants is variable and differs depending on health system preference and availability. There is no current standard for preferential agent or laboratory test for use with respect to anticoagulation in patients with ECMO circuits.

### Purpose:

The purpose of this retrospective study is to compare direct thrombin inhibitors and unfractionated heparin in therapeutic anticoagulation target attainment in patients on venoarterial extracorporeal membrane oxygenation.

### Methods:

This will be a retrospective cohort study of patients that are greater than 18 years of age and require therapeutic anticoagulation for venoarterial extracorporeal membrane oxygenation for at least 24 hours. Patients will be excluded from the study if they have a known coagulation disorder at baseline, if they are pregnant, have irreversible neurological impairment, active malignancy, advanced liver cirrhosis, or a contraindication to systemic anticoagulation. Therapeutic anticoagulation will be assessed based on percentage within goal range based on institutional standards which will be the primary endpoint for this study. Secondary endpoints will include clinically defined major bleeding, clinically relevant thrombotic events, in-hospital mortality, ICU length of stay, and hospital length of stay.

### Learning Objectives:

Recall various laboratory monitoring parameters utilized in measuring anticoagulation in VA ECMO

Identify reasons why use of direct thrombin inhibitors may be utilized for anticoagulation in VA ECMO

### Self Assessment Questions:

Which of the following laboratory parameters would be useful in measuring the degree of anticoagulation associated with a bivalirudin infusion?

- A: Platelet count
- B: Fibrinogen levels
- C: Activated clotting time
- D: Heparin PF4 antibody

In which scenario might unfractionated heparin be preferred over direct thrombin inhibitors?

- A: The clinician wants an agent with a specific reversal agent
- B: A patient's chart has a documented history of HIT
- C: The patient has a history of heparin resistance
- D: A patient's antithrombin III levels are low

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACIST-DRIVEN MANAGEMENT OF BONE HEALTH IN PROSTATE CANCER PATIENTS RECEIVING ANDROGEN DEPRIVATION THERAPY

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### Background

Cancer patients are at a risk of therapy-induced bone loss with a higher prevalence of osteoporosis in cancer patients (40% vs 16%, p=0.05). Patients on androgen deprivation therapy (ADT) have a 4.6% bone loss after therapy initiation and are associated with a 21-54% increased fracture risk. Despite the known risk of osteoporosis in high risk cancer patients, bone health is poorly managed with opportunities for improvement identified in 90% of prostate cancer patients receiving ADT.

### Objectives

This study implemented and evaluated a pharmacist-driven management program for bone health in prostate cancer patients initiated on ADT. The primary objective was adherence to existing practice guidelines in managing bone health in cancer patients. Secondary objectives further describe the effect of pharmacist-driven management including completion of osteoporosis risk screening, bone mineral density testing, sub-specialty referrals, initiation of anti-resorptive agents and/or vitamin supplements, pharmacist time spent, and an estimate of reimbursable services.

### Methods

This IRB approved, retrospective, quasi-experimental study compared pharmacist and physician driven management of bone health in prostate cancer patients. Inclusion criteria were adult patients diagnosed with non-metastatic prostate cancer that are newly initiated on a luteinizing hormone releasing hormone. Patients following with an endocrinologist for osteoporosis diagnosis or history of hypercalcemia, primary hyperthyroidism, sarcoidosis, or other granulomatous disease were excluded. Patients meeting criteria were managed based on a physician approved pharmacy practice protocol. Pharmacist responsibilities included screening prostate cancer patients, providing education, ordering related labs and/or bone mineral density testing, and initiating supplements or bone-modifying agents as appropriate

Results – Results and conclusions to be presented at the conference.

Conclusions – Results and conclusions to be presented at the

### Learning Objectives:

Recognize that cancer patients are at higher risk of osteoporosis and fracture risk.

Describe guideline-based recommendations for bone health management in cancer patients.

### Self Assessment Questions:

Which of the following would be at a higher risk for osteoporosis and fracture risk?

- A: Normal men
- B: Premenopausal women
- C: Men on androgen deprivation therapy
- D: Men on calcium and vitamin D therapy

Which of the following is a recommendation for bone health management in cancer patients at high risk for osteoporosis and fractures?

- A: Always avoid calcium to minimize risk of hypercalcemia
- B: Baseline dual-energy x-ray absorptiometry (DXA) scan
- C: Prophylactic denosumab for any patient starting cancer therapy
- D: Provide education, but only treat pharmacologically after a fracture

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF OPIOID PRESCRIBING RESTRICTIONS ON NON-OPIOID ADJUVANT USE IN A PALLIATIVE ONCOLOGY POPULATION

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**Purpose:** The American Society of Clinical Oncology (ASCO) and the Centers for Disease Control and Prevention (CDC) each released guidelines in 2016 recommending non-opioid medications as first-line therapies for pain. Ohio law placed restrictions on opioid prescribing for acute pain, effective August 2017. The impact of these events on opioid and non-opioid prescribing for cancer pain is unknown. Neuropathic pain affects a large proportion of cancer patients. Both opioids and non-opioid neuropathic adjuvants are used for management of this pain. The purpose of this study is to compare utilization of non-opioid neuropathic adjuvant medications for cancer pain in a palliative oncology clinic population prior to and after release of local and national pain management prescribing guidelines. **Methods:** A single-center, retrospective chart review of cancer patients referred to an outpatient palliative medicine clinic during one of two six-month time periods (September 1, 2014-February 28, 2015 or September 1, 2017-February 28, 2018) was conducted. Patients were included who completed at least one clinic visit within a one-year time period of September 1 to August 31 encompassing the date of referral. The primary objective was to compare the proportion of new referrals seen in the clinic who had at least a single outpatient prescription for any first-line non-opioid neuropathic pain adjuvant between September 1, 2014 to August 31, 2015 versus September 1, 2017 to August 31, 2018. Proportion of study participants on a target dose of the adjuvant, referrals placed to other providers to address multi-modal pain treatment options, and morphine equivalent daily dose (MEDD) were evaluated as secondary outcomes. Results will provide evidence to assist in guiding clinical practice regarding optimal and appropriate modalities for managing neuropathic pain. **Results/Conclusions:** Study results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss recent pain management guidelines and subsequent pharmacologic and non-pharmacologic recommendations for the management of neuropathic and cancer-related pain.

Review neuropathic adjuvant and opioid prescribing patterns for cancer pain and the impact local and national pain management prescribing guidelines had on these trends.

### Self Assessment Questions:

Which of the following medication classes are recommended to be used as second-line therapies for neuropathic pain?

- A Tricyclic antidepressants (ie. amitriptyline)
- B: Calcium channel alpha(2)-delta ligands (ie. gabapentin)
- C: Opioids
- D: Dual reuptake inhibitors of serotonin and norepinephrine (ie. duloxetine)

The Ohio opioid prescribing limitations that went into effect in August of 2017 exclude which of the following patient types?

- A Chronic pain
- B Acute pain
- C Palliative care
- D A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF CLINICAL OUTCOMES OF PATIENTS WHO RECEIVE OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY VERSUS PATIENTS WHO REMAIN IN A TRANSITIONAL CARE FACILITY FOR ANTIMICROBIAL THERAPY FOR ACUTE OSTEO

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### Purpose:

Outpatient parenteral antimicrobial therapy (OPAT) has become a common treatment option for patients requiring extended durations of intravenous (IV) antimicrobials. There are many studies evaluating the efficacy and safety of OPAT; however, there is a paucity of evidence comparing the outcomes of patients who receive prolonged courses of IV antimicrobials in the home setting through an OPAT program versus those who receive their IV antimicrobial course in a transitional care facility (TCF). The objective of this study is to determine if a difference in treatment failure exists between patients who receive IV antimicrobials through OPAT versus TCF for the treatment of acute osteomyelitis.

### Methods:

This study is a retrospective, electronic chart review of patients who were diagnosed with acute osteomyelitis between January 1st, 2010 through December 31st, 2017. Patients were included in this study if they were discharged home with IV antimicrobials (OPAT group) or transferred to our institution's TCF (TCF group) to complete their IV antimicrobial course. The primary endpoint of this study is acute osteomyelitis treatment failure between groups. This study will also evaluate the following secondary endpoints between groups: documented adverse drug reactions to antimicrobials, number of patients who develop C. difficile infections, and number of patients who develop a catheter-related bloodstream infection.

### Results/Conclusions:

Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the potential advantages and disadvantages of OPAT  
Identify patient characteristics to consider for initiation of OPAT

### Self Assessment Questions:

Which of the following is a potential disadvantage of OPAT?

- A Reduced risk of health care associated infections
- B: More rapid return to normality of life for the patient
- C: Poor compliance and/or lack of follow-up
- D: Increased costs for the hospital

Which of the following patient characteristics is ideal for OPAT?

- A Patients with an unstable medical condition
- B Patients who are homeless
- C Reliable patients with support at home
- D Patients with a history of substance abuse

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A PHARMACIST-DRIVEN METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS NASAL POLYMERASE CHAIN REACTION TESTING PROTOCOL IN A COMMUNITY HOSPITAL

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**Purpose:** Practice guidelines published by The Infectious Diseases Society of America states that patients with pneumonia should be treated with antibiotics that cover methicillin-resistant *Staphylococcus aureus* (MRSA). These guidelines, however, do not explain when to de-escalate antibiotic therapy. Studies have evaluated the utility of a nasal swab polymerase chain reaction (PCR) test to determine the likelihood a patient having pneumonia caused by MRSA. It was found that this test can accurately identify patients without MRSA pneumonia. Baptist Health Lexington has implemented a protocol which allows pharmacists to order this test and guide recommendations. This study will retrospectively evaluate the impact of this protocol on the days of anti-MRSA therapy in patients with pneumonia.

**Methods:** This study has been approved by the local Institutional Review Board. This study involves a retrospective chart review of patients with a diagnosis of pneumonia or a lower respiratory tract infection and who are placed on anti-MRSA antibiotic coverage. The study will evaluate if the MRSA PCR test was ordered for the patient, and subsequent time to de-escalation of therapy. The primary outcome is the days of anti-MRSA therapy received by patients before and after implementation of the protocol. Secondary outcomes will include patient length of stay, adherence to the protocol (how often the test was appropriately ordered and followed up on), and the number of vancomycin levels drawn.

**Results:** Results are in progress and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recall the effectiveness of the MRSA nasal PCR

Indicate appropriate use of MRSA nasal PCR

### Self Assessment Questions:

What is the approximate negative predictive value of the MRSA nasal PCR

- A 20%
- B: 54%
- C: 73%
- D: 96%

What is an appropriate diagnosis for using the MRSA nasal PCR?

- A Pneumonia and sepsis
- B Osteomyelitis
- C Lower respiratory tract infection
- D Skin and soft tissue infection

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## UTILIZATION OF A VACCINATION HISTORY ASSESSMENT DURING COMPREHENSIVE MEDICATION REVIEW IN AN INDEPENDENT COMMUNITY PHARMACY SETTING

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### Purpose:

Nationwide, 74.7% of adults aged 65 and older report receiving a pneumococcal vaccine. In northern Indiana, only 65.3% report receiving a pneumococcal vaccine. Communities with under vaccinated populations are at an increased risk for outbreaks of vaccine-preventable diseases. Pharmacists can increase herd immunity, mitigate outbreak risk, and help protect this unvaccinated population by utilizing one-on-one time for patient education and vaccine administration. The purpose of this study is to examine the association between vaccination history assessment in comprehensive medication reviews (CMRs) and a change in vaccination rates.

### Methods:

This was a retrospective, cross sectional study conducted in rural northern Indiana. The study compared data from the pre-intervention period: July 1 – December 31, 2017 to post-intervention period: July 1 – December 31, 2018. Beginning July 1, 2018, vaccination history assessment was implemented during the CMR process at an independent community pharmacy. The assessment included guided discussion for patients to provide their vaccination history followed by verification in the onsite prescription dispensing system and the Childre and Hoosier Immunization and Registry Program (CHIRP). Eligible participants were PPSV23, PCV13, and/or annual influenza vaccine-eligible patients who completed a CMR at the pharmacy during the pre- and/or post-intervention periods.

The following data was collected through chart review of CMR records and the onsite prescription dispensing system: insurance provider, known vaccination history, vaccination eligibility, and PPSV23, PCV13, and/or annual influenza vaccine administration within two weeks of CMR completion at the pharmacy. Age, sex, and race were collected to characterize the patient population.

Administration rates before and after implementation of the vaccination history assessment were evaluated using chi2 test and logistic regression to account for covariance. A chi2 McNemar test was utilized to account for repeat patients.

### Results/Conclusion:

To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss Target vaccination rates per healthy people 2020

Identify Vaccines pharmacists can give per protocol in Indiana

### Self Assessment Questions:

The target percentage of people aged 65 and older who should receive pneumococcal vaccination is:

- A 60%
- B: 70%
- C: 85%
- D: 90%

Pharmacists in Indiana can give which vaccines via protocol?

- A Influenza
- B Pneumococca
- C Tetanus, Diphtheria, Pertussis
- D All the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF AN ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOL IN BARIATRIC SURGICAL PATIENTS TO DECREASE POST-OPERATIVE NAUSEA AND VOMITING: A RETROSPECTIVE CHART REVIEW

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**Purpose:** Post-operative nausea and vomiting is a significant concern for both patients and providers that leads to greater patient dissatisfaction and contributes to increased hospital length of stay and morbidity. Decreasing post-operative nausea, vomiting, and opioid use is a priority among health care providers. This study aims to enhance the small pool of available published literature and provide evidence of a novel enhanced recovery after surgery (ERAS) program in bariatric surgical patients. This ERAS program employs a pre-operative regimen of aprepitant, transdermal scopolamine, acetaminophen, pregabalin, and celecoxib to decrease post-operative antiemetic and opioid requirements. **Methods:** This study is approved by the local Institutional Review Board. The retrospective chart review will identify patients who underwent bariatric surgeries, including roux-en-y gastric bypass and sleeve gastrectomy, and compare outcomes pre- and post-implementation of the ERAS program. Exclusion criteria include any patient in the post-implementation group in which the ERAS protocol was deviated from, patients who underwent revision of a previous bariatric procedure, and patients on chronic opioid therapy. The following data will be collected: age, gender, length of hospital stay, procedure start and end time, Bariatric Risk Score, American Society of Anesthesiologists Physical Status score, allergies, intra-operative drug administration, route of anesthesia, chronic opioid use, serum creatinine, pain scores, post-operative antiemetic use, and post-operative opioid use. The primary outcome is post-operative anti-emetic use, measured as the number of individual doses of antiemetic agents and the number of individual antiemetic agents administered in the post-operative period (cumulatively at 24 hours, 48 hours, and total period). Secondary outcomes include post-operative opioid use measured as total morphine milligram equivalents administered in the post-operative period (cumulatively at 24 hours, 48 hours, and total period), hospital length of stay, and cost analysis. **Results/Conclusion:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recall the definition of an enhanced recovery after surgery program.  
Explain the purpose of enhanced recovery after surgery programs in the management of surgical patients.

### Self Assessment Questions:

An enhanced recovery after surgery program is a(n):

- A: Multidisciplinary perioperative care plan
- B: Legal obligation to prevent malpractice lawsuits
- C: Financially driven program to reduce care quality
- D: Optional benefit for patients who can afford it

The purpose of enhanced recovery after surgery programs is to:

- A: Increase the patient's cost of hospital stay
- B: Increase the patient care burden for nursing
- C: Improve post-operative patient outcomes
- D: Increase opioid use among surgical patients

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING ALERT CONTENT AND PROVIDER FOLLOW UP OF COMMONLY OCCURRING DRUG-DRUG INTERACTIONS

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Computerized provider order entry (CPOE), along with clinical decision support (CDS) tools, can notify providers of interacting medications upon order entry. Ideally, a medication alert should only trigger at an appropriate and clinically relevant time. Systems are challenged by frequent bypassing of alerts due to the volume of alerts triggering and alert fatigue. Additionally, medication alert content provided by third party knowledge vendors may differ from independent clinical evaluation. An internal assessment comparing alert content against clinical practice can help determine the appropriateness of the frequently triggered alerts. The aim of this study is to evaluate the clinical appropriateness of a top subset of drug-drug interaction alerts and assess for appropriate alert follow-up actions by providers.

A descriptive study will be conducted and the top 25 drug-drug interaction alerts meeting inclusion criteria will be analyzed. Alerts classified as a drug-drug interaction, non-filtered, and representing the top 25 by volume occurring between 8/7/2018 and 8/20/2018 will be included. An Expert Panel, consisting of thirteen pharmacists spanning multiple practice areas, will evaluate each drug-drug interaction with an internally developed standardized tool. The tool was designed to assess the severity of each drug-drug interaction without confounding factors, such as patient specific information, compared to the severity ratings reported by drug compendia references available at this institution. The tool will also determine an urgency response category indicating how quickly or if a change in medication therapy should occur after a drug-drug interaction alert is triggered. After the Expert Panel reviews each interaction, reports analyzing alert actions will be created and assessed. The primary outcome is the composite of provider follow-up appropriateness. Secondary outcomes include inter-rater variability of alert content appropriateness, alert volume, and alert actions.

Drug-drug interactions are currently being analyzed by the Expert Panel. Data analysis to follow.

### Learning Objectives:

Explain the rationale for conducting an internal assessment of alert content for frequently triggered drug-drug interaction alerts.  
Review frequently triggered drug-drug interaction alerts for clinical appropriateness.

### Self Assessment Questions:

An internal assessment of drug-drug interactions will benefit an institution because

- A: It will result in eliminating all insignificant drug-drug interactions from the system
- B: It provides understanding of alert content and if appropriate follow-up actions
- C: It validates the need for eliminating drug-drug interactions to prevent alert fatigue
- D: It provides no additional benefit or value and should not be conducted

Which of the following is a common drug-drug interaction alert that is frequently bypassed?

- A: Aspirin and heparin
- B: Etoposide and atovaquone
- C: Digoxin and psyllium
- D: Insulin and nifedipine

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE ROLE OF VALUE FRAMEWORKS IN ONCOLOGY FORMULARY DECISIONS WITHIN A HEALTH SYSTEM

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**Background:** An estimated \$6.2 billion was spent on antineoplastic agents, accounting for 18.1% of total medication expenditure in the United States in 2017. With the cost burden in oncology medication use, health systems have attempted to identify the most value in patient care for oncology patients. Several organizations have attempted to measure value in oncology utilizing value-based frameworks. These frameworks include the American Society of Clinical Oncology Value Framework, the National Comprehensive Cancer Network Evidence Blocks, Memorial Sloan Kettering Cancer Center Drug Abacus, Institute for Clinical and Economic Review Value Assessment Framework, and the European Society for Medical Oncology Magnitude of Clinical Benefit Scale.

**Purpose:** The objective of this study is to describe whether one oncology value-based framework provides more utility in determining value of an FDA-approved medication for an oncology-related condition compared to other frameworks for a community-based health system. **Methods:** This retrospective observational study conducted an evaluation of oncology-approved drugs evaluated from April 2017 to June 2018 by the OhioHealth Oncology Formulary Subcommittee of the variable inputs used. Variable inputs from all five value-based frameworks were included to determine what role value-based frameworks play in the formulary evaluation process for oncology medications. The study will encompass a rubric to conclude if the current value frameworks in oncology evaluate the variables deemed relevant from a health system's perspective. Within each value-based framework, the feasibility for an input to be identified and input utility on formulary considerations were measured. A survey was performed with members of the Oncology Formulary Subcommittee, to evaluate the impact on formulary decision making based variable considered in respective value-based frameworks. **Results/Conclusion:** Data analysis is currently ongoing. Results and conclusions will be shared at the 2019 Great Lakes Residency Conference.

### Learning Objectives:

Identify value-based frameworks focused in oncology medication use  
Describe the factors value-based frameworks may play in health system oncology medication use

### Self Assessment Questions:

Which of the following value-based frameworks formulates the Net Health Benefit score for the treatment regimen of a cancer?

- A: Institute of Clinical and Economic Review
- B: National Comprehensive Cancer Network
- C: American Society of Clinical Oncology
- D: European Society for Medical Oncology

According to the FDA, what is the maximum incremental cost of care for a new treatment to be approved in comparison to current standard of care for a cancer?

- A: \$50,000/qaly
- B: \$100,000/qaly
- C: \$150,000/qaly
- D: No limit

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## RENAL OUTCOMES WITH SODIUM-GLUCOSE CO-TRANSPORTER-INHIBITOR USE IN VETERANS WITH TYPE 2 DIABETES MELLITUS (ROSE-VET)

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**Abstract:** Renal function is a vital concern when addressing management of Type 2 Diabetes Mellitus (T2DM). Due to the high association between T2DM and kidney disease, clinicians are often faced with attempting to lower blood glucose while preserving renal function. While evidence from Empagliflozin, Cardiovascular Outcomes and Mortality in Type 2 Diabetes (EMPA-REG) and Cardiovascular and Renal Events in Type 2 Diabetes (CANVAS) trials noted potential renal protectiveness with Sodium-Glucose Co-Transporter-2 (SGLT-2) inhibitor use, the Food and Drug Administration safety announcement of increased risk of Acute Kidney Injury (AKI) on SGLT-2 inhibitor presents need for further research. The primary goal of this study is to evaluate potential impact of SGLT-2 inhibitor use on renal function, including increased risk of AKI in Veterans with T2DM.

**Methods:** The research study will conduct a case-control retrospective electronic chart review on Veterans between 18-89 years of age at the Battle Creek VA Medical Center with diagnosis of T2DM with or without an active SGLT-2 inhibitor prescription between April 1, 2013 and April 1, 2018. The following data will be collected: patient age, gender, body mass index, race, comprehensive medication list, ICD-9/10 diagnosis codes and laboratory values. The incidence of AKI, change in estimated glomerular filtration rate (eGFR) from baseline and discontinuation rates of SGLT-2 inhibitors will be calculated. The primary outcome is the relative risk of AKI (per the Kidney Disease Improving Global Outcomes criteria and/or AKI pertinent ICD 9/10 codes) in T2DM patients utilizing SGLT-2 inhibitors when compared to those not receiving SGLT-2 inhibitor therapy. The secondary outcomes include changes in eGFR, serum creatinine, and microalbuminuria from baseline following SGLT-2 inhibitor initiation and discontinuation rates of SGLT-2 inhibitors.

### Learning Objectives:

Identify the current evidence on association between SGLT-2 inhibitor use and renal function.  
Describe the current place in therapy for SGLT-2 inhibitors.

### Self Assessment Questions:

Which statement correctly matches the evidence identified by the EMPA-REG trial?

- A: Rates of AKI were similar in both placebo and SGLT-2 inhibitor groups
- B: There is a delay in progression of albuminuria with SGLT-2 inhibitors
- C: 101 cases of AKI in patients on SGLT-2 inhibitors were identified
- D: 9% of patients experienced a doubling of serum creatinine

In addition to reduced mortality from CVD, select another clinical benefit of SGLT-2 inhibitor use

- A: Decrease in LDL, TG
- B: Blood pressure reduction
- C: Increase in eGFR
- D: Reduced risk of amputations

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## A COMPARISON OF SAFETY AND EFFICACY OUTCOMES FOR INDUCTION THERAPY IN RENAL TRANSPLANT

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**Background:** Induction immunosuppression with lymphocyte depleting agents alemtuzumab and anti-thymocyte globulin (ATG) reduces acute rejection following kidney transplantation. The Kidney Disease Improving Global Outcomes guidelines recommend either medication for induction therapy. Previous analyses suggest no significant differences in efficacy but less is known regarding safety. Leukopenia is common with all lymphocyte depleting agents. Prolonged leukopenia may lead to reductions in maintenance immunosuppression and infection prophylaxis dosing, potentially increasing risk for infection, malignancy, and rejection. We sought to characterize the safety of ATG compared to alemtuzumab when used for induction therapy following kidney transplant.

**Methods:** Mercy Health Saint Mary's Institutional Review Board approved this retrospective cohort analysis. Data were extracted from electronic medical record databases. Kidney transplant patients that received ATG or alemtuzumab as induction therapy from January 1, 2009 through December 31, 2014 were analyzed. Prior kidney transplant recipients undergoing preemptive transplant were excluded. The primary outcome was incidence of leukopenia within 12 months post-transplant. Secondary outcomes included incidence of leukopenia, thrombocytopenia, and subsequent medication dose adjustments at 3, 6, 9, and 12 months post-transplant, incidence of infection within 1 year post-transplant, malignancy within 3 years post-transplant, incidence of biopsy-proven acute rejection, all-cause mortality, and graft failure within 1 and 3 years post-transplant. Nominal data were assessed using a Chi-square or Fisher's exact test while continuous data were assessed using a student's t-test or a Mann-Whitney U test.

**Results:** Results will be presented at the Great Lakes Pharmacy Resident Conference. A total of 522 eligible patients were identified for analysis in this study.

**Conclusion:** Will be presented at the Great Lakes Pharmacy Resident conference.

### Learning Objectives:

Define induction therapy and why it is used in kidney transplant patients  
Recall safety outcomes used to characterize both alemtuzumab and thymoglobulin

### Self Assessment Questions:

What is the purpose of lymphocyte depleting induction therapy in kidney transplant patients?

- A Induction therapy destroys lymphocytes in the recipient to decrease
- B: Induction therapy is used to prevent acute rejection
- C: Induction therapy is used to prevent graft loss
- D: All of the above

Both induction agents talked about today carry the risk of leukopenia. What is an important outcome used to assess the long-term safety of induction therapy?

- A Infusion reactions
- B Infection
- C Incidence of acute rejection
- D Biopsy-proven acute rejection

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A TRANSITIONS OF CARE PROCESS FOR PATIENTS ADMITTED WITH HEART FAILURE BY AMBULATORY CARE PHARMACISTS

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Heart Failure (HF) is a complex clinical syndrome resulting from structural or functional impairment of ventricular filling or ejection of blood. Heart failure currently accounts for 17% of unplanned 30-day readmissions at Mercy Health Muskegon (MHM). HF patients with an increased risk of mortality may require efficient coordination of care and follow-up, both of which can be optimized with the involvement of a pharmacist. Pharmacist transitions of care programs have been shown to decrease medication errors and decrease emergency department visits. MHM has a primary care network that consists of approximately 22 clinics, 17 of which employ an ambulatory care pharmacist. However there was no standard process for these ambulatory care pharmacists to follow-up with HF patients recently discharged from the hospital.

The aim of this project was to develop a transitions of care process utilizing our ambulatory care pharmacists.

Patients admitted with heart failure at MHM were identified for transitions of care follow-up by a physician or an inpatient pharmacist. These patients were targeted for ambulatory pharmacist follow-up phone calls. After discharge to home, the ambulatory care pharmacist identified changes made to the HF medication regimen and attempted to contact the patient. During the phone calls, pharmacists addressed medication adherence, patient knowledge of disease state, medications, side effects, and when to contact their primary care physician. The primary endpoints were 30-day hospital readmission rate and emergency department visits. Secondary endpoints included percentage of patients who were contacted, time from discharge until pharmacist contact, medication discrepancies identified, time spent on follow-up, and identified patient barriers.

Results and conclusions are pending.

### Learning Objectives:

Identify clinical pharmacy services that have been shown to improve care for patients with heart failure.

Describe the HF transitions of care process for ambulatory care pharmacists at Mercy Health Muskegon.

### Self Assessment Questions:

Which of the following pharmacy services are commonly recommended to reduce medication errors during transitions of care?

- A medication reconciliation
- B: patient education
- C: order verification
- D: both a and b

Mercy Health Muskegon's ambulatory transitions of care service include which of the following components?

- A Phone call
- B Medication reconciliation
- C Patient education
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INITIATING A TRANSITIONS OF CARE PROGRAM IN A VETERANS HEALTH ADMINISTRATION HOSPITAL

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Multiple pilot programs and studies have shown that transitions of care programs can reduce hospital readmission rates and improve patient medication adherence. In November 2018, a pharmacy transitions of care pilot program was initiated at a Veterans Affairs Medical Center (VAMC). This pilot program evaluated pharmacy interventions made for patients recently discharged from the hospital. The goals of this pilot program were to resolve medication related problems before an adverse event occurs, decrease polypharmacy, improve patient's understanding and adherence to medication therapy, and prevent medication related hospitalizations and emergency room visits. Patients recently discharged from an inpatient admission had scheduled visits with a clinical pharmacist or pharmacy resident prior to their primary care provider appointment. Education provided during the visit focused on medication names, doses, indications, special administration instructions, possible adverse events, and techniques of using medical devices. Patients were provided pill boxes, medication disposal bags, an updated medication list, and education handouts at the conclusion of the appointment. After the appointment was completed, the patient's primary care provider was updated on information obtained during the appointment and provided clinical recommendations. Interventions made during the visits were categorized as follows: new medication, disease state recommendation, drug-disease interaction, drug-drug interaction, prevention or management of adverse drug reactions, formulary conversions, dose form interchange, duplication of therapy, dose/frequency adjustment, drug-allergy interaction, drug not indicated, or medication missing from disease state. The interventions made during this pilot program identified an opportunity for outpatient primary care clinical pharmacists to impact care for recently discharged patients.

### Learning Objectives:

Explain the steps needed to identify patients and implement a pharmacy pilot outpatient transitions of care program

Identify opportunities for pharmacist-driven interventions during transitions of care in an outpatient facility

### Self Assessment Questions:

Which of the following is true in regards to a pharmacist-led transitions of care program?

- A: Pharmacists can help improve patient safety
- B: Pharmacists can provide education to the patient about proper inhalation
- C: Pharmacist can prevent medication errors by preventing duplication
- D: All of the above

Which of the following disease states does the Centers of Medicare and Medicaid Services use to measure excess readmission ratios (ERR)?

- A: Chronic obstructive pulmonary disease
- B: Gout exacerbation
- C: Urinary tract Infection
- D: Atrial fibrillation

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## AN EVALUATION OF VASOPRESSORS ON DURATION OF REFRACTORY SEPTIC SHOCK

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### Purpose:

Septic shock is a life threatening disorder with a mortality upwards of 40%. In septic shock, fluid resuscitation is inadequate at restoring an acceptable mean arterial pressure (MAP) and the addition of vasopressor agents are required for further hemodynamic support. The importance of early vasopressor initiation is supported in the recent Surviving Sepsis Campaign Bundle update, which states vasoactive agents should be added within the first hour to maintain MAPs  $\geq 65$  mmHg. The guidelines recommend norepinephrine first line, vasopressin and epinephrine second-line, and dopamine and phenylephrine as additional options. Recent publications support mortality rates as high as 60 - 90% for patients requiring multiple vasopressor agents and/or high peak vasopressor doses to maintain MAPs. Despite this high mortality rate, there is still a paucity of literature focused on methods of vasopressor management in this patient population. This study aims to retrospectively evaluate vasopressor usage at our institution and compare time to MAP stabilization based on the number of vasopressors used and vasopressor dose requirements.

### Methods:

This is a single center, retrospective chart review of patients admitted to the medical intensive care unit with septic shock requiring vasopressor support between January and August 2018. All endpoints will be analyzed based on the number of vasopressors used and cumulative vasopressor dose requirements. The primary outcome is the time from initiation of vasopressors to the attainment of the patient's MAP at 65 mmHg for at least 24 hours without the use of vasopressors. The secondary endpoints assess intensive care unit (ICU) length of stay, ICU mortality, time to initiation of vasopressors from time of admission to the ICU and the average vasopressor doses used both individually and in norepinephrine equivalents.

### Results and conclusions:

Data analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference in April 2019.

### Learning Objectives:

Discuss the pathophysiology of hypotension in septic shock.

Describe the recommendations for vasopressor usage within the Surviving Sepsis Campaign bundles.

### Self Assessment Questions:

Which of the following shock states is most commonly associated with septic shock?

- A: Obstructive
- B: Cardiogenic
- C: Anaphylactic
- D: Distributive

Which vasopressor is considered first line by the Surviving Sepsis Campaign Guidelines?

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

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OUTCOME OF TITRATING GUIDELINE DIRECTED MEDICAL THERAPY IN HEART FAILURE PATIENTS AT 90-DAY POST-HOSPITAL DISCHARGE

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Purpose: Heart failure (HF) affects nearly 5.7 million people living within the United

States. Optimal doses of guideline directed medical therapy (GDMT) is a key component for prevention of symptom exacerbation, disease progression, and hospital readmission in patients with a heart failure reduced ejection fraction (HFrEF). The pharmacist in the heart failure discharge clinic at Northwestern Memorial Hospital, recently entered into a collaborative practice agreement to titrate heart failure medications to goal doses. During this time the heart failure program also entered into a bundle payment initiative to reduce 90 day readmission rates. Therefore the objective of this study is to determine the number of patients discharging from the hospital that would benefit from medication titration and the potential benefit of optimal dose GDMT on 90-days readmission rates.

Methods: This Institutional Review Board approved, single-center, retrospective, observational chart review study, included patients who were at least 18 years old and were discharged with diagnosis of HFrEF (EF  $\leq$ 40%) between July 1, 2016 to December 31, 2016. Patients diagnosed with end stage renal disease, heart failure with preserved ejection fraction (EF > 40%), pregnant women, or those who were deceased or received advanced therapies during the 90-days post discharge were excluded. The intervention group consisted of patients at 50% or greater of goal doses or maximum tolerated doses of GDMT at hospital discharge. The control group consisted of patients at <50% of goal doses of GDMT. The primary outcome was the hospital readmission rate at 90-days post discharge. The secondary outcomes included an assessment of the titration of GDMT in the control group at 90-days post discharge, including percentage with GDMT titration, percentage at goal or maximum tolerated doses, impact on readmission, and identifying factors limiting dose titration.

Results: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Report the association between percentage of achieved goal doses of GDMT and hospital readmission in patients with HFrEF at 90-day post discharge

Identify factors limiting dose optimization of GDMT in patients with HFrEF

### Self Assessment Questions:

Use of GDMT is associated with which of the following

- A: Reduction in the rate of hospitalization
- B: Decreased length of hospital stay
- C: Prevention of disease progression
- D: A&C

Which of the following can be a limiting factor for achieving target dose of GDMT

- A: Renal dysfunction
- B: Hypotension
- C: Bradycardia
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## RELATIVE DOSE INTENSITY OF GEMCITABINE IN METASTATIC PANCREATIC CANCER

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Patients with metastatic pancreatic cancer have very poor survival and a myriad of treatment related complications. Current standard of care for metastatic pancreatic cancer as described in the NCCN guidelines consists mostly of gemcitabine-based regimens. Gemcitabine + nab-paclitaxel is one of three preferred options for patients with good performance status. There are many dosing strategies with this regimen and none has been proven to be more effective than another. The standard of care dose of Gemcitabine is 1000mg/m<sup>2</sup> once weekly for 3 consecutive weeks every 28-days. However, many patients cannot tolerate that dose and it is empirically reduced in anticipation of treatment related complications. Other times, the dose will be reduced or held during the course of therapy as complications arise. We do not currently have good evidence of whether or not reduced-dose gemcitabine maintains clinical benefit.

This is a retrospective chart review. We will define the median relative dose intensity (RDI) of patients at the Markey Cancer Center between January 2015 - September 2018 receiving a gemcitabine based regimen for advanced or unresectable pancreatic cancer and compare cohorts above and below the median RDI to determine if it can predict antitumor effects. Manual chart review will be performed to collect relevant data. We will compare our patients' dose to the standard of care dose in order to determine the relative dose intensity.

The primary endpoint will be a composite clinical benefit endpoint defined as complete response, partial response, or stable disease as identified by RECIST criteria. Secondary objectives include overall survival, progression free survival, and time to treatment failure. We will also collect relevant demographic data and data regarding reasons for dose reductions, rate of dose reductions, rate of adverse effects, and reasons for discontinuation of therapy.

### Learning Objectives:

Explain the current standard of care therapy for metastatic pancreatic cancer and its limitations

Discuss risks and benefits of reducing the dose of gemcitabine for metastatic pancreatic cancer patients

### Self Assessment Questions:

Which of the following is an NCCN recommended first-line treatment option for metastatic pancreatic cancer patients with good performance status?

- A: cytarabine + doxorubicin
- B: Folfex
- C: gemcitabine + nab-paclitaxel
- D: axicabtagene ciloleucel

What is a common side effect of gemcitabine-containing chemotherapy regimens?

- A: flu-like symptoms
- B: cold intolerance
- C: cardiac toxicity
- D: urine discoloration

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF BARCODE-ASSISTED MEDICATION PREPARATION (BCMP) IN AN INPATIENT SATELLITE PHARMACY

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**Purpose:** To compare the incidence of dispensing-related medication errors following implementation of barcode-assisted medication preparation (BCMP) software (EPIC Dispense Prep) in an inpatient satellite pharmacy.

**Methods:** This quasi-experimental study will compare the incidence of pharmacist-reported dispensing-related medication errors in a satellite pharmacy prior to and after implementation of BCMP technology. Errors reported related to oral, unit dose medication products during a one-month time period prior to implementation will be compared with a one-month sample collected two months after implementation of BCMP. Data collected via the self-reporting platform prior to and post-implementation will include drug type, description of error reported, and action taken. Post-implementation data will also be collected in Epic reports, which will capture drug, dispense time, errors identified, and overrides. The primary outcome will be dispensing errors, and secondary outcomes will include BCMP adherence, barcode scanning failures, dispense time, and staff feedback. Statistical analysis of errors reported and captured as well as dispense time will be performed using a student's t-test, and descriptive statistics will evaluate staff experience.

**Preliminary Results:** Data is being collected through March 2019. Preliminary results are not available at this time but will be complete before the time of this presentation.

**Conclusions:** Conclusions will be drawn upon assessment of results.

### Learning Objectives:

Describe automated dispensing workflow systems and their impact on health system pharmacy practice

Explain the effectiveness of a phased implementation of BCMP in acute care pharmacies at Michigan Medicine

### Self Assessment Questions:

Which of the following is an advantage of barcode-assisted medication preparation?

- A Offers an additional safety check
- B: Reduces risk of human error
- C: Allows for better reporting of dispensing activities
- D: All of the above

According to a 2017 survey of hospitals and health systems, what percentage of institutions report using no technology in dispensing processes?

- A 39%
- B 56%
- C 64%
- D 82%

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPACT OF PHARMACIST INTERVENTIONS IN TIKOSYN® (DOFETILIDE) MONITORING

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**Purpose:** Dofetilide, a class III antiarrhythmic medication, previously required a Risk Evaluation and Mitigation Strategy (REMS) program to ensure appropriate monitoring was completed. In 2016, the REMS program was removed; however, monitoring remains necessary to reduce the risk of proarrhythmic effects and avoid lapses in therapy. The primary objective is to evaluate the impact of pharmacist involvement in monitoring dofetilide by identifying the number and type of interventions made in a dofetilide consult service.

**Methods:** In this retrospective chart review at Chalmers P. Wylie Veterans Affairs, 35 patients treated with dofetilide were identified. Completed progress notes were reviewed to assess the total number and type of interventions made by pharmacists and the percentages of interventions accepted by providers. Types of interventions included renal and EKG dosage adjustments, electrolyte replacement, medication changes due to drug interactions, and referrals due to adverse effects. On average, EKG and labs were assessed every three months.

**Results:** After 8 months of follow-up, 39 interventions were made by pharmacists. Interventions included assessment of drug interactions (19), renal adjustments (7), EKG changes (6), adherence (5), and electrolyte imbalance (2). Eight therapeutic changes were implemented by providers including discontinuation of dofetilide or other QTc prolonging medications due to EKG changes, more frequent monitoring, and renal dosage adjustments. No serious adverse events were reported.

**Conclusions:** Of the 30 patients analyzed, 19 patients benefitted directly from pharmacists' interventions. While most interventions did not result in direct therapeutic changes, pharmacist intervention allowed for more complete monitoring and better communication between providers. The most common identified issues were drug interactions indicating risk of QTc prolongation; such interactions often required more regular EKG monitoring rather than discontinuing the medication.

Regular review of medications by pharmacists can prevent complication and improve patient safety. Future studies could measure patient and provider satisfaction and financial savings.

### Learning Objectives:

Recall monitoring parameters for patients on dofetilide

Recognize key medications that may result in QTc prolongation

### Self Assessment Questions:

Which one the following medications interact with dofetilide?

- A Albuterol
- B: Ondansetron
- C: Sertraline
- D: All the above

Which of the electrolytes should be monitored when utilizing dofetilide?

- A Na+, Cl-
- B Na+, Mg2+
- C K+, Mg2+
- D K+, hco3-

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF NON-OPIOID ORDER PANELS IN A REGIONAL MEDICAL CENTER EMERGENCY DEPARTMENT

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**Purpose:** To combat opioid misuse in the United States, healthcare providers have become more judicious when prescribing opioid medications. Healthcare institutions nationwide have taken steps to assist prescribers in the appropriate management of pain through non-opioid modalities by incorporating alternatives to opioids (ALTO) protocols. These protocols support the American College of Emergency Physicians' guidance that pharmacologic treatment of many acutely painful conditions should begin with a non-opioid agent. The purpose of this study is to assess the impact of two recently implemented non-opioid order panels for the management of pain in the Parkview Regional Medical Center emergency department (ED).

**Methods:** Two order panels containing non-opioid medications for atraumatic headache pain and general pain management were created and made available in EPIC on December 3rd, 2018. Electronic medical records will be used to identify patients 18 years of age and older admitted and discharged from the emergency department who received at least one dose of a medication appearing on the non-opioid order panels. Patients will be divided into pre and post order panel implementation groups based on their dates of admission. Patient demographics will be collected, as well as ED length of stay; name, dose, and timing of opioid and non-opioid pain medication administrations; pain scores on presentation and throughout visit; presence of opioids on the home medication list prior to arrival, and receipt of a prescription on discharge for an opioid medication. The primary outcome compared between pre and post panel implementation groups will be oral morphine equivalents administered during ED admission. Secondary outcomes include ED length of stay, receipt of a non-opioid pain medication prior to opioid administration, and receipt of an opioid prescription at discharge.

**Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize key recommendations from the American College of Emergency Physicians 2017 policy statement on optimizing the treatment of acute pain in the emergency department

Discuss the benefits of implementing non-opioid order panels for use in the emergent setting

### Self Assessment Questions:

Which of the following recommendations is found in the American College of Emergency Physicians policy statement titled "Optimizing the Treatment of Acute Pain in the Emergency Department"?

- A: The use of opioid medications in the emergency department is rare
- B: Pharmacologic treatment of many acutely painful conditions should be avoided
- C: Non-pharmacologic treatments for pain are generally ineffective and should be avoided
- D: When initiating treatment with opioids, extended-release or long-acting formulations should be used

Which of the following is a potential benefit of non-opioid order panel implementation?

- A: Total elimination of severe, acute pain is often achieved
- B: Pharmacy involvement in the emergency department setting is minimized
- C: The need for non-pharmacologic pain control interventions is reduced
- D: Order panels can facilitate the ordering of non-opioid pain medications

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMMUNE CHECKPOINT INHIBITORS: OPTIMIZATION OF PHARMACIST SERVICES IN TOXICITY MANAGEMENT

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Immune checkpoint inhibitors (ICPIs) have a unique toxicity profile and can lead to immune related adverse effects (irAEs) that can affect multiple organ systems. Early detection and subsequent treatment may limit their morbidity and mortality. Last year at UW Health Carbone Cancer Center, a pharmacist lead program was established to routinely assess patients for irAEs within lung, melanoma, and gastrointestinal clinics to ensure appropriate and early management.

The purpose of this project is three-fold: optimize previously developed pharmacist workflows and documentation, expand the optimized workflows to all UW Health Cancer Clinics, and finally evaluate the outcomes of enrolled patients. Optimization will be achieved by observing pharmacist encounters with enrolled patients, reviewing pharmacist documentation of patient encounters and interviewing pharmacists involved with the program. Information obtained while analyzing the current state of the program will be utilized to standardize outreach criteria and develop additional electronic health record tools to help facilitate pharmacist documentation. These pharmacy services will then be expanded to all UW Health Carbone Cancer Center clinics. After implementation, retrospective chart reviews will be performed to evaluate patient outcomes from the optimized ICPI program. The primary outcome of this project is the number of pharmacist identified patients with grade 1 or 2 irAEs enrolled in the ICPI program. Additional outcomes include the number of grade 3 or 4 irAEs discovered by a pharmacist, the total number of patients with grade 1 or 2 irAEs, the number of patients with grade 3 or 4 irAEs and the number and type of pharmacist interventions.

Expected results of the project include optimized pharmacist workflows to allow for expansion of pharmacy services and reduced incidence of grade 3 or 4 irAEs in patients receiving ICPIs. Additional anticipated results are increased patient safety and improved clinical outcomes through early identification and management of irAEs.

### Learning Objectives:

Review the unique spectrum of toxicities associated with immune checkpoint inhibitors for the treatment of oncologic diseases

Describe the steps of the UW Health immune checkpoint inhibitor program to ensure early identification and management of immune related adverse events

### Self Assessment Questions:

What is the most common immune related adverse event?

- A: Colitis
- B: Dermatitis
- C: Hypothyroidism
- D: Pneumonitis

What is a proposed benefit from the UW Health pharmacist ICPI program?

- A: Earlier identification of irAEs
- B: Reduced incidence of grade 3 and grade 4 irAEs
- C: Improved patient outcomes
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PRESCRIBING PATTERN OF ORAL ANTICOAGULANTS IN PATIENTS WITH OBESITY

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**Introduction:** There is limited efficacy and safety data of DOACs in patients with obesity. The primary objective is to describe the prescribing pattern of oral anticoagulants in obese patients at our institution. Secondary objectives are to determine the efficacy, safety, and adherence to oral anticoagulants.

**Methods:** Retrospective, observational study in patients >18 years with a history of VTE and/or atrial fibrillation. Patients with a BMI > 40 kg/m<sup>2</sup> and/or weight > 120 kilograms and a prescription for warfarin or a DOAC from January 1, 2014 until August 31, 2017 are included. The primary outcome is the number of warfarin or DOAC prescriptions. Secondary outcomes include recurrent VTE or stroke and bleeding events. Adherence data was evaluated through time in therapeutic range, antithrombosis clinic missed appointment rate and medication possession ratio.

**Results:** 308 patients met eligibility criteria. 132 (42.9%) were prescribed a DOAC and 176 (57.1%) were prescribed warfarin. Preliminary secondary results of 177 patients reveal 5 (6.6%) stroke or recurrent VTE with a DOAC versus 6 (7%) with warfarin (p=0.92). There were 12 (13.2%) bleeding events versus 9 (10.5%) with warfarin (p=0.74). The time in therapeutic range for warfarin patients was 43 + 4%, and missed appointment rate was 28.7%.

**Conclusions:** Despite limited data in obese patients, DOACs are prescribed in this population. Preliminary data suggests there is no difference in safety and efficacy compared to warfarin, and barriers to medication and appointment adherence exist in this population.

### Learning Objectives:

Review the current literature and guidance regarding DOAC use in patients with obesity  
Identify a patient that is an ideal candidate for a DOAC

### Self Assessment Questions:

Which is true regarding the current literature and guidance for DOAC use in patients with obesity?

- A: ISTH suggests that DOACs should not be used in patients with BMI > 40
- B: ISTH suggests that DOACs should not be used in patients with BMI > 35
- C: Pharmacokinetic studies suggest that there is no difference in DOAC use between obese and non-obese patients
- D: A majority of patients in pivotal DOAC clinical trials were obese

Which of the following patients is the most ideal candidate for a DOAC?

- A: 54 year old female, 80kg, CrCl 55mL/min, mechanical mitral valve
- B: 42 year old male, 90 kg, CrCl 90 mL/min, AFib with CHADS<sub>2</sub>VASc 2
- C: 38 year old female, 175 kg, CrCl 120 mL/min, acute bilateral PE
- D: 49 year old man, 100kg, CrCl 80 mL/min, acute DVT, on carbamazepine

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF NASAL METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS POLYMERASE CHAIN REACTION TESTING ON VANCOMYCIN DAYS OF THERAPY IN PATIENTS WITH PNEUMONIA

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Vancomycin is often used empirically for pneumonia in those at risk for methicillin-resistant Staphylococcus aureus, yet methicillin-resistant Staphylococcus aureus pneumonia is rare. With a lack of objective culture data, it is often difficult to promote de-escalation in this population. Methicillin-resistant Staphylococcus aureus polymerase chain reaction (PCR) nares tests are associated with a strong negative predictive value for methicillin-resistant Staphylococcus aureus pneumonia and have proven to support de-escalation and conservation of vancomycin in this population. The purpose of this study is to determine the impact of nasal methicillin-resistant Staphylococcus aureus polymerase chain reaction testing on vancomycin days of therapy in pneumonia patients.

This retrospective medication use evaluation is being conducted at a single study center. A pharmacist-driven protocol implemented in September of 2018 allows pharmacists to order methicillin-resistant Staphylococcus aureus PCR tests in patients receiving vancomycin for the indication of pneumonia. If the PCR test is negative, pharmacists will contact the provider to discontinue vancomycin. Patients included in the study will be at least 18 years of age and will have received vancomycin for the indication of pneumonia. The primary outcome of vancomycin days of therapy will be evaluated three months before and three months after the pharmacist-driven protocol implementation. The secondary outcome is a cost-savings analysis. Subgroup analysis will be performed on those with a positive PCR test who were de-escalated based on procalcitonin levels per institutional protocol. Preliminary results demonstrated a 45.5% reduction in days of vancomycin therapy after the protocol implementation. Final results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Explain the utility of a polymerase chain reaction nares screen for MRSA.  
Recognize opportunities for streamlining vancomycin therapy based on MRSA nares PCR results.

### Self Assessment Questions:

How does the MRSA nares PCR test support antimicrobial stewardship?

- A: Support appropriate de-escalation of antibiotics used in pneumonia
- B: Supports discontinuation of all antibiotics used in pneumonia
- C: Decrease unnecessary vancomycin use
- D: A and C

**Patient Case:** A patient presents to the Emergency Department with shortness of breath, cough and a temperature of 100.6 OF. The patient was admitted to the hospital 4 weeks ago for pneumonia and was treated with vancomycin.

- A: Add IV azithromycin
- B: Discontinue piperacillin-tazobactam
- C: Discontinue vancomycin
- D: Repeat MRSA nares PCR in 1 week then discontinue vancomycin

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RETROSPECTIVE ANALYSIS OF TIMING OF ANTIBIOTICS IN SEPSIS AND SEPTIC SHOCK AT A COMMUNITY HOSPITAL

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Early identification and appropriate management in the initial hours after sepsis develops improves patient outcomes. The Surviving Sepsis Campaign makes a strong recommendation that administration of intravenous antimicrobials be initiated as soon as possible after recognition of sepsis and within one hour for both sepsis and septic shock. A number of patient and organizational factors influence antimicrobial delays. Purpose: The purpose of this study is to determine how quickly Munson Medical Center administers antibiotics to patients diagnosed with sepsis and septic shock, and to evaluate the correlation between timing of antibiotics in sepsis and patient outcomes. Analyzing the entire process of starting an antibiotic in a patient with sepsis will allow Munson Medical Center to implement changes focused on reducing the time to antibiotic administration. The primary outcome of this study is the percent of patients that receive antibiotics within one hour of prescriber antibiotic order. Secondary outcomes include time between arrival in the emergency department and antibiotic order, time between antibiotic order and pharmacist verification, time between pharmacist verification and antibiotic administration, time between arrival in the emergency department and antibiotic administration, hospital LOS ICU LOS, in hospital mortality, and 30 day readmission. Methods: A retrospective chart review of patients who received a diagnosis code of either 65.20 (severe sepsis without shock) or 65.21 (severe sepsis with shock) and met the CMS definition for sepsis (2/4 SIRS criteria, organ dysfunction, clinical documentation of sepsis or provider diagnosis of sepsis) at Munson Medical Center from 10/1/17 to 10/1/18 was performed. Patients were excluded if they were already receiving an antibiotic at the time of sepsis recognition. Results/conclusions: Results will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe organizational factors that influence antimicrobial delays.  
Review the impact of time to antimicrobial therapy in sepsis.

### Self Assessment Questions:

According to the Surviving Sepsis Campaign, antibiotics should be administered within how many hours after recognition of sepsis?

- A One hour
- B: Two hours
- C: Three hours
- D: Four hours

Which of the following outcomes is associated with timely administration of antimicrobial therapy in patients with sepsis and septic shock?

- A Increased rates of antimicrobial resistance
- B Increased adverse effects from antibiotics
- C Decreased mortality
- D Increased rates of acute kidney injury

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE RISK OF DEVELOPING THROMBOCYTOPENIA WITHIN FIVE DAYS OF CONTINUOUS RENAL REPLACEMENT THERAPY INITIATION IN SEPTIC SHOCK PATIENTS

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Purpose: Many critically ill patients admitted to an intensive care unit are diagnosed with thrombocytopenia during their hospital stay. To date, there has been a paucity of literature published examining the association between continuous renal replacement therapy (CRRT) and thrombocytopenia in critically ill patients. Heparin-induced thrombocytopenia (HIT) is often suspected in patients receiving CRRT when thrombocytopenia occurs. This study was conducted to assess the temporal relationship of thrombocytopenia in relation to CRRT initiation. In addition, the study investigators examined the total incidence of positive HIT antibody results when HIT was suspected and subsequently assessed by ordering HIT antibody assays. With the results and conclusions of this study, the findings may support the utility of sending less HIT antibodies in the future, overall minimizing extraneous healthcare resources.

Methods: This Institutional Review Board approved two-group, retrospective, cohort study was conducted using an electronic medical records database. Reverse chronological order was utilized for study recruitment and inclusion until eighty patients were included in each cohort (subjects with septic shock who did not receive CRRT versus those who did receive CRRT). Patients were excluded if the baseline platelet count was  $<150 \times 10^3/\text{mm}^3$ , if a platelet transfusion was ordered before a platelet count of  $150 \times 10^3/\text{mm}^3$ , if patients had end-stage liver disease prior to admission, patients on extracorporeal membrane oxygenation (ECMO), documented active bleeding, and patients without a baseline platelet count upon hospital admission. Between-group comparisons of nominal variables were assessed using Chi-square or Fisher exact tests while those measured on a continuous scale were assessed using student t-test.

Results and Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize factors that may lead to thrombocytopenia development after continuous renal replacement therapy initiation.

Identify sequelae from thrombocytopenia development in patients admitted to an intensive care unit.

### Self Assessment Questions:

Which is most appropriate regarding thrombocytopenia development during continuous renal replacement therapy (CRRT)?

- A Limited studies have been published examining the effects CRRT
- B: Thrombocytopenia will always develop as a result of CRRT initiation
- C: The mechanism of how CRRT causes thrombocytopenia is well understood
- D: Currently in the literature there is a standard percent decline of platelets

Which is not a sequela of developing thrombocytopenia in patients admitted to an intensive care unit (ICU)?

- A Longer ICU lengths of stay
- B Increased bleeding risk
- C Longer mechanical ventilation days
- D Fewer blood transfusions required

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF APIXABAN USE IN PATIENTS WITH END-STAGE RENAL DISEASE

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Anticoagulation in patients with non-valvular atrial fibrillation or venous thromboembolism with concurrent renal dysfunction is a challenge healthcare providers frequently face. While warfarin has historically been the standard in this patient population, there is growing interest in the utilization of apixaban in patients with end-stage renal disease (ESRD) on hemodialysis. The FDA-approved prescribing information for apixaban states that apixaban may be used in patients with ESRD on hemodialysis despite the lack of clinical efficacy and safety. The purpose of this medication use evaluation is to identify the number of patients with ESRD who received apixaban at The Ohio State University Wexner Medical Center (OSUWMC) so that the current recommendation to avoid apixaban in patients with creatinine clearance (CrCl) less than 30 ml/min can be re-evaluated.

A single-center retrospective chart review was conducted to evaluate all orders and prescriptions written for apixaban in patients with an eGFR below 30 between November 1, 2016 and January 21, 2018 at OSUWMC. The primary outcome is the number of patients with ESRD on hemodialysis who received at least one dose of apixaban. Secondary outcomes include occurrence of any bleeding events, dose of apixaban by indication, held orders of apixaban due to AKI, number of prescriptions for apixaban written for patients with ESRD, and appropriateness of order question responses.

Of 180 orders placed for apixaban, 144 (80%) patients received at least one dose and 32 (22.22%) of those patients were on hemodialysis. Among the 144 patients who received apixaban, 113 (78.47%) orders were continuation of home therapy. There were eight bleeding events that resulted in doses being temporarily held and one event that led to the patient converting to warfarin.

The FDA approved dosing of apixaban in patients with renal dysfunction may be appropriate despite the exclusion of these patients in phase III clinical studies.

### Learning Objectives:

Define the recommended dosing of apixaban for non-valvular atrial fibrillation and treatment of venous thromboembolism

Review the available evidence and rationale supporting the use of apixaban in patients with ESRD

### Self Assessment Questions:

What is the recommended dosing of apixaban for an 81-year-old patient with non-valvular atrial fibrillation and ESRD on hemodialysis?

- A: 2.5 mg PO twice daily
- B: 5 mg PO twice daily
- C: 10 mg PO twice daily for 7 days, followed by 5 mg twice daily
- D: Apixaban would not be appropriate for this patient

Which of the following regarding apixaban dosing is NOT true?

- A: Approval of apixaban in patients with ESRD on hemodialysis is based on clinical studies
- B: Patients with ESRD on hemodialysis being treated for DVT or PE are not eligible for apixaban
- C: Clinical studies that led to FDA approval of apixaban included patients with ESRD on hemodialysis
- D: Standard dosing for patients taking apixaban for non-valvular atrial fibrillation is 5 mg PO twice daily

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PATIENT-ALIGNED CARE TEAM CLINICAL PHARMACY SPECIALISTS' INTERVENTIONS FOR REDUCING HYPOGLYCEMIA IN A VETERAN POPULATION

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**Purpose:** The goal of this project is to perform a retrospective chart review to evaluate if Clinical Pharmacy Specialists (CPS) within Veteran Affairs patient-aligned care teams (PACT) are making a meaningful impact on the reduction of hypoglycemia in veterans. The hypothesis is that CPS are making interventions that resolve or improve the incidence or severity of hypoglycemia and that patients with an intervention for hypoglycemia will have a low rate of hospital admission, ER visits, or emergency medical intervention for hypoglycemia.

**Methods:** This study was approved by the Institutional Review Board of the University of Cincinnati. Chart review will be performed on patients that had a CPS intervention for "adjusted medication for low blood sugar or "changed medication for low blood sugar" documented by the Pharmacists Achieve Results with Medications Documentation (PhARM) tool from January 1, 2017 through December 31, 2017. The following data will be collected via retrospective chart review: demographic data (age, sex, ethnicity), type of diabetes mellitus (DM), the pharmacologic intervention made for hypoglycemia, the lowest glucose value <70mg/dL, and the number of glucose values <70mg/dL before and after the intervention. At the follow-up appointment, it will be noted whether hypoglycemia resolved or required another intervention and if the patient was hospitalized, went to the ED, or needed emergency medical intervention caused by hypoglycemia prior to the second appointment. If another intervention is required, fingerstick blood glucose readings will be evaluated to determine if there was a change in lowest blood glucose value or number of hypoglycemic events between the initial and follow-up appointments. Additionally, any hypoglycemia diabetes self-management education will be recorded, along with any factors that could have precipitated unresolved hypoglycemia such as diet, exercise, or incorrect use of medications.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the importance of interventions that PACT clinical pharmacy specialists can have to reduce the incidence of hypoglycemia in their patients.

Describe the effect that pharmacist-initiated medication changes have on reducing patient hypoglycemia.

### Self Assessment Questions:

Which is a factor that increases a patient's risk of hypoglycemia?

- A: Gender
- B: Copd
- C: Obesity
- D: Use of insulin

Which of the following is true?

- A: Patients who experience severe hypoglycemia with symptoms are at a higher risk of mortality
- B: Severe hypoglycemia is not correlated with an increase in the risk of mortality
- C: Hypoglycemia is preferable to hyperglycemia, as hypoglycemia does not affect the frequency or severity of hypoglycemia
- D: Pharmacists cannot affect the frequency or severity of hypoglycemia

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A CRITICAL CARE PHARMACIST-DRIVEN STRESS ULCER PROPHYLAXIS DISCONTINUATION POLICY AT A COMMUNITY TEACHING HOSPITAL

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**Background:** Stress ulcer prophylaxis (SUP) is commonly used in the intensive care setting, designed to prevent stress-related mucosal bleeding of the upper gastrointestinal system. Proton pump inhibitors (PPIs) are commonly prescribed as prophylaxis for SUP, however, prevalence of clinically important bleeding in the intensive care unit (ICU) is low. Concerns have been raised due to increasing evidence regarding adverse events associated with PPIs such as *Clostridioides difficile* infections and hospital-acquired pneumonia in ICU patients. Recently, pharmacist-driven discontinuation policies are increasingly employed to address SUP and PPI overuse to eliminate inappropriate therapy, reduce potential harm and cost. At Mercy Health Saint Mary's, an ICU SUP discontinuation policy was created in collaboration with intensivists to empower pharmacists to continually evaluate SUP need and either discontinue therapy no longer indicated or interchange PPIs for histamine-2 receptor antagonists (H2RAs). The purpose of this project is to evaluate a pharmacist-driven SUP discontinuation policy in the ICU before and after its implementation.

**Methods:** This is a quasi-experimental retrospective chart review of patients  $\geq 18$  years old followed by the critical care service who received at least one dose of pantoprazole, lansoprazole, or famotidine, before and after implementation of the policy. The primary objective of the project is to compare inappropriate SUP per 100 patient days before and after the implementation of the SUP discontinuation policy. Secondary objectives include SUP de-escalation, therapy duration, adverse events, and therapy at discharge. The electronic medical record was used to collect data such as patient demographics, major and minor risk factors for stress ulceration, duration of SUP, and adverse events such as hospital-acquired pneumonia and *C. difficile* infections.

**Results:** Pending data analysis

**Conclusion:** Will be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Review current literature surrounding the use of stress ulcer prophylaxis discontinuation policies.

Discuss the results of the pharmacist-driven stress ulcer prophylaxis discontinuation policy in the ICU at Mercy Health Saint Mary's.

### Self Assessment Questions:

According to a recent study, the percentage of critically ill patients discharged from the hospital inappropriately prescribed SUP is:

- A 5.2%
- B 24.4%
- C 10.9%
- D 18%

According to recent evidence, PPIs are the preferred therapy for SUP over H2RAs due to:

- A Efficacy
- B Cost
- C Safety
- D None of the above: PPIs are not preferred over H2RAs

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ADVERSE OUTCOMES ASSOCIATED WITH HYPERTONIC SALINE IN A NEUROCRITICAL CARE POPULATION

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**Purpose:** Elevated intracranial pressure and cerebral edema are leading predictors of poor neurological outcomes and mortality in patients with head trauma, intracranial hemorrhages, or acute ischemic strokes. Hypertonic saline (HTS) is the mainstay of treatment to increase plasma osmolarity causing excess water to flow from cerebral tissue to the blood, ultimately decreasing swelling and intracranial pressure. However with this treatment option, there are adverse events that can occur, specifically kidney related adverse events and mortality. Recent trials in critically ill populations have demonstrated a reduction in kidney related adverse events with the use of balanced crystalloid groups when compared to 0.9% sodium chloride (NaCl). The available data have shown poorer outcomes with using 0.9% NaCl as treatment, as well as worse outcomes with increasing chloride levels in the medical intensive care unit (ICU), surgical ICU as well as the emergency department. The purpose of this study is to assess adverse kidney outcomes and risk of in-hospital mortality associated with HTS in a neurocritical care population.

**Methods:** A retrospective cohort study was conducted at a large academic medical center on 112 adult patients in the neurosciences ICU who received 3% NaCl and/or 23.4% NaCl from July 1, 2016 to July 31, 2018. The primary endpoint was Major Adverse Kidney Events (MAKE-30), defined as at least one component of the composite: in-hospital mortality, receipt of new renal-replacement therapy, or persistent renal dysfunction defined as a serum creatinine  $\geq 200\%$  of baseline at 30 days. Baseline characteristics, indication for HTS, pertinent lab values including changes in serum electrolyte concentrations, total HTS volume and associated sodium and chloride milliequivalents, and patient outcomes were collected. Data was entered into a REDCap database and statistical analysis was performed using SPSS software.

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

### Learning Objectives:

Explain the role of hypertonic saline for elevated intracranial pressure and cerebral edema

Identify the contributing factors leading to adverse outcomes from hypertonic saline administration in a neurocritical care population

### Self Assessment Questions:

What is the mechanism of action of hypertonic saline in reducing intracranial pressure and cerebral edema?

- A Decreases plasma osmolarity causing excess water to flow from th
- B Increases plasma osmolarity causing excess water to flow from th
- C Produces an osmotic diuresis by increasing the osmotic pressure
- D Reduces blood viscosity which increases cerebral flow and oxygen

Possible advantages to using hypertonic saline include which of the following?

- A Producing smooth muscle vasodilation improving blood flow
- B Reducing intracranial pressure by increasing plasma osmolarity
- C Reducing secondary cell injury caused by cerebral edema
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## USE OF DIRECT ORAL ANTICOAGULANTS COMPARED TO WARFARIN IN THE OBESE POPULATION

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**Purpose:** The purpose of this study is to evaluate recurrence rates of stroke and venous thromboembolism in obese patients treated with a direct oral anticoagulant (DOAC) compared to warfarin. The American Heart Association guidelines for stroke and atrial fibrillation recommend a DOAC or warfarin for the prevention of venous thromboembolism or stroke in obese patients. The American College of Chest Physicians (CHEST) guideline recommends a DOAC for venous thromboembolism prophylaxis. These guidelines do not differentiate between obese and non-obese patients. **Methods:** The retrospective study was approved by the Institutional Review Board. It examined the primary efficacy composite endpoint of the incidence of recurrent venous thromboembolism or stroke in obese patients treated with a DOAC compared to warfarin. The single-center study was conducted at a 450 bed regional medical center located in Central Illinois, United States and reviewed the electronic medical record of patients discharged between March-September 2018. Patients 18 years or older with a body mass index (BMI) greater than 25 kg/m<sup>2</sup> who were discharged on warfarin, dabigatran, apixaban, or rivaroxaban for the treatment of atrial fibrillation venous thromboembolism, or ischemic stroke are included. Patients included must have a creatinine clearance greater than 30 mL/minute, be non-pregnant, not have a diagnosis of active cancer, and not be treated with anticoagulation for a hip or knee replacement surgery. The primary safety endpoint of major bleeding events will be identified using International Statistical Classifications of Diseases (ICD) 10 codes for gastrointestinal or intracranial bleeding, and major bleeding related to anticoagulant medications. **Conclusions:** Preliminary data collection reveals patients with baseline characteristics of age 70.9 years, average BMI of 34.9 kg/m<sup>2</sup>. The primary disease state seen in the study population is atrial fibrillation. Final results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the common oral medications used to prevent recurrent stroke and venous thromboembolism

Recognize the potential impact of institution-specific rates of recurrent venous thromboembolism and stroke on providing evidence-based recommendations for appropriate anticoagulant medication selection

### Self Assessment Questions:

Which of the following medications is a direct thrombin inhibitor that can be used for the prevention of recurrent stroke or venous thromboembolism?

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

Current guidelines make which of the following recommendations regarding anticoagulation to prevent recurrent stroke or venous thromboembolism in obese patients?

- A Choice of anticoagulant and dose of medication do not differ between obese and non-obese patients
- B In obese patients it is preferable to use warfarin rather than a direct oral anticoagulant
- C In obese patients, a direct oral anticoagulant can be used but a higher dose is required
- D Neither warfarin nor direct oral anticoagulants are appropriate options for obese patients

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

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### Learning Objectives:

### Self Assessment Questions:

- A
- B:
- C:
- D:

- A
- B
- C
- D

Q1 Answer: Q2 Answer:

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **SAFETY AND EFFICACY OF PROPYLENE GLYCOL-FREE MELPHALAN IN MULTIPLE MYELOMA PATIENTS WITH RENAL IMPAIRMENT**

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**Purpose:** Melphalan is an alkylating agent that has shown positive benefit in the setting of conditioning chemotherapy prior to autologous stem cell transplant (auto-SCT) in patients with multiple myeloma. The conventional formulation of melphalan hydrochloride has limited solubility and a short stability upon reconstitution, requiring the addition of propylene glycol (PG) as a co-solvent. In high doses, PG has been associated with severe toxicities, including renal dysfunction and cardiac arrhythmias. Propylene glycol-free (PG-free) melphalan is a novel formulation of melphalan that eliminates the need for PG by using Captisol as a co-solvent. By simplifying preparation and administration, this has potential to improve overall patient outcomes. PG-free melphalan has been shown to be a safe and effective option, with outcomes consistent with those of conventional melphalan. However, unlike conventional melphalan, PG-free melphalan has not been studied in patients with poor renal function. The objective of this study is to evaluate safety and efficacy of PG-free melphalan in patients with baseline renal dysfunction. **Methods:** This is a single center, retrospective analysis of multiple myeloma patients with baseline creatinine clearance (CrCl) < 60 mL/min, treated with melphalan as conditioning chemotherapy prior to auto-SCT. Exclusion criteria include baseline CrCl ≥ 60 mL/min, melphalan dose < 140 mg/m<sup>2</sup>, or lost to follow up within 100 days. Patients will be divided into two arms for comparison: conventional melphalan or PG-free melphalan. Our primary outcomes will be time to neutrophil and platelet engraftment, as defined by absolute neutrophil count ≥ 500/mm<sup>3</sup> for three consecutive days and platelet count ≥ 20 x 10<sup>9</sup> L for three consecutive days, respectively. Secondary outcomes will include overall response at day 100, incidence of acute kidney injury, hospital length of stay, and transplant-related mortality within 100 days of auto-SCT. Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Describe the role of melphalan in autologous stem cell transplant  
Explain the benefits of using a propylene glycol-free melphalan formulation as compared to conventional melphalan

### **Self Assessment Questions:**

Which of the following is true regarding high dose melphalan in autologous stem cell transplant?

- A: Stem cell rescue is not necessary after high dose melphalan administration
- B: High dose melphalan is myeloablative, causing irreversible cytopenias
- C: The purpose of giving high dose melphalan is to prevent graft-versus-host disease
- D: Melphalan itself does not cause toxicities, all of the toxicities are due to propylene glycol

Which of the following problems are associated with utilizing conventional melphalan?

- A: Co-solvent (propylene glycol) can cause toxicities independent of melphalan dose
- B: Product has limited solubility in preparation
- C: Reconstituted drug has very short stability
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## **VALIDATION OF THE RAP-AM SCORE TO PREDICT VENOUS THROMBOEMBOLISM IN ELDERLY TRAUMA PATIENTS**

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**Purpose:** Venous thromboembolism (VTE) is associated with increased morbidity, mortality, and healthcare burden. Risk factors for VTE in trauma patients include underlying medical conditions, iatrogenic factors, injury-related factors, and age; however, emerging data suggests risk plateaus or even decreases above 65 years of age. Greenfield Risk Assessment Profile (RAP) ≥ 5 places patients at high VTE risk, with increasing age assigning higher points. The purpose of this study is to validate age-modified RAP (RAP-AM) ability to predict VTE in elderly trauma patients. The hypothesis is elderly trauma patients with a RAP-AM ≥ 5 will have a greater incidence of VTE compared to elderly trauma patients with a RAP-AM < 5.

**Methods:** This retrospective, cohort study included patients admitted to the trauma service with age ≥ 65 years and prescribed chemoprophylaxis within 72 hours of admission. Patients were excluded if VTE was diagnosed prior to receipt of chemoprophylaxis, died within 24 hours, or were pregnant or a prisoner. Primary outcome was VTE incidence between RAP-AM ≥ 5 (i.e., high VTE risk patients) and RAP-AM < 5 (i.e., low VTE risk patients). Secondary outcomes include risk factor determination for VTE, unfractionated heparin (UFH) prescribing, enoxaparin prescribing, and bleeding events. Categorical data were analyzed using Chi-square or Fisher's exact test, whereas continuous data were analyzed using Student's t-test or Wilcoxon Rank Sum, as appropriate. Multivariate logistic regression was performed for risk factor determination. Receiver operating characteristic curve analysis was performed to determine the area under the curve, sensitivity and specificity of RAP-AM, RAP, and Injury Severity Score (ISS) for predicting VTE.

**Results:** Data collection and analysis are currently on-going.

### **Learning Objectives:**

Classify trauma patient VTE risk using the Greenfield Risk Assessment Profile  
Translate trauma patient VTE prophylaxis literature

### **Self Assessment Questions:**

CG is a 65 year old male with a past medical history of hyperlipidemia and type II diabetes mellitus. He was admitted to the trauma service following a motor vehicle collision. Injuries include right

- A: RAP 13; High risk
- B: RAP 13; Low risk
- C: RAP 9; High risk
- D: RAP 9; Low Risk

Based on his calculated RAP, which agent is best for the patient's chemoprophylaxis (no contraindications to therapy at this time)?

- A: Enoxaparin 30 mg subcutaneously twice daily
- B: Heparin 5,000 units subcutaneously every 8 hours
- C: Enoxaparin 40 mg subcutaneously twice daily
- D: Heparin 7,500 units subcutaneously every 8 hours

Q1 Answer: A      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSOCIATION OF RAPID PATHOGEN IDENTIFICATION AND PHARMACIST INTERVENTION ON MORTALITY IN PATIENTS WITH BLOODSTREAM INFECTIONS AT A COMMUNITY TEACHING HOSPITAL

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**Purpose:** Bloodstream infections have been associated with poor patient outcomes including a high mortality and extended hospital length of stay. Rapid pathogen identification coupled with real-time intervention by an antimicrobial stewardship team has been shown to improve patient outcomes and decrease health-system costs. While many of these studies are performed at large, tertiary academic health-systems, these interventions are possible at smaller community based institutions that lack many of the resources available to larger institutions. The main objective of this study is to assess patient outcomes for bloodstream infections pre- and post-implementation of rapid pathogen identification technology.

**Methods:** This quasi experimental study is approved by the institutional review board. In December 2016, the microbiology laboratory modified the positive blood culture reporting process, notifying an ID pharmacist on weekdays between the hours of 0700-1600, and a pharmacy generalist outside of these hours. The pharmacist then notifies the provider and makes a real-time recommendation on drug therapy. Patients will be sequentially reviewed for inclusion pre- and post-implementation of the rapid pathogen identification technology if they are 18 years or older and have at least one positive blood culture. Patients will be excluded if they are under eighteen years of age, pregnant, have a polymicrobial blood culture, undergoing hospice, have a culture result known at time of admission, expire prior to blood culture turning positive or are a transplant patient. Data to be collected includes patient demographics, risk factors, PITT bacteremia score, presumed source, organism identified, sensitivity data/resistance mechanism, effective antimicrobial regimen, optimal antimicrobial regimen, time to effective and optimal regimens, length of stay, length of ICU stay, in-hospital mortality, and total admission costs. The primary outcome is in-hospital mortality pre- and post-implementation of the rapid pathogen identification technology. Secondary outcomes include additional clinical outcomes as well as health-system costs.

### Learning Objectives:

Describe how rapid diagnostics can improve patient outcomes for the treatment of bloodstream infections

Explain the importance of an antimicrobial stewardship team when implementing rapid diagnostic tests

### Self Assessment Questions:

Which of the following is true regarding rapid diagnostic tests (RDTs) for bloodstream infections?

- A RDTs have been shown to improve time to optimal therapy and inc
- B: RDTs have been shown to improve time to optimal therapy but the
- C: RDTs have been shown to improve time to optimal therapy and de
- D: There is no role for RDTs as they have not shown to improve patie

Which of the following best describes the role antimicrobial stewardship (ASP) teams have when utilizing rapid diagnostic tests?

- A An ASP team with real-time intervention is essential to optimize RI
- B An ASP team with real-time intervention is not necessary to optimi
- C Evidence consistently shows a decrease in patient mortality with o
- D Evidence consistently shows an increase in patient mortality with c

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE SAFETY AND EFFICACY OF VERAPAMIL VERSUS DILTIAZEM FOR ACUTE RATE CONTROL AT AN ACADEMIC MEDICAL CENTER

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Due to critical shortages of intravenous diltiazem in 2018, several health systems adopted intravenous verapamil as an alternative. However, there is a paucity of data supporting the use of intravenous verapamil infusions for rate control in the acute treatment of atrial fibrillation. The purpose of this retrospective, case-control study was to determine the safety and efficacy of intravenous verapamil infusions compared to diltiazem infusions for this indication. All patients that received verapamil infusions for acute treatment of atrial fibrillation between June 1 and September 30, 2018 (N=73) at The Ohio State University Wexner Medical Center were identified and case-matched to patients who received diltiazem infusions between June 1 and September 30, 2017.

The primary safety outcome of the composite need for inotrope or vasopressor was similar for both groups (5% with verapamil versus 4% with diltiazem). The rate of SBP <90 mm Hg, MAP <65 mm Hg, or both was similar between groups (37% with verapamil versus 35% with diltiazem), and the rate of HR <60 bpm was similar between groups (19% with verapamil versus 18% with diltiazem). The efficacy outcomes of this study were similar for both groups, with 65 patients (89%) in the verapamil group and 66 patients (90%) in the diltiazem group achieving a goal HR < 110 bpm during the infusion. One patient (1.4%) in the verapamil group and three patients (4%) in the diltiazem group required amiodarone in addition to the calcium channel blocker.

Results of this study provide safety and efficacy information regarding the use of intravenous verapamil infusions in the acute treatment of atrial fibrillation. Compared to diltiazem, verapamil patients had similar rates of safety and efficacy outcomes. The results of this study support the use of intravenous verapamil for acute atrial fibrillation when treatment with a calcium channel blocker is warranted.

### Learning Objectives:

Explain the role of intravenous calcium channel blockers in the acute management of atrial fibrillation.

Identify the differences between intravenous verapamil and diltiazem continuous infusions when used for the acute management of atrial fibrillation.

### Self Assessment Questions:

Diltiazem is preferred over verapamil continuous infusions for rate control in the acute management of atrial fibrillation. Which of the following is the primary reason for this difference?

- A Verapamil is not manufactured as an intravenous product
- B: Verapamil may increase the risk of symptomatic hypotension as c
- C: Verapamil is not effective at achieving rate control
- D: Verapamil has fewer drug-drug interactions as compared to diltiaz

What initial treatment would be appropriate for a 50-year old male with acute atrial fibrillation, ventricular rate of 140 bpm, blood pressure of 130/90 mmHg, and an ejection fraction of 55%?

- A Diltiazem infusion initiated at 5 mg/hr
- B Diltiazem ER tablet 600 mg daily
- C Verapamil infusion initiated at 5 mg/hr
- D A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DETERMINING OPPORTUNITIES FOR RISK REDUCTION AMONG PATIENTS RECEIVING CHRONIC OPIOIDS IN PRIMARY CARE CLINICS

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Among patients being prescribed chronic opioids, defined as continuous use of opioids for three months or longer, by their primary care provider (PCP), one in four struggle with opioid use disorder. Characteristics of patients receiving chronic opioid prescriptions in Froedtert & the Medical College of Wisconsin (F&MCW) primary care clinics have not been previously assessed. F&MCW PCPs and patients may benefit from integrated care with pharmacists as team members to assist in managing patients' risk factors for opioid misuse and abuse; these include daily Morphine Milligram Equivalents over 50, concomitant benzodiazepine therapy, history of overdose or substance abuse, and mental health conditions. Additionally, pharmacists can optimize patients' protective factors by assisting with opioid tapering, naloxone prescribing, routine urine drug screens, documentation of pain agreements, and screening of patients who may benefit from a referral to pain management. This study sought to better understand F&MCW primary care patients at risk for opioid misuse and abuse.

This retrospective chart review evaluated patients who received chronic opioid prescriptions from an F&MCW PCP between April 1st, 2018 and October 1st, 2018. Patients prescribed opioids from an oncology clinic, those with active cancer, or those followed by hospice and/or palliative care or pain management clinic were excluded. The F&MCW prescribing patterns and patient characteristics were assessed based on the 2016 Center for Disease Control and Prevention (CDC) Guideline for Prescribing Opioids for Chronic Pain to identify the current management of risk factors and protective factors of patients receiving chronic opioid therapy. F&MCW will use this data to identify the optimal ambulatory care pharmacist role to reduce the number and extent of patients at risk of opioid misuse and abuse in primary care clinics.

Data collection and analysis are ongoing. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize risk factors and protective factors for patients who receive chronic opioid prescriptions as outlined by The Center for Disease Control and Prevention (CDC).

Identify opportunities for integrated care of pharmacists in primary care clinics to reduce the number and extent of patients at risk for opioid misuse and abuse in the ambulatory care setting.

### Self Assessment Questions:

Which of the following is NOT a risk factor of opioid misuse and abuse for patients prescribed chronic opioid therapy?

- A Concomitant benzodiazepine therapy
- B: Daily Morphine Milligram Equivalents of 50 or higher
- C: Annual urine drug screens
- D: Comorbid mental health condition

What services could an ambulatory care pharmacist provide to reduce the number and extent of patients at risk of opioid misuse, abuse, and overdose?

- A Order and assess urine drug screens at appropriate intervals
- B Identify patients at risk and develop opioid taper plans
- C Prescribe and educate patients on use of naloxone
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## TREATMENT BUNDLE OF INTRAVENOUS ASCORBIC ACID, THIAMINE, AND HYDROCORTISONE FOR PATIENTS WITH SEPSIS IN THE INTENSIVE CARE UNIT

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Purpose: Intravenous ascorbic acid, thiamine, and hydrocortisone administered as an adjunctive regimen for sepsis reduced in-hospital mortality by 31.9% in a recent retrospective study. Contention exists whether this therapy could so drastically impact outcomes for sepsis. This bundle is proposed to mitigate the deleterious effects of the dysregulated host response in septic patients through antioxidant and anti-inflammatory activity. Within our health system, patients receive the bundle at the discretion of the attending intensivist. This study seeks to identify the impact of this regimen for intensive care unit (ICU) patients with sepsis. Methods: This retrospective chart review was approved by the site Institutional Review Board. Patients with a discharge diagnosis for sepsis or septic shock were screened for inclusion. The treatment group patients received intravenous ascorbic acid, thiamine, and hydrocortisone for at least 24 hours compared to control patients who did not receive this bundle. ICU patients with a Sequential Organ Failure Assessment (SOFA) score of 2 or more at ICU admission and who received 5 or more days of antibiotic therapy after diagnosis or until expiration were eligible for inclusion. Patients who were under 18, incarcerated, or pregnant were excluded. To reduce patient heterogeneity, the groups were matched 1:1 based on SOFA score (+/- 2), age (+/- 15 years), and need for mechanical ventilation (Y/N) or vasopressor support (Y/N) within 12 hours of ICU admission. The primary outcome was in-hospital mortality. Secondary outcomes included length of stay, ventilator days, antibiotic duration, vasopressor dose and duration within 72 hours after ICU admission and at expiration. Adherence to target fluid resuscitation and time to antibiotics were also assessed. Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the risks and benefits of adopting a treatment bundle of ascorbic acid, thiamine, and hydrocortisone for patients with sepsis or septic shock. Recognize confounding factors that influence mortality in patients with sepsis and septic shock

### Self Assessment Questions:

Which potential adverse effect of high-dose intravenous ascorbic acid led to the addition of thiamine to the treatment bundle in the landmark study?

- A Nephrolithiasis
- B: Pancreatitis
- C: Hepatosteatorosis
- D: Drug Interactions

Which of the following is associated with reduced mortality in patients with sepsis?

- A Minimal fluid resuscitation
- B Delayed administration of anti-infectives
- C High tidal-volume ventilation
- D Norepinephrine as the first-choice vasopressor

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A PRECISION MEDICINE BASED APPROACH IN PATIENTS WITH METASTATIC COLORECTAL CANCER

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### Purpose:

In patients that have progressed on multiple lines of therapy, genomic sequencing offers therapies that may not have previously been considered. Formal assessment of the clinical benefit of these programs within specific disease types have been limited. This study investigated the impact of genomically directed therapy on metastatic colorectal cancer patient outcomes. The primary objective of this study was to evaluate the progression free survival (PFS) ratio in patients treated with genomically directed therapy versus those that were not. The secondary objectives looked at median PFS and overall survival (OS) between the two groups.

### Methods:

Patients with metastatic colorectal cancer were referred to the Precision Genomics Program. Tumor samples were sent for sequencing to determine actionable targets. A multidisciplinary molecular tumor board reviewed the reports and made recommendations for genomically directed therapy on any actionable targets. The PFS ratio was calculated by taking the PFS of the genomically directed line of therapy divided by the PFS of their prior line. Any ratio  $\geq 1.3$  was considered clinically meaningful.

### Results:

151 patients were evaluated for inclusion with 63 deemed eligible. Of the 63 evaluable patients, 44 went on genomically directed therapy while 19 did not. In the genomically directed group, 30.3% had a PFS ratio  $\geq 1.3$  versus 26.3% in the non-genomically directed group [p-value 0.51]. Median PFS was 3.2 months in the genomically directed group versus 3.1 months in the non-genomically directed group [p-value 0.68]. Median overall survival was 9.5 months in the genomically directed group versus 8.9 months in the non-genomically directed group [p-value 0.46].

### Conclusions/Discussion:

PFS ratio, median PFS and OS were not significantly different between the two groups. Limitations of this study include small sample size and many patients being lost to follow-up.

### Learning Objectives:

Discuss the role of genomic sequencing in patient with colorectal cancer  
Review ways to measure outcomes in trials evaluating genomically directed therapy.

### Self Assessment Questions:

What is one of the goals of genomically directed therapy in patients with colorectal cancer?

- A Use targeted therapy to cure patients of colorectal cancer
- B: Discover new therapies to treat all patients with colorectal cancer
- C: Identify potential targets in patient specific tumors for drugs or clinical trials
- D: Determine best FDA approved standard of care treatment for the patient

What is the gold standard in measuring outcomes in trials evaluating genomically directed therapy?

- A Progression Free Survival
- B Overall Survival
- C Progression Free Survival Ratio
- D There is no standard

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CIRRHOSIS, THROMBOSIS, FINDING FACTS ABOUT DOSES: DOSING OF UNFRACTIONATED HEPARIN FOR VENOUS THROMBOEMBOLISM IN CIRRHOSIS

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Hepatic cirrhosis generally results in complex and diametrically opposed coagulopathies for the afflicted patient, and thus increases risks of both bleeding and thrombosis. While clotting factor dysfunction and lab abnormalities are commonly identified in these patients, it is unclear how these changes may impact dosing strategies for therapeutic unfractionated heparin infusions. Since anti-Xa levels have been found to be falsely low in this population, our study objective is to see if cirrhotic patients actually require higher doses of heparin compared to non-cirrhotic controls. Ultimately, we ponder whether or not a unique heparin dosing nomogram may be needed for this population.

The electronic medical record is used to identify patients with a diagnosis of cirrhosis and proven or suspected venous thromboembolism who are receiving unfractionated heparin continuous intravenous infusion on the DVT/PE nomogram for at least 72 hours. Initial analysis determines patients' heparin requirements over the duration of infusion and anti-factor Xa levels yielded during the infusion period. Additional demographic data collected includes: age, weight, sex, location of thrombus, Child-Turcotte-Pugh and MELD scores, history of thromboembolism or ischemic stroke, comorbidities responsible for cirrhosis, risk factors for thromboembolism or bleeding, institutional heparin protocol used, and anticoagulation prior to beginning heparin therapy.

Data collection and analysis is still ongoing, but includes mean and median heparin infusion rates once patients have two consecutive therapeutic anti-Xa levels. Other descriptive analyses include anti-Xa level after protocol initiation, time to first therapeutic anti-Xa, percent of time in therapeutic range, and number of dose increases required to reach therapeutic anti-Xa levels. Safety data will also be collected, including episodes of ischemic stroke, breakthrough venous thromboembolism, major bleeding and death. At present, sufficient data has not been analyzed to draw conclusions, but identification and interpretation of trends will be completed before the presentation deadline.

### Learning Objectives:

Recognize trends in anti-Xa monitoring which may be different in patient with cirrhosis.

Describe how patterns in anti-Xa monitoring can be used to adjust heparin therapy in cirrhotic patients to compensate for the known trends

### Self Assessment Questions:

Which of the following best describes the production of anti-Xa in patients with cirrhosis?

- A Severity of liver disease has no correlation to anti-Xa levels
- B: Severity of liver disease is inversely correlated with anti-Xa levels
- C: Severity of liver disease is positively correlated with anti-Xa levels
- D: Severity of liver disease should not be used to describe liver function

Which of the following outcomes is most likely to be useful in applying this research directly to clinical heparin infusion monitoring in cirrhotic patients?

- A Average time in therapeutic range
- B Rate of bleeding within 30 days of heparin infusion initiation
- C Median time to first therapeutic anti-Xa level
- D Median rate at which patients with cirrhosis first achieved therapeutic anti-Xa levels

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## HIGH-DOSE METHOTREXATE-BASED REGIMENS WITH OR WITHOUT VINCRIStINE FOR THE TREATMENT OF PRIMARY CENTRAL NERVOUS SYSTEM LYMPHOMA

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**Purpose:** Systemic high-dose methotrexate (HD-MTX) therapies have historically served as the backbone of primary central nervous system lymphoma (PCNSL) treatment, and one induction regimen for PCNSL commonly used at our institution is rituximab, HD-MTX, procarbazine and vincristine (R-MPV). While there is literature to support R-MPV, no high-level evidence exists to support the optimal HD-MTX induction regimen. One agent within the R-MPV regimen worth evaluating is vincristine (VCR) due to dose-limiting neuropathies and its poor blood brain barrier penetration. Furthermore, neuropathy often forces dose reductions or discontinuation of VCR from induction therapy. The decision to omit vincristine is not a universal practice, which prompts the need to study if the removal of VCR affects clinical outcomes in patients with PCNSL treated with rituximab, HD-MTX, and procarbazine (R-MP) or rituximab and HD-MTX (R-M). Our hypothesis is that removing VCR from induction R-MPV will not affect the complete response (CR) rate and that HD-MTX-based regimens without vincristine will be associated with lower toxicity.

**Methods:** This is a single-center, retrospective cohort review conducted to assess the impact of VCR in the treatment of PCNSL. Patients aged 18-89 years with a biopsy-proven diagnosis of PCNSL that received R-MPV, R-MP, or R-M at our institution between January 1, 2009 and May 31, 2018 were included. The primary objective is to evaluate the response rate in PCNSL as measured by the CR rate after a maximum of seven cycles. Secondary objectives include progression free survival, overall survival, and the frequency and severity of adverse events. The results of this hypothesis-generating study may inspire prospective studies to further investigate if vincristine affects clinical outcomes and work towards identifying the optimal induction regimen for this patient population. Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe current treatment options for induction therapy with primary central nervous system lymphoma.

Discuss clinical scenarios that may warrant the removal of vincristine from induction therapy with high-dose methotrexate-based regimens in patients with primary central nervous system lymphoma.

### Self Assessment Questions:

According to 2018 NCCN guidelines, which of the following is a proposed systemic treatment option for induction therapy in patients with primary central nervous system lymphoma?

- A High-dose cisplatin-based regimen
- B: High-dose ifosfamide-based regimen
- C: High-dose cytarabine-based regimen
- D: High-dose methotrexate-based regimen

Which of the following adverse effects is commonly associated with vincristine therapy?

- A Neuropathy
- B Cardiotoxicity
- C Nephrotoxicity
- D Hepatotoxicity

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE EFFECT OF IMPLEMENTING AN INFORMATICS-BASED HYPOGLYCEMIA RISK ASSESSMENT

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**Purpose:** Hypoglycemia and hyperglycemia have been associated with increased morbidity and mortality in hospitalized patients. Literature indicates there are predictable risk factors for inpatient hypoglycemia. Currently at Community there is a multi-faceted approach to diabetes management. In addition to current practices, a risk assessment report to alert pharmacists of patients at risk would add another method to prevent hypoglycemia. The purpose of this study is to prevent hypoglycemia rates on an inpatient unit by implemented use of a hypoglycemia risk assessment report.

**Methods:** The Institutional Review Board at Community Hospital approved this study. Patients who are 18 years of age or older, not pregnant, and are admitted to Community Hospital at the time of evaluation will be included. Patients who have been treated within 48 hours for diabetic ketoacidosis will be excluded. Patients will be considered at risk if they have a blood glucose reading of 90mg/dL or less in the previous 24 hours and have an active order for insulin, a sulfonylurea, or a meglitinide analog. The following data will be collected: If the patient has an increase in serum creatinine (Scr)  $\geq 0.5$ mg/dL from baseline, hemodialysis, injectable corticosteroid therapy, a sulfonylurea, basal insulin  $>0.25$ units/kg, a previous hypoglycemic episode during the current stay, a new NPO diet order within the previous 24 hours, is undergoing a corticosteroid taper, or weighs  $< 60$  kg. The primary endpoint is the change in rate of hypoglycemia in the pilot unit post-implementation compared to historical data. Secondary endpoints include the frequency of each risk factor, average number of risk factors per patient, average basal insulin dose, average number of hypoglycemic episodes per patient, average length of stay, and recommendation acceptance rate.

**Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify risk factors for hypoglycemia.

Describe recommended methods for glycemic control in hospitalized patients.

### Self Assessment Questions:

Which of the following factors may put a patient at risk for hypoglycemia

- A An actual weight of 89 kg
- B: A regimen of basal insulin with a sulfonylurea
- C: A calculated creatinine clearance of 75 mL/min
- D: Consistently eating only 50% of provided meals

According to the Standard of Medical Care in Diabetes, which of the following is an appropriate method for glycemic control of a non-critically ill hospitalized patient with low nutritional intake?

- A A basal insulin plus bolus insulin correction regimen
- B Monotherapy with either metformin or a sulfonylurea
- C Monotherapy with a sliding-scale insulin regimen
- D Continuous intravenous insulin adjusted to glycemic targets

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACY INTERVENTIONS WITHIN THE EMERGENCY DEPARTMENT ON TIME TO ANTIBIOTIC ADMINISTRATION AND PATIENT OUTCOMES IN PATIENTS WITH SEPSIS

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**Purpose:** The surviving sepsis campaign recently released new guidelines which recommend initiating intravenous antibiotics as soon as possible, not to exceed one hour after recognition of sepsis. The objective of this study is to implement new pharmacy processes to decrease time to antibiotic administration, as well as evaluate the effect these processes have on patient outcomes. **Methods:** This study was approved by the local Institutional Review Board. Patients will be identified by initiation of the sepsis order set in the electronic medical record system. Exclusion criteria will include patients that transferred from an outlying hospital, patients who did not receive antibiotics within the first six hours, patients missing time of antibiotic administration, patients receiving antibiotics prior to sepsis presentation, and patients without suspected or diagnosed sepsis. Both a retrospective and prospective review of these patient charts will be completed to determine if there are any significant changes in patient outcomes after implementation of new processes. New processes include an alert to pharmacists when a patient has suspected sepsis, stocking commonly prescribed antibiotics for sepsis in the automated dispensing machine for removal, and education to nursing staff in the emergency department on the importance of timely antibiotic administration. The following data will be collected: patient demographics, time to antibiotic initiation, mortality, hospital length-of-stay, intensive care unit length-of-stay, and duration of vasopressor use. All data will be stored and collected on secure health system computers. Data collection documents will be encrypted, and password protected to prevent exposure of data to unintended persons. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the recent changes to the Surviving Sepsis Campaign Guideline  
Describe the potential benefits of reducing time to antibiotic administration in sepsis patients.

### Self Assessment Questions:

Within what amount of time should antibiotics be administered per the 2018 update of the Surviving Sepsis Campaign Guidelines?

- A: 30 minutes
- B: 1 hour
- C: 2 hours
- D: 6 hours

What is one potential benefit of reducing time to antibiotic administration in sepsis patients?

- A: Increased mortality rate
- B: Increased hospitalizations
- C: Decreased mortality rate
- D: Decreased antibiotic use

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## TARGETED STRATEGIES TO IMPROVE POPULATION HEALTH IN A RURAL COMMUNITY

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**Purpose:** Diabetes and/or hypertension affects an estimated 1.8 million adults in Wisconsin. Blood glucose and blood pressure control are essential to minimize micro and macro-vascular complications. Pharmacist intervention in diabetes and hypertension management is well-documented and has produced positive outcomes. Monroe Clinic Pharmacotherapists have worked within collaborative practice agreements with physicians for over a decade and are well-positioned to care for high-risk diabetic and hypertensive patients. The purpose of this project is to identify patients with sub-optimal diabetes and hypertension control, and develop an outreach protocol that will facilitate access to a Pharmacist for chronic disease management to improve health outcomes.

**Methods:** We developed an electronic record-based tool that identifies high-risk patients that meet any of the following criteria: Hgb A1c greater than 8 percent, systolic blood pressure greater than 140 mmHg, and/or diastolic blood pressure greater than 90 mmHg. We included patients greater than 18 years of age with a Monroe Clinic primary care physician with whom we have a collaborative practice agreement. High risk patients will be contacted by the Pharmacotherapy team to offer our services and schedule an appointment. We will measure and report the change in A1c, proportion of patients with an A1c less than 8 percent, change in systolic blood pressure, change in diastolic blood pressure, and proportion of patients with blood pressure less than 140/90 mmHg. Additionally, we will trend the number of pharmacotherapy visits, measure rates of patient decline/acceptance of Pharmacotherapy service following outreach, and assess both patient and provider satisfaction. We will evaluate financial benefit by predicting Merit-based Incentive Payment System (MIPS) reimbursement categories based on outcome measures and revenue generated by reestablishing contact with patients who may otherwise be lost to follow-up. Success will be determined by evaluation of therapeutic outcomes and financial viability of the service.

Results: Pending

Conclusions: Pending

### Learning Objectives:

Discuss the role of pharmacists in chronic disease management in the ambulatory setting

Describe the study methodology and outcomes that will be collected to assess the impact of pharmacist intervention in high-risk diabetic and hypertensive patients

### Self Assessment Questions:

Which of the following results have NOT been associated with pharmacist-led chronic disease management, in previous studies?

- A: Reduction in hemoglobin A1c
- B: Increase in hemoglobin A1c
- C: Reduction in systolic blood pressure
- D: Reduction in diastolic blood pressure

In this study, which of the following outcome measures were used to assess the impact of pharmacist intervention?

- A: Hospital admission rate
- B: All-cause mortality
- C: Change in hemoglobin A1c
- D: Change in body mass index

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF AN UNDERSERVED PATIENT CARE ELECTIVE COURSE ON STUDENT PHARMACISTS' EMPATHY

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Empathy is an important attribute of health professionals in the delivery of patient care. The Accreditation Council for Pharmacy Education (ACPE) cites empathy as an important communication skill for pharmacy graduates to possess. Underserved populations are at increased risk of suffering from health and health care disparities. Understanding the barriers that these populations face is necessary in preparing students to become empathetic and culturally competent providers. A variety of educational strategies exist to cultivate empathy in healthcare providers and students. An elective course was developed to increase student pharmacists' knowledge of the challenges faced by underserved patient populations and ways healthcare providers can assist patients in overcoming these challenges. Course activities included participation in service learning, simulation activities, and reflection exercises. The primary objective of this study was to evaluate the impact of an underserved patient care elective course on student pharmacists' empathy.

Students (N=23) voluntarily enrolled in an elective course, Vulnerable and Underserved Patient Care, at Purdue University College of Pharmacy during the spring semester in 2018. As part of course requirements, students completed pre- and post- course surveys regarding their self-perceived ability to meet learning objectives and ability to express empathy. Student demographics and reasons for course enrollment also were collected. The Kiersma-Chen Empathy Scale was utilized to assess empathy, which includes 15 items and uses a 7-point Likert scale, where responses range from strongly disagree to strongly agree. A unique personal identifier was used to link pre- and post- course surveys by student.

Descriptive statistics will be performed for all items. Paired t-tests will be conducted to analyze change in pre- and post-course responses on learning objectives and empathy. The results of this study will assist in developing teaching strategies to enhance the development of empathy in pharmacy students, specifically related to interacting with underserved patient populations.

### Learning Objectives:

Explain the importance of empathy as an attribute of health professionals in providing patient-centered care  
Identify indicators used to calculate the Index of Medical Underservice to recognize areas of underserved populations

### Self Assessment Questions:

Which of the following statements is true about empathy?

- A Empathy and sympathy are equally important attributes for healthcare
- B: Empathy is the ability to understand and share the feelings of one
- C: Empathy is expressing feelings of pity and sorrow for someone else
- D: Empathy is not a requirement for the accreditation of health professions

The Index of Medical Underservice includes which of the following variables:

- A Elderly (over age 65) mortality rate
- B Percent of the population employed
- C Average distance to health care provider
- D Population to provider ratio

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF COMMUNICATION TECHNIQUE TRAINING ON RATES OF NALOXONE DISPENSING

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Opioid overdose is a nationwide epidemic resulting in more than 100 deaths every day in the United States. Despite pharmacists' requirements for accredited training on naloxone, comfort level addressing the topic has been identified as a common barrier to dispensing naloxone. To help overcome this barrier, the primary objective of the study is to determine the effectiveness of a communication technique training using a scenario-based active learning approach for pharmacists on the dispensing rates of naloxone in patients receiving high-risk opioids. The secondary objective is to characterize factors of pharmacists' dispensing patterns and workflow variables that impact naloxone dispensing.

A multi-site prospective pre and post intervention study will be conducted from January 2019 to March 2019 within six grocery store chain pharmacies in the western and southern Chicago suburbs. Locations will be selected based on a prescription volume of greater than or equal to 1200 prescriptions per week, which includes at least 50 prescriptions for opioids greater than or equal to 50 mg morphine dose equivalents. Eligible participants include all pharmacists who work at one of the included study locations. Pharmacists must have completed the ACPE approved training by Illinois Department of Human Services. Participants will receive the 30-minute communication technique training at their study locations. Data will be collected pre and post intervention training at the study locations to assess impact of the training and compare the dispensing rates of naloxone. Data collection pre and post intervention will include demographic data of study participants (age, gender, years of work experience and pharmacy degree), study location hours, time of dispensing naloxone, number of naloxone units dispensed, and patient copay for dispensed naloxone.

Data collection and analysis using the SPSS software are in progress. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify patients who are taking high dose opioids equal to or more than 50 morphine milligram equivalents.  
Recognize effective communication technique to counsel patients on the importance of naloxone prescriptions.

### Self Assessment Questions:

A 45-year-old patient drops off a prescription for hydrocodone/APAP 10-325 mg with directions "Take one tablet by mouth every 4 hours as needed for pain." Which of the following is an important step?

- A Review of hydrocodone/APAP fill history
- B: Calculation of morphine milligram equivalents
- C: Identify insurance coverage
- D: Discuss naloxone with the patient

Which of the following statements is not appropriate to use when discussing the importance of naloxone with a patient?

- A "Has anyone talked to you about the side effects of opioids?"
- B "Are you familiar with the use of naloxone?"
- C "Can I speak with you about some resources available for prevention?"
- D "Would you have time to learn about how to safely take opioid medication?"

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT OF A PAIN STEWARDSHIP PROGRAM IN AN ACUTE CARE SETTING

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The opioid epidemic has escalated for years, and has touched the lives of many. While Froedtert Hospital has made changes to reflect regulatory requirements of the Joint Commission, the goal of this project is to improve the current pain management process at Froedtert Hospital, with intentions of expanding identified best practices throughout the system. Through this work, Froedtert Health will enhance safe and effective practices for appropriate uses of opioids for the treatment of pain.

A multidisciplinary team including anesthesia, physical therapy, nursing, pharmacy, and occupational therapy was formed. The group identified three primary areas to focus attention, which include pre-operative screening, inpatient management, and discharge workflows. Three subgroups have been formed to develop strategies in each area. An analysis was performed using SWOT analyses, process mapping, and an effort/impact matrix.

The pre-operative subgroup is developing tools to better screen for high-risk patients. The inpatient management subgroup is creating a new, interdisciplinary comprehensive pain service. As part of this project, a business plan will be proposed to create a pain stewardship pharmacist position. The discharge subgroup will revise documentation and discharge education practices. Information technology tools will be utilized to augment the current electronic health record in order to better equip staff members with the knowledge needed to manage complex pain patients.

The pain stewardship pharmacist will work collaboratively on the comprehensive pain service to manage consulted patients, in addition to performing surveillance across the hospital to identify high-risk patients. Other duties may include auditing order sets, developing system-wide policies and procedures, and assisting the pain management clinic.

Establishment of pharmacy-led initiatives and a new, pain stewardship program will help drive the change that is needed to improve outcomes for patients at Froedtert Health.

### Learning Objectives:

Review CDC recommendations for prescribing opioids in chronic pain  
Discuss potential responsibilities of a pain management pharmacist in the acute care setting

### Self Assessment Questions:

Which of the following is least likely to be included in the pain stewardship pharmacist workflow?

- A: Inpatient therapy management of post-surgical, opioid-naive patient
- B: Prior to admission medication and pain history
- C: Motivational interviewing during therapy alterations
- D: Functional pain assessment

According to the CDC Guidelines for Prescribing Opioids in Chronic Pain, which of the following statements is not correct?

- A: Clinicians should carefully reassess individual benefits and risks
- B: Clinicians should avoid increasing doses to  $\geq 90$  MME/day
- C: Clinicians should treat all chronic pain patients with  $\geq 30$  MME/day
- D: Clinicians should carefully justify a decision to titrate dosage to  $\geq 90$

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## WEEKLY VERSUS EVERY THREE WEEKS PACLITAXEL, CARBOPLATIN, AND CETUXIMAB (PCC) IN RECURRENT/METASTATIC HEAD AND NECK CANCER

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### Purpose:

In patients with squamous cell carcinoma of the head and neck (SCCHN), 15 percent present with recurrent/metastatic (R/M) disease, which has a median overall survival (OS) of less than one year. Chemotherapy agents in the R/M setting are limited to platinum, 5-fluorouracil, taxanes, and cetuximab combinations given every three weeks as established in the EXTREME and TPEX trials. While these regimens improve patient outcomes, they are limited in clinical practice by toxicity. An alternative regimen is weekly paclitaxel, carboplatin, and cetuximab (PCC), which was shown to be an effective, less toxic treatment option. At our institution, standard chemotherapy for R/M SCCHN is to administer PCC as either a weekly or every three weeks regimen based on physician preference/patient performance status. The purpose of this study is to compare safety and efficacy of weekly versus every three weeks PCC. The primary objective is to compare the incidence of grade 3/4 toxicities. Secondary objectives include median weekly dose intensity of PCC agents, time to progression, progression free survival, and OS.

### Methods:

This retrospective, single center, cohort study will include patients 18 years of age and older with a diagnosis of R/M SCCHN who were treated at The James Cancer Hospital from January 1, 2013 to July 31, 2018 with at least one cycle of the weekly or every three weeks regimen of PCC. Patients will be excluded if they were diagnosed with nasopharyngeal or salivary gland carcinoma, changed from paclitaxel to docetaxel, or received PCC as an induction regimen prior to radiation or surgery. Patients will be stratified by line of therapy in the metastatic setting (1st vs 2nd and beyond); performance status (ECOG 0-1 vs  $\geq 2$ ); age ( $<$  or  $\geq 70$  years); and those who recurred/progressed within six months of primary chemoradiation.

### Results:

Data collection and analysis are ongoing.

### Learning Objectives:

Review guideline recommendations for the treatment of recurrent/metastatic squamous cell carcinoma of the head and neck  
Identify common adverse events associated with paclitaxel, carboplatin, and cetuximab

### Self Assessment Questions:

Which of the following is a known risk factor for squamous cell carcinoma of the head and neck?

- A: Consuming 1-2 drinks of alcohol per week
- B: Diet
- C: Illicit drug use
- D: Human papillomavirus (HPV) infection

Which adverse event occurs most commonly with cetuximab?

- A: Neutropenia
- B: Nausea
- C: Rash
- D: Thrombocytopenia

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## HIGH DOSE DAPTOMYCIN: FAST AND FURIOUS?

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**Purpose:** Shortages of IV base solutions have plagued the healthcare system in recent years. One strategy to conserve resources includes taking medications traditionally infused in an IV diluent and instead administer via IV push. At our institution, daptomycin was transitioned from an IV infusion to IV push in lieu of solution shortages. Safety data supports 2 minute infusions of IV daptomycin up to the labeled dose of 6 mg/kg. Doses of daptomycin above the labeled dose have been associated with improved outcomes for invasive staphylococcal and enterococcal infections. The purpose of this study is to evaluate the safety of administering high dose daptomycin (HDD) (> 6 mg/kg) as a 2 minute IV infusion compared to traditional 30 minute infusion.

**Methods:** The present study is a retrospective cohort in a five hospital health system. Inclusion criteria: Patients receiving HDD as either a rapid 2 minute IV infusion or a traditional 30 minute infusion while inpatient. Exclusion criteria: duration of daptomycin therapy < 48 hours, pregnant patients, patients age < 18, patients receiving concomitant medication commonly associated with infusion related reactions (e.g., amphotericin B or monoclonal antibody infusions). Data was manually extracted using a standardized case report form. The primary outcome is the proportion of patients with infusion related reactions after daptomycin administration. Potential infusion related reactions will be assessed using the Naranjo algorithm and adjudicated blinded to administration strategy. Secondary outcomes include the development of musculoskeletal side effects and hospital length of stay. Bivariate statistical tests were used to compare patient characteristics and outcomes between groups. Data was reported using descriptive statistics measures of central tendency.

**Summary:** Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the pharmacokinetic and pharmacodynamics indices related to daptomycin

Identify strategies organizations can use in response to medication shortages.

### Self Assessment Questions:

• Which of the following is an evidence based dose for daptomycin for a patient with vancomycin resistant enterococcal bacteremia who is 80 kg and has a creatinine clearance > 120 mL/min.

- A: Daptomycin 4 mg/kg every 12 hours
- B: Daptomycin 6 mg/kg every 24 hours
- C: Daptomycin 10 mg/kg every 24 hours
- D: Stop daptomycin and start vancomycin plus cefazolin.

Your organization hears there is an impending normal saline shortage due to a natural disaster.

- A: Treat patients, first come first serve
- B: Evaluate therapeutic alternatives.
- C: Stockpile medication
- D: Continue current practice as shortages are likely to resolve quickly

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## SAFETY AND EFFICACY OF 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE FOR THE EMERGENT REVERSAL OF FACTOR Xa INHIBITORS

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**Purpose:** Oral factor Xa inhibitors are commonly used anticoagulation alternatives to warfarin therapy. As the use of oral factor Xa inhibitors continues to rise, the need for a safe and effective reversal agent has become increasingly apparent. Historically, a direct reversal agent for factor Xa inhibitors has not been available. As a result, four-factor prothrombin complex concentrate (4FPCC) has been used off-label for the management of life-threatening or uncontrollable bleeding in patients taking a factor Xa inhibitor. In May 2018, the FDA approved andexanet alfa through an accelerated approval pathway for the reversal of apixaban and rivaroxaban. Due to cost, limited distribution and accessibility, and paucity of data supporting the use of andexanet alfa, many institutions continue to use 4FPCC for the management of life-threatening bleeding associated with factor Xa inhibitors. The aim of this study is to retrospectively evaluate the safety and efficacy of 4FPCC for the management of hemorrhages associated with factor Xa inhibitors. The results of this study will build to the limited body of literature available regarding the use of 4FPCC for factor Xa reversal.

**Methods:** This study was approved by the Gundersen Lutheran Institutional Review Board. The study is a retrospective, electronic chart review of patients that received 4FPCC for the management of life-threatening or uncontrollable bleeding in patients using a factor Xa inhibitor from October 1, 2014- October 1, 2018. The primary outcome was in-hospital mortality and venous thromboembolism within 30 days of receiving 4FPCC. Secondary outcomes include 30-day mortality, hemostatic efficacy, Glasgow coma scale at discharge (if intracerebral hemorrhage), intensive care unit and hospital length of stay.

**Results & Conclusion:** Data analysis is ongoing. Findings will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the effectiveness of 4FPCC for the management of factor Xa inhibitor-associated bleeding.

Discuss the safety complications of 4FPCC for the management of factor Xa inhibitor-associated bleeding.

### Self Assessment Questions:

Four-factor prothrombin complex concentrate (4FPCC) is FDA approved for the reversal of which of the following anticoagulants?

- A: Enoxaparin
- B: Rivaroxaban, apixaban, edoxaban, betrixaban
- C: Warfarin
- D: B & c

AF is a 63 yo female (80 kg) who presents to the emergency department after falling on the ice. Per her husband, she last took her medications this morning which included apixaban. A CT of the head shows

- A: 2000 units (25 units/kg)
- B: Fixed 2500 units
- C: 4000 units (50 units/kg)
- D: Fixed 5000 units

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## **SAFETY OF AXICABTAGENE CILOLEUCEL CAR T-CELL THERAPY FOR THE TREATMENT OF RELAPSED OR REFRACTORY LARGE B CELL LYMPHOMA**

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Recent advances in immunotherapy for Non-Hodgkin lymphoma have resulted in the development of chimeric antigen receptor (CAR) T-cell therapy. One example of such treatment is axicabtagene ciloleucel (axi-cel), a CD19-directed genetically modified autologous T-cell immunotherapy, currently indicated for the treatment of relapsed or refractory large B-cell lymphoma. In the phase II trial (ZUMA-1), all 101 patients who received axi-cel experienced adverse events. Cytokine release syndrome (CRS) occurred in 93% of patients, with a majority being low grade (grades 1-2) and 13% grade 3 or higher. Neurologic events occurred in 64% of patients, with 28% being grade 3 or higher.

Patients treated with axi-cel at The James Cancer Hospital are commonly heavily pretreated, often with more residual disease than patients in the phase II trial. This data is necessary to better understand toxicity profiles and refine management of toxicities for this novel therapy.

Thirty-seven patients were included in this retrospective review from January 2018 – December 2018. Patients < 18 or > 89 years of age, patients who were pregnant or incarcerated, and those treated with axi-cel as part of a clinical trial were not included.

Primary objectives include evaluating the safety of axi-cel in patients with relapsed or refractory large B-cell lymphoma, as measured by the incidence, severity, and time to initial onset of CRS, neurotoxicity, febrile neutropenia, and infection. Secondary objectives include assessing disease response, risk factors for CRS and neurotoxicity using a multivariate analysis, and response to cytokine-directed therapy by evaluating the relationship between C-reactive protein (CRP) and ferritin with CRS.

Final results will be presented at the 2019 Great Lakes Pharmacy Resident Conference. Future directions include assessing resource utilization for toxicities and infection.

### **Learning Objectives:**

Describe common toxicities associated with the chimeric receptor antigen (CAR) T-cell therapy, axicabtagene ciloleucel.

Recognize patients who may be at a higher risk of developing more serious CAR T-cell related adverse events.

### **Self Assessment Questions:**

During ZUMA-1, the pivotal phase II trial leading to FDA approval of axicabtagene ciloleucel, which toxicity occurred most commonly in patients?

- A Neurotoxicity
- B: Cytokine release syndrome (CRS)
- C: Myocardial infarction
- D: Thrombosis

Which of the following are thought to increase a patient's risk of CRS and neurotoxicity?

- A Bulky disease/disease status at baseline
- B High baseline C-reactive protein and ferritin
- C History of bone marrow or CNS involvement of disease
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **TRANSITIONING TO A DECENTRALIZED PHARMACY PRACTICE MODEL IN A TERTIARY HOSPITAL**

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Background: Integration of all healthcare providers in patient care has shown to be essential over the last few decades. With this ideology, our hospital has chosen to move towards a decentralized pharmacy structure. Our pharmacists were previously assigned a clinical or operational shift on any given day. The clinical pharmacists worked in a centralized location responding to "pharmacy to dose" consults. The order entry pharmacists covered the order entry queue to verify all order from the hospital.

We are moving towards a decentralized model, where pharmacists are out on their respective floors, providing clinical and operational services for their assigned patients.

Methods: The transition to a decentralized pharmacy practice model allowed for varying primary and secondary objectives to be measured. The primary objectives being evaluated are the pharmacy verification turn-around time, calls to the central pharmacy, and medication errors event reporting. The pharmacy verification turn-around time (TAT) is measured by collecting number of scripts in the verification queue along with wait time every two hours during decentralization. The calls to central pharmacy are measured by collecting the total number of calls along with call types during decentralization. Lastly, the medication errors will be tracked throughout the study to watch for trends. The secondary objectives being evaluated are the satisfaction of nursing and pharmacy staff pre-decentralization and post-decentralization. In order to collect this data, a 10 question survey with responses ranked on a numeric scale from 0 to 5 (strongly disagree to strongly agree) was created. The pre-decentralization survey and post-decentralization survey were matched to best evaluate change in satisfaction. The goal was to collect at least 30 nursing surveys with a goal of 50 and have all pharmacy staff complete the survey.

Results/Conclusions: Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Describe the decentralization model that pharmacists at Lutheran Hospital experienced

Identify barriers to success for the decentralization pharmacy practice model

### **Self Assessment Questions:**

The pharmacists who are decentralized are expected to do what tasks?

- A Compound IVs and complete chemo double-checks
- B: Refill Pyxis and answer phone calls for the whole hospital
- C: Complete "pharmacy to dose(s)" and verify orders
- D: Put away floor stock and help nurses

What were common suggestions for improvements to decentralization?

- A Redistribute workload and implement education to improve confidence
- B Re-centralize to main pharmacy and continue as before decentralization
- C Increase the workload for clinical and order entry components
- D No changes- Continue with the proposed decentralization model

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARING THE ACCURACY OF ADMISSION MEDICATION RECONCILIATION AT FRANKFORT REGIONAL MEDICAL CENTER

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**Purpose:** Accurate medication reconciliation is critical in preventing possible drug-drug and drug-disease interactions and ensures continuation of the appropriate medications while receiving care in the hospital. Throughout HCA hospitals it is not standard practice to utilize pharmacy personnel for medication reconciliation. Literature supports the implementation of pharmacist in this process. Previous research completed at FRMC supports pharmacy involvement in this process as well. In comparing the accuracy of the reconciliations produced from the current process to those completed by pharmacy personnel, the benefit of pharmacy involvement in the process at FRMC can be assessed for formal process changes.

**Methods:** Upon IRB approval, a list of patients admitted for inpatient care will be obtained. Patients admitted to labor and delivery, Behavioral Health Unit (BHU), hospice, those intubated or sedated or less than 18 years old will be excluded from the study. A reconciled medication list produced following the current FRMC process should already be entered by nursing personnel. Pharmacy personnel will then review this medication list for accuracy. It will be documented if the patient provides a medication list or prescription bottles, and if the patient is a capable historian (aware of medications or no altered mental status). Record of all medications will be kept and documentation of errors and interventions to correct errors will be tracked. It will also be documented if information was pulled from the newly implemented Intermedex program. Each day the total number of admitted patients, calls to patient pharmacy, and the number of errors found will be documented and analyzed. No specific patient identifying information will be analyzed and the data collected will be stored with password protection on computers accessed only by authorized personnel within the pharmacy of FRMC.

**Results:** Research in progress.

**Conclusion:** To be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the process medication reconciliation.  
Explain the importance of accurate medication reconciliations.

### Self Assessment Questions:

Which of the following are to be obtained in a medication reconciliation?

- A side effects and monitoring
- B: dosage and frequency
- C: duration and efficacy
- D: adverse effects and cost

What is mostly likely prevented by having an accurate medication list while hospitalized?

- A Drug-drug interactions
- B Suppression of disease
- C Symptom monitoring
- D Side effects of medications

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## MICROBIOLOGY MATTERS FOR SEPSIS MANAGEMENT

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**Purpose:** Septic shock is a life-threatening syndrome that continues to present as a challenge for healthcare providers. Appropriate treatment of septic shock is confounded by mimics and/or lack of definitive microbiological etiology. After 48 hours, the CDC recommends assessing the appropriateness of antibiotics, regardless of culture status. Depending on the time to culture finalization and the presence or absence of microbial identification, antibiotics may be continued unnecessarily and/or may be suboptimal for the microorganism cultured. The adverse effects associated with prolonged use of empiric antibiotics (PEAT) is not well understood. The purpose of this study was to characterize antibiotic use, outcomes, and adverse events in culture-negative versus culture-positive septic shock.

**Methods:** This is an IRB approved, retrospective cohort, comparing antibiotic use, outcomes and adverse events in septic shock patients with definitive versus without definitive bacterial microbiological etiology. Patients were identified via the institutional sepsis database by admission to a medical intensive care unit (MICU) between April 6, 2013 to July 1, 2018 for septic shock and the presence of antibiotic administration following microbiological culture collection. Patients were excluded if they transferred from an OSH, < 18 years old, positive viral or fungal culture within 72 hours of septic shock onset, or expired within 72 hours. Cultures collected within the first 72 hours of sepsis onset were used to categorize patients as either culture-negative or culture-positive septic shock. Primary outcome: PEAT, defined as the number of antibiotics continued after 72 hours for patients without definitive infection (CDC criteria) or broader spectrum than the microorganism cultured. Secondary outcomes included antibiotic adverse effects and mortality.

**Results/conclusions:** Will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify culture-positive septic shock, culture-negative septic shock, and sepsis mimics.

Define prolonged empiric antibiotic use in patients presenting with septic shock.

### Self Assessment Questions:

Which of the following findings would categorize a patient as having culture-positive septic shock?

- A Growth of Escherichia coli in blood culture
- B: Procalcitonin of 1.2
- C: Urinalysis positive for leukocyte esterase
- D: Elevated white blood cell count

Which of the following antibiotics would be considered prolonged empiric antibiotic therapy (PEAT) after a respiratory culture finalizes with methicillin-sensitive Staphylococcus aureus in a patient with

- A Cefazolin
- B Nafcillin
- C Vancomycin
- D Amoxicillin

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A PHARMACIST-DRIVEN SLIDING SCALE INSULIN PROTOCOL ON GLYCEMIC CONTROL IN A CRITICAL CARE SETTING

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**Purpose:** Hyperglycemia in critically ill patients is associated with poor clinical outcomes including worsened immune function, poor wound healing, and increased duration of infection. Therefore, it is appropriate to maintain a blood glucose (BG) level less than 180 mg/dL within the intensive care unit (ICU). The objective of this study is to implement and assess the impact and safety of a pharmacist-driven sliding scale insulin protocol on glycemic control for patients in a neuro medical/surgical intensive care setting.

**Methods:** Single center, prospective interventional study comprised of hyperglycemic patients in the critical care unit. Patients will be included in the study if they are admitted to the neuro medical/surgical ICU, age 18 years and older, and have two or more consecutive BG readings above 180 mg/dL. Patients with an admitting diagnosis of diabetic ketoacidosis or hyperglycemic hyperosmolar syndrome, those who are imprisoned, pregnant, already on high dose sliding scale insulin, have an allergy to insulin aspart, or have an endocrinology consultation will be excluded. Clinical pharmacists working in the ICU will screen patients daily as a part of routine workflow and add insulin sliding scale per protocol for patients that meet inclusion criteria. Data will be collected after the intervention including type of sliding scale initiated, pre- and post-implementation BG levels, age, current medications that may cause hyperglycemia (ex. steroids, fluids), history of diabetes (A1c, home medications), and other active antidiabetics at the time of implementation. The primary outcome measure is the percentage of patients who achieve adequate glycemic control (average BG less than 180 mg/dL) after sliding scale implementation. Secondary outcome measures include change in average BG after implementation, incidence of hypoglycemia, and incidence of other related adverse events.  
**Results/Conclusion:** Data collection and analysis is ongoing. Final result and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize potential candidates for correctional insulin in the critical care setting and barriers to adequate glycemic control.  
Identify potential risks of prolonged hyperglycemia in critically ill patients

### Self Assessment Questions:

According to American Diabetes Association guidelines, at blood glucose levels above which threshold is it recommended to initiate insulin for inpatients?

- A: 140 mg/dL
- B: 160 mg/dL
- C: 180 mg/dL
- D: 200 mg/dL

Hyperglycemia in inpatients has been shown to be associated with all of the following EXCEPT:

- A: Altered immune response
- B: Decreased length of stay
- C: Slower wound healing
- D: Increased infection risk

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT OF MENOPAUSAL SYMPTOM MANAGEMENT BY A CLINICAL PHARMACIST VS. PRIMARY CARE PROVIDER IN A VETERANS AFFAIRS MEDICAL CENTER

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**Purpose:** The average age of menopause onset is 51 years old and there are over 950,000 women veterans nationwide over the age of 50, making menopausal-age women the fastest growing group within the Veterans Health Administration. Due to the expected increase in women seeking treatment for menopausal symptoms, the need for providers who are comfortable and knowledgeable in the treatment of bothersome menopausal symptoms is growing. The primary objective of this study is to assess the management of menopausal symptoms in female veterans seen by a designated clinical pharmacist or a primary care provider.  
**Methods:** This study was a retrospective chart review of female veterans receiving care for menopausal symptoms by a gynecology designated clinical pharmacist or from a primary care physician from August 1, 2017 to August 31, 2017. Women were included who were seen in person or by phone for menopausal symptoms by the clinical pharmacist or a primary care physician. Women were excluded if they received care from an outside provider for menopausal symptom management, were lost to follow up after initial visit, or who were seen by a physician or nurse practitioner in the gynecology clinic. Patients were identified based on their ICD-9/ICD-10 diagnosis of menopausal symptoms or by active outpatient prescriptions for menopause treatments during the study period. The primary outcome was control of vasomotor and vaginal menopausal symptoms through patient self-reported presence of symptoms or improvement of symptoms at the initial appointment, 6-month follow-up, and 12-month follow-up. Secondary outcomes include medication name and dose used, total number of medications used, number of appointments related to menopausal symptom management, documentation of vaginal symptoms discussion, and documentation of non-pharmacologic interventions.  
**Results and conclusion:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define common menopausal symptoms and their associated impact on quality of life  
Identify the benefits and areas of improvement for treatment of menopausal symptoms by a pharmacist or primary care provider

### Self Assessment Questions:

Which of the following is the most commonly experienced symptom of menopause?

- A: Sleep disturbance
- B: Mood swings
- C: Hot flashes
- D: Hair loss

Vasomotor menopausal symptoms have been associated with which of the following?

- A: Increased cardiovascular disease risk
- B: Improved quality of sleep
- C: Increased energy level
- D: Increased risk of breast cancer

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PREVALENCE AND PATTERNS OF CONTROLLED SUBSTANCE DIVERSION BEHAVIORS BY HEALTHCARE WORKERS

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It is widely recognized that healthcare workers (HCW) are at risk for diverting controlled substances (CS) as they have ready access to CS. CS diversion by HCWs results in substantial risk to the diverter, the diverter's colleagues, patients under the diverter's care, and to the reputation of the organization.

Pharmacy leaders have legal and moral obligations to maintain the integrity of the medication use process by limiting diversion. Identifying diverters remains a cumbersome process despite improved surveillance technologies and increased dedicated resources for diversion prevention. Modern systems readily detect statistical outliers of diversion, but are not sensitive enough to detect minor variances in inventory that may be indicative of diversion among thousands of CS transactions occurring each day.

Greater understanding of CS diversion risk factors will aid leaders in identifying HCWs at risk for diversion. The main objective of this research is to identify work-related, personal and social factors most strongly associated with CS diversion by HCWs and develop a model aimed at increasing the rate of successfully identifying CS diverters.

To our knowledge, health-system human resources records and department of pharmacy CS diversion surveillance program data has never been used to study the prevalence and predictors of CS diversion. This single-center case-control study seeks to quantify the prevalence of CS diversion by healthcare workers and understand the most common diversion methods at a large academic healthcare institution. Additionally, this study will identify work-related and personal/social-related factors associated with CS diversion. Odds ratios and 95% confidence intervals will be calculated to be used to develop a multiple regression model to increase the specificity of our current CS surveillance methods. Data collection and analysis will be performed upon IRB approval. Preliminary results and discussion will be presented at Great Lakes Pharmacy Residency Conference in April 2019.

### Learning Objectives:

Discuss common risk points for controlled substance diversion. Identify strategies to mitigate controlled substance diversion by healthcare workers.

### Self Assessment Questions:

Without a controlled substance diversion prevention program, hospitals may put themselves at risk for violation of the following federal law:

- A Drug Supply Chain and Security Act (2013)
- B: Patient Safety and Quality Improvement Act (2005)
- C: Controlled Substances Act (1970)
- D: Federal Food, Drug, and Cosmetic Act (1938)

A comprehensive controlled substance diversion prevention program includes which of the following:

- A Administrative Oversight
- B System-level controls
- C Provider-level controls
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DIABETIC KETOACIDOSIS: A RETROSPECTIVE EVALUATION OF TIME TO RESOLUTION

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Purpose: Diabetic ketoacidosis (DKA) is a life-threatening metabolic complication consisting of hyperglycemia, metabolic acidosis and ketosis. As the most recent DKA guidelines were published by the American Diabetes Association in 2009 and the National Institute for Health and Care Excellence in 2015, along with a lack of strong randomized controlled trials, protocols and recommendations vary greatly. Frequent evaluation of DKA protocols can identify opportunities to optimize patient care and outcomes. The purpose of this study is to evaluate the efficacy and safety of Carle Foundation Hospital's (CFH) DKA protocol utilized in adult patients. Methods: Retrospective cohort study using Carle Foundation Hospital (CFH) electronic medical record (EMR) data from July 1 2013 through July 31 2018. Patients utilizing the current DKA protocol were analyzed for time to DKA resolution, hypoglycemic events, and adherence to protocol-based fluid administration and insulin infusion titration. Results and conclusions: To be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review Review DKA pathophysiology and treatment.

Discuss Discuss the safety and efficacy outcomes of Carle Foundation Hospital's current DKA treatment protocol.

### Self Assessment Questions:

Which of the following is a diagnostic criterion for DKA?

- A Plasma glucose > 300 mg/dL
- B: Serum bicarbonate  $\leq$  18 mEq/L
- C: Anion gap > 16
- D: Abdominal pain

Which of the following is an opportunity for DKA protocol assessment and improvement?

- A Adherence to IV calcium administration
- B Time to administration of Lactated Ringer's (LR)
- C Time to hemoglobin A1c  $\leq$  7.0
- D Adherence of 0.9% Normal Saline (NS) and Dextrose 5% in Water

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DECENTRALIZATION OF CLINICAL PHARMACISTS AND THE EFFECTS OF DASHBOARD-DRIVEN PATIENT MONITORING IN AN AMBULATORY CARE SETTING

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**Purpose:** As stated in the 2010 American Society of Health-System Pharmacist Practice Advancement Initiative (ASHP PAI) recommendations, ambulatory care patients have needs that can be met by a range of pharmacy providers, including both clinical pharmacists and clinical pharmacy specialists. The ASHP PAI also notes that the use of technology-driven patient care should be a priority amongst pharmacy services. These two recommendations act as motivation for the implementation of a pharmacy care electronic dashboard that will be operated by clinical pharmacists in designated ambulatory care clinics.

**Methods:** The clinical pharmacists will rotate into a selected ambulatory care clinic at our medical center, with one clinical pharmacist assigned to the clinic each day. The daily responsibilities of the clinical pharmacists will include patient medication reviews, completion of therapeutic conversions to preferred medications, and review of specified metrics focused on patient care. The clinical pharmacist will utilize the dashboard to identify patients with adherence concerns, those on high-risk medications, and those who require therapy adjustments per evidence-based guidelines. The dashboard will be derived from real-time data reports that capture all patients with future appointments in the specified clinic. The clinical pharmacist will speak with the identified patients at the time of their scheduled appointment with their primary care physician. The information collected in the interview and subsequent recommendations will be communicated to the prescriber and documented in the patient's electronic medical record. Encounter codes will be used to track the impact of the clinical pharmacist and dashboard in the ambulatory care clinics with the primary desired outcome of increased patient quality goals and improved utilization of pharmacy resources.

Results and conclusions will be discussed at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss ASHP's Practice Advancement Initiative's (PAI) role in expanding pharmacy services  
Identify potential benefits of dashboard-driven patient monitoring in primary care

### Self Assessment Questions:

Which of the following is a pillar of ASHP's Practice Advancement Initiative?

- A Third-Party Billing
- B: Care Team Integration
- C: Video Conferencing
- D: Collaborative Practice Agreements

Which of the following was a patient metric used in the dashboard to stratify patients?

- A Days between refills
- B Date of last primary care appointment
- C Count of opioid dosing units per month
- D Count of active prescriptions

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CREATING A PROPOSAL TO IMPLEMENT A SPECIALTY PHARMACY WITHIN A HEALTH SYSTEM

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**Purpose:** In 2017, specialty medications consumed 46.5% of drug expenditure while accounting for 1.9% of prescription volume. Seventy-six percent of new drugs brought to market in 2017 were specialty products. Our health system's employees fill specialty prescriptions at contracted pharmacies resulting in lost revenue, high expenditures, and missed opportunities for direct pharmacist involvement. Implementation of a specialty pharmacy within our healthcare system provides an opportunity to enhance services to patients while reducing expenditure. The objective of this project is to develop a business plan to implement a specialty pharmacy within our healthcare system.

**Methods:** First, financial analysis of specialty prescription utilization for health care system employees was evaluated. Employees are more easily captured due to location and brand recognition. Next, specialty prescription utilization for Medicare, Medicaid, and marketplace insurance was analyzed using patients who see providers within our health system. These populations may elect to utilize specialty pharmacy services at our facility and generate additional revenue. Using medications our health system is able to currently acquire through our wholesaler, we were able to gauge revenue our specialty pharmacy may be able to capture. Utilization of our existing retail pharmacy will reduce costs. However, additional workspace will be needed for specialty drug storage and technical functions. Implementation will require the addition of a full-time pharmacist and two full-time technicians. After consideration of potential revenue and costs, the proposal will be created and presented to stakeholders for consideration.

**Preliminary Results:** Approximately \$300,000 per year could be captured by providing pharmacy services to health system employee members. Another \$206,000 of gross profit could be added if we capture 25% of the Medicare, Medicaid, and marketplace members that see providers in our system.

### Learning Objectives:

Identify disease states for which a specialty pharmacy may dispense medications.  
Discuss potential expenses a specialty pharmacy must consider prior to implementation.

### Self Assessment Questions:

A patient with which of the following disease states would benefit from medication counseling from a pharmacist at a specialty pharmacy?

- A Prostate cancer
- B: Multiple myeloma
- C: Multiple sclerosis
- D: All of the above

Which of the following is not an expense that a specialty pharmacy must factor into their business model for initial implementation?

- A Cold-chain shipping
- B Technician time for PA approvals
- C Accreditation fees
- D Dispensing software

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A HEALTH-SYSTEM INTEGRATED SPECIALTY PHARMACY ON TIME TO THERAPY FOR PATIENTS WITH JUVENILE IDIOPATHIC ARTHRITIS

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Biologics are specialty medications that have become standard of care for treatment of juvenile idiopathic arthritis (JIA). Prior authorizations, high co-payments, and fragmented communication amongst stakeholders are barriers that can delay patient access to specialty medications. A perceived benefit of health-system integrated specialty pharmacies is optimization of the medication access process resulting in decreased time to therapy.

The primary objective of this study is to assess the impact of health-system integrated specialty pharmacy on time to therapy for patients with JIA newly started on biologic medications. The secondary objective is to evaluate the effects of health-system integrated specialty pharmacy on clinical outcomes.

Electronic medical records and fill history will be retrospectively reviewed on a random sample of patients with a diagnosis of JIA newly started on biologic medications from January 2015 to June 2016, and from January 2017 to June 2018 at a pediatric rheumatology clinic. A biologic medication will be defined as one of the following: abatacept, adalimumab, etanercept, and tocilizumab. Fill history will be obtained through patient's filling specialty pharmacy. Time to therapy will be calculated based on the written date of the prescription and the date of the first fill. Clinical outcomes will be assessed at baseline and first appointment between 6 and 12 months. The control group will be patients newly started on medication prior to the development of the health-system integrated specialty pharmacy. The first active group will be patients in which the health-system integrated specialty pharmacy completed the prior authorization, but the medication was filled at an external pharmacy. The second active group will be patients in which the health-system integrated specialty pharmacy completed the prior authorization and filled the medication.

Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify barriers that may inhibit patient access to specialty medications  
Recognize the impact of health-system integrated specialty pharmacies on time to therapy

### Self Assessment Questions:

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

- A Require infrequent monitoring
- B: Easy to administer
- C: Low cost
- D: Treat complex, chronic conditions

Which of the following is a barrier that may delay patient access to specialty medications?

- A Low co-payments
- B Streamlined communication amongst stakeholders
- C Prior authorizations
- D Ability to fill at community pharmacy

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST INTERVENTION IN THE TRANSITION OF CARE OF TICAGRELOR THERAPY IN PATIENTS WITH ACUTE CORONARY SYNDROME

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### Background:

Ticagrelor is an antiplatelet medication prescribed to patients with ACS for up to 12 months. Patients who fail to take prescribed antiplatelet medications are at an increased risk of future heart attack, stroke, or other vascular events. Barriers to compliance include cost of the medication, lack of education, and adverse events.

### Methods:

Patients who present to the outpatient pharmacy with a prescription for ticagrelor upon discharge from the hospital will be counseled during their initial fill by a pharmacist or pharmacy student. These patients will then be contacted within 5 days and after 21 days of discharge to receive counseling and refill coordination. Patients will be counseled on side effects and barriers to adherence. This study will be established at an outpatient pharmacy that is part of a community pharmacy chain. Exclusion criteria includes anyone under 18 years old or who receive a 90-day supply for the initial fill. In a prospective cohort design, patients will be categorized into two groups: a historical control group and an intervention group. The historical control group will consist of patients who received a prescription for ticagrelor in a 90-day period before the intervention. The intervention group will consist of patients who receive a prescription for ticagrelor therapy after the intervention. The primary outcome of fill of P2Y12 receptor antagonist therapy at 30 days will be evaluated in these two groups.

### Preliminary Results:

Analysis of preliminary data indicate 62.5% of patients receive their second refill of medication within 30 days.

### Conclusions:

We anticipate the intervention will demonstrate a significant improvement in patient adherence. Therefore, pharmacists practicing in an outpatient community pharmacy setting have the ability to improve adherence to antiplatelet therapy and potentially improve clinical outcomes.

### Learning Objectives:

Explain the role of ticagrelor in preventing future hospitalizations in patients with Acute Coronary Syndrome  
Describe how a pharmacist in the community setting can improve patient adherence through counseling and refill coordination

### Self Assessment Questions:

Which of the following describe the mechanism of action of ticagrelor?

- A Reversible P2Y12 receptor blocker
- B: Irreversible P2Y12 receptor blocker
- C: Glycoprotein IIb/IIIa inhibitor
- D: Irreversible cyclooxygenase-1 and 2 (COX-1 and 2) enzymes inhibitor

What interventions can a community pharmacist make to improve patient adherence?

- A Counsel the patient on possible side effects, and how to manage them
- B Submit for prior authorizations, and identify patient assistance programs
- C Process prescription refills before patient is due for refill to identify barriers
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACIST-DRIVEN CAREGIVER VACCINE AND SMOKING CESSATION SCREENING TO IMPROVE PEDIATRIC PATIENT HEALTH

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To promote public health and to protect the pediatric population, the American Academy of Pediatrics recommends the influenza vaccine for all close contacts of children younger than 5 years of age, with an emphasis on infants 0-6 months of age, who are not candidates for the immunization. Additionally, the Advisory Committee on Immunization Practices recommends adult contacts of infants less than 12 months of age receive a single dose of a tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis, adsorbed (Tdap) vaccine, if not previously immunized. Lastly, secondhand and thirdhand smoke has been recognized as detrimental to the health of children. Approximately 4 out of 10 US children ages 3-11 years are exposed to secondhand smoke. The effects of secondhand smoke have been widely studied and show links between secondhand smoke and asthma, sleep-disordered breathing, and cardiovascular effects. Pharmacists are positioned well to screen and educate caregivers regarding smoking cessation to reduce smoke exposure.

The purpose of this project is to improve the health of pediatric patients by increasing access to vaccines and smoking cessation tools for caregivers of eligible hospitalized pediatric patients through pharmacist screening and delegation. Appropriate delegation protocols and guidelines will be created to allow pharmacists to screen for and order vaccines and offer nicotine replacement therapy. Additionally, workflows will be developed to allow pharmacists to facilitate screening, administration of vaccines, and ordering of smoking cessation tools efficiently for caregivers of all eligible patients.

The primary outcome measures are the number of caregivers pharmacists screen for vaccines and smoking cessation, the number of caregivers who receive vaccines through the designed workflow, and the number of caregivers who receive nicotine replacement therapy.

### Learning Objectives:

Describe the importance of vaccinating caregivers of pediatric patients and the effects of second-hand smoke on pediatric patients.

Identify opportunities for pharmacists to screen, order, and administer vaccines to caregivers of pediatric patients and order nicotine replacement therapy for caregivers.

### Self Assessment Questions:

The American Academy of Pediatrics recommends that all household contacts and out-of-home care providers of children with high-risk conditions or of children younger than \_\_\_\_\_ old receive the influ

- A 10 years
- B: 5 years
- C: 18 years
- D: 6 months

If a pediatric patient's mother smokes a half-pack per day, what is the most appropriate nicotine patch size to recommend?

- A 14 mg
- B 21 mg
- C 7 mg
- D 28 mg

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST-LED NURSING EDUCATION ON SAFE DIABETIC KETOACIDOSIS CARE IN THE EMERGENCY DEPARTMENT

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The mismanagement of diabetic ketoacidosis (DKA) medication therapy has the potential to cause significant patient harm. In the emergency department, nursing staff is key in safely executing the medication components of DKA protocols. This research aimed to evaluate the impact of pharmacist-led education of emergency department nursing staff on both nursing knowledge and patient safety outcomes related to DKA. The primary outcome was assessment of nursing knowledge through a written competency; the same ten-question competency was administered before and after pharmacist education. DKA pathophysiology, goals of treatment, principles of fluid resuscitation, and safe insulin administration were the focus of the education and corresponding assessment. Secondary safety outcomes pre-education and post-education were obtained through retrospective chart review. Emergency department visits for adult patients with a confirmed diagnosis of DKA were analyzed for the following: incidence of hypokalemia and hypoglycemia, appropriate initiation of initial fluid and then dextrose-containing fluid, and avoidance of inappropriate insulin initiation.

For the primary outcome, 71 sets of completed nursing competencies were analyzed. The mean pre-test score was  $5.5 \pm 1.4$  and post-test score was  $9.3 \pm 0.7$ . The mean change in score from pre- to post-test was  $3.8 \pm 1.4$ ,  $p < 0.0001$  by the Wilcoxon signed rank test. For nine of ten competency questions, nurses statistically significantly improved their understanding of safe diabetic ketoacidosis after receiving education from a pharmacist. Secondary patient safety outcomes for post-education population are being collected and will be compared to those of the pre-education population. Preliminary results indicate that pharmacist education of emergency department nursing staff significantly improves knowledge of safe medication therapy for DKA patients, as measured through a written assessment.

### Learning Objectives:

Describe the impact of pharmacist-led education on nursing knowledge of diabetic ketoacidosis medication therapy.

Recall which electrolyte should be repleted prior to or during the administration of insulin.

### Self Assessment Questions:

How did nursing DKA competency scores change from pre-test to post-test as a result of pharmacist-led nursing education?

- A Scores statistically significantly improved for the majority of questions
- B: Scores statistically significantly decreased for the majority of questions
- C: Scores were unchanged for the majority of questions
- D: Scores were not measured during this initiative

Which electrolyte should ideally be repleted prior to the initiation of intravenous insulin therapy for DKA?

- A Sodium
- B Potassium
- C Magnesium
- D Chloride

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF THE EFFECT OF DIRECT ORAL ANTICOAGULANTS AND WARFARIN ON THROMBOELASTOGRAM IN PATIENTS WITH TRAUMA OR HEMORRHAGIC BRAIN BLEEDS

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**Background:** Thromboelastography (TEG) is used to quickly assess and guide coagulopathy treatment in patients presenting to the emergency room. The TEG R time parameter measures the time it takes for a blood sample to begin clotting, typically 5 to 10 minutes in healthy individuals. The purpose of this study is to identify whether a TEG R time can be used to guide treatment decisions in potentially hypercoagulable anticoagulated level 1 trauma or hemorrhagic brain bleed patients.

**Methods:** Data was retrospectively collected from 8/1/2015 to 11/31/2018 at Indiana University (IU) Health Methodist Emergency Department in all patients presenting with level 1 trauma or hemorrhagic brain bleeds (ICH, SAH, SDH) who had a TEG within 6 hours of admission. Adults who had blood products administered prior to TEG, were transferred from a non-IU outside hospital, or were on another anticoagulant were excluded. The primary outcome was TEG R time in non-anticoagulated patients vs. warfarin or direct oral anticoagulants (DOACs), categorized as < 5 minutes or > 5 minutes. Secondary outcomes included subgroup analysis of mean R times in hemorrhagic brain bleed patients and trauma patients alone.

**Results:** One hundred fifty patients were included with the mean R time for no anticoagulation, warfarin, and DOACs being 4, 5.18, and 4.98, respectively. For the primary outcome comparing no anticoagulation to warfarin, 14% (7/50) and 50% (25/50) of patients had R times > 5 minutes, respectively (p=0.0002). The DOAC group was identical to warfarin and returned the same comparison (p=0.0002).

**Conclusion:** Compared to patients on no anticoagulation, those on warfarin and DOACs appear to have an increased R time even when in a potentially hypercoagulable state. Further prospective studies are needed to evaluate what utility TEG can add to standard considerations when making anticoagulation reversal decisions.

### Learning Objectives:

Identify the thromboelastography (TEG) R time and how to interpret the result

Recognize the utility of TEG in the assessment of hypercoagulable state

### Self Assessment Questions:

What does a prolonged R time typically represent?

- A An increase in the number of clotting factors
- B: A decrease in the number of clotting factors
- C: The patient has experienced a major trauma
- D: The patient has been transfused

Studies of patients on warfarin have demonstrated that warfarin affects the TEG by:

- A Shortening the R time
- B Widening the R time
- C Increasing the R time
- D Decreasing the amplitude

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DIRECTED EDUCATION AND FEEDBACK TO NON-PHYSICIAN PROVIDERS TO REDUCE TREATMENT OF ASYMPTOMATIC BACTERIURIA AT A COMMUNITY HOSPITAL

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**Purpose:** Asymptomatic bacteriuria (ASB) is the isolation of significant bacteria in an appropriately collected urine specimen from a patient without urinary symptoms. The Infectious Diseases Society of America (IDSA) recommends that ASB with or without pyuria not be treated with antibiotics except in pregnant patients or patients undergoing invasive urological procedures. Despite the recommendations from the IDSA, treatment for ASB is still common. In addition to promoting antimicrobial resistance, unnecessary antibiotic use increases the risk for Clostridium difficile infections and adverse drug events. At Norton Healthcare, members of the Antimicrobial Stewardship Program (ASP) provide recommendations to physicians to stop treatment for ASB after therapy has been initiated. However, it is common for non-physician hospitalist providers (NPPs) to admit patients, initiate antibiotics, and then hand-off to their attending physicians. Since the NPPs never receive the recommendation to discontinue inappropriate ASB treatment, it is not expected for their practice to change. It is therefore the purpose of this study to determine the impact of directed education and feedback to non-physician providers on the initiation of treatment for ASB.

**Methods:** A quasi-experimental pre-post study evaluating the effect of education and feedback on NPP prescribing rates for ASB was conducted. Retrospective chart review was performed on 100 pre- and 100 post-intervention patients prescribed IV ceftriaxone with a UTI indication by an NPP. The intervention included an education session on ASB and current ASB prescribing rates. The primary outcome was the change in the rate of inappropriate ASB treatment with IV ceftriaxone ordered by NPPs. The secondary outcome was the impact on all IV ceftriaxone orders with a UTI indication by any provider 60 days before and after the intervention.

**Results and conclusions:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the prevalence of asymptomatic bacteriuria.

Identify patients where observation off antibiotics may be applied.

### Self Assessment Questions:

Which of the following statements is TRUE?

- A Prevalence of ASB decreases with age
- B: ASB is more common in elderly persons living in long-term care
- C: ASB is common among healthy young men
- D: ASB is rare in patients with chronic indwelling catheters

Which of the following patients could observation off antibiotics be applied?

- A Patient with septic shock requiring pressor support
- B Male about to undergo a transurethral resection of the prostate
- C Patient presenting with altered mental status, not meeting any SIR
- D Patient with right flank pain, fever, and elevated white blood cell cc

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMAL TIMING OF VENOUS THROMBOEMBOLISM (VTE) PROPHYLAXIS INITIATION IN TRAUMA PATIENTS

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**Purpose:** Venous thromboembolism (VTE) is a common complication in trauma patients. The American College of Chest Physicians (ACCP) and Eastern Association for Surgery of Trauma (EAST) recommend the use of low dose unfractionated heparin (UFH), low molecular weight heparin (LMWH), and/or mechanical prophylaxis for prevention of VTE in patients with traumatic injury. Timing of initiation has been shown to be an important predictor in prevention of VTE in this patient population. Studies showed that a delay of thromboprophylaxis initiation beyond four days increased risk of VTE by three-fold. However, there is a lack of consensus and data to support the appropriate timing of initiation of thromboprophylaxis after traumatic injury. Concerns with early initiation acutely after a major traumatic injury include risk of hemorrhagic complications. Results from recent studies show a trend towards lower VTE rates with earlier initiation but these studies were heterogeneous in defining the time frame of "early initiation", were not designed and powered to look at rate of VTE as the primary outcome, were limited by sample size, and/or only analyzed specific trauma populations. Therefore, the objective of this study is to determine the effect that timing of initiation of VTE prophylaxis has on VTE rate in all trauma patients.

**Methods:** This is a multicenter retrospective review utilizing data accessed from the Michigan Trauma Quality Improvement Program (MTQIP) database ranging from January 1, 2012 to January 1, 2019. Primary outcome is the rate of VTE during hospitalization. Secondary outcomes include in-hospital mortality after thromboprophylaxis initiation length of stay (ICU and total hospital), hemorrhagic complications, and a composite of any serious in-hospital complication.

The results and conclusions of this study will be presented at the 2019 Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Describe the current guideline recommendations for VTE prophylaxis in patients after a major traumatic injury  
Identify existing knowledge gaps regarding optimal timing of VTE prophylaxis in patients after a major traumatic injury

### Self Assessment Questions:

Which of the following reflects the current recommendations published in the most recent ACCP and EAST guidelines on VTE prophylaxis in major trauma patients?

- A: For major trauma patients at high risk for VTE, mechanical prophylaxis
- B: For major trauma patients at high risk for VTE, pharmacologic prophylaxis
- C: For major trauma patients at high risk for VTE, pharmacologic prophylaxis
- D: For major trauma patients at high risk for VTE, periodic surveillance

Which of the following statements is true regarding timing of VTE prophylaxis initiation?

- A: Studies have shown that VTE prophylaxis should be initiated within 4 hours of injury
- B: Studies have shown that VTE prophylaxis should be started after 7 days of injury
- C: Studies have shown that VTE prophylaxis is not necessary in trauma patients
- D: There are a lack of studies supporting the optimal timing of VTE prophylaxis

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF AN EDUCATION PROGRAM TO IMPROVE TIME TO ANTIBIOTIC ADMINISTRATION IN TRAUMA PATIENTS WITH OPEN LONG BONE FRACTURES

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**Purpose:** The American College of Surgeons (ACS) states patients who present with open fractures should receive intravenous antibiotics within 60 minutes of presentation. The objective of this study is to determine the impact of staff education on proper documentation and time to antibiotic administration in patients with open long bone fractures.

**Methods:** This study was submitted to the Institutional Review Board for approval. This study is a retrospective, single center chart review of patients who presented to a Level 1 Trauma Center with open long bone fractures from July 1, 2018 through January 31, 2019. The institution trauma database and electronic medical record were used to identify patients who presented during the study period. All data was recorded without patient identifiers and maintained confidentially. Time to antibiotic administration was calculated. Appropriate antibiotic selection was evaluated based on the Eastern Association for the Surgery of Trauma (EAST) and institution specific guidelines for the management of open fractures. Education targeted emergency department personnel including nurses, physicians, and pharmacists, and consisted of proper triage of possible open fracture patients, selection of appropriate antimicrobial agents, and proper documentation in the medication administration record. The primary aim of this study is to compare time to antibiotic administration and proper MAR documentation in open long bone fracture patients before and after implementation of an education program. The goal following implementation is 100% administration within the 60 minute time window.

**Results/Conclusions:** Data collection and analysis is currently in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define the Eastern Association for the Surgery of Trauma (EAST) guideline recommendations for antimicrobial therapy in open long bone fractures.

Discuss the impact of an education program on time to antibiotic administration in patients with open long bone fractures.

### Self Assessment Questions:

The Eastern Association for the Surgery of Trauma (EAST) guidelines recommend systemic antimicrobial therapy against which pathogens in the management of type III open fractures?

- A: Gram positive pathogens only
- B: Gram positive and anaerobic pathogens
- C: Gram positive and gram negative pathogens
- D: Gram positive, gram negative, and anaerobic pathogens

HB is a 27 yo male who presents as a trauma activation with a grade I open tibia fracture. He has no known medication allergies. Which of the following would be the most appropriate antibiotic choice

- A: Cefazolin 2g IVPB x1
- B: Piperacillin-Tazobactam 4.5 g IVPB x1
- C: Clindamycin 900 mg IVPB x1
- D: Antibiotic therapy is not necessary

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PRIOR AUTHORIZATION STANDARDIZATION ACROSS AN ONCOLOGY SERVICE LINE

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### Purpose

The purpose of this project is to standardize prior authorization processes across the UW Health oncology service line to improve prior authorization referral, approval, and denial management as well as improve the patient experience.

### Methods

The current state of prior authorization (PA) processes for all oncology-related PA requests submitted to the medication prior authorization coordinator (MPAC) and ambulatory medication prior authorization (AMPAC) teams was assessed. Areas of inefficiency, inconsistency, gaps in communication, and causes for workarounds leading to a PA determination not being documented prior to treatment were identified and targeted. An interdisciplinary workgroup defined urgent versus non-urgent chemotherapy with associated PA turnaround times, excluding payor-driven delays. A PA procedure was developed and adopted by the service line which standardized the process for PA request submission, review, and documentation. A system for reviewing therapy for patients needing same-day supportive care treatment as well as for established patients who are uninsured or undocumented immigrants was implemented. Metrics surrounding PA turnaround time and claims denial management will be evaluated.

### Results

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

### Conclusion

Measuring the impact of PA process standardization will reveal positive impacts on the patient experience and health system financial performance as well as demonstrate sustainability within an evolving healthcare landscape.

### Learning Objectives:

Identify Identify barriers to standardizing prior authorization practices within a health-system

Discuss Discuss the impact of prior authorization standardization on prior authorization turnaround time, claims denial management, and staff satisfaction

### Self Assessment Questions:

Which of the following are key drivers that favor prior authorization standardization?

- A Increasing denials management efforts
- B: Increasing payor coverage criteria
- C: Rapid development of biosimilar agents
- D: All the above

What metrics may be used to evaluate prior authorization process standardization within a health-system?

- A Prior authorization turnaround time
- B Number of approved prior authorizations
- C Number of appointments rescheduled due to third-party medication
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF ORAL ANTIDIABETIC MEDICATIONS ON A SUBCUTANEOUS INSULIN PROTOCOL IN HOSPITALIZED PATIENTS WITH DIABETES

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Purpose: Insulin therapy was the preferred method for achieving glycemic control in the hospital setting in the 2009 consensus statement published by the American Association of Clinical Endocrinologists (AACE) and American Diabetes Association (ADA). Noninsulin medications were described as having a limited role due to potential renal insufficiency and unstable hemodynamic status in hospitalized patients. According to the 2017 ADA guidelines focusing on diabetes care in the hospital setting, the safety and efficacy of noninsulin medications is an area of active research. The primary objective is to evaluate the impact of oral antidiabetic medications on glycemic control in hospitalized diabetic patients on a subcutaneous insulin protocol.

Methods: This was a retrospective chart review of diabetic patients 18 years of age or older admitted from January 1, 2016 to January 1, 2018 and placed on the institution's subcutaneous insulin protocol. Patients were stratified into the following two groups: patients with oral antidiabetic medications restarted within 48 hours of admission and those without oral antidiabetic medications restarted within 48 hours. Patients were randomized utilizing a random number generator. Randomization was continued until 100 patients met inclusion criteria for each group, resulting in the inclusion of 200 total patients. Baseline demographics included age, gender and body mass index. Data collected included total number and class(es) of oral antidiabetic medications per patient, time until oral antidiabetic medication(s) restarted during hospital stay, blood glucose results, total number of units of insulin lispro administered per patient, and administration of long acting insulin if ordered. Charts were reviewed for administration of dextrose 50 percent and for types of adverse events experienced with blood glucose less than 70 mg/dL. Data was analyzed using descriptive and inferential statistics.

Results/Conclusions: Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the current guidelines for hyperglycemia treatment in the hospital setting

Describe the impact of oral antidiabetic medications on glycemic control in hospitalized diabetic patients on a subcutaneous insulin protocol

### Self Assessment Questions:

The AACE and ADA guidelines give preference to which of the following therapies for achieving glycemic control in the hospital setting?

- A Noninsulin therapy
- B: Insulin therapy plus noninsulin therapy
- C: Insulin therapy
- D: Nutrition control

According to the AACE and ADA guidelines, noninsulin medications have a limited role in achieving glycemic control due to which of the following characteristics in the hospital setting?

- A Renal insufficiency
- B Unstable hemodynamic status
- C Multiple adverse drug reactions
- D A and B

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A PHARMACIST-DRIVEN INSULIN OPTIMIZATION PROGRAM ON MEDICAL GENERAL PRACTICE UNITS

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**Purpose:** Hyperglycemia is a common occurrence in hospitalized patients with or without a past medical history of diabetes mellitus. National practice guidelines discourage use of sliding scale insulin alone to achieve euglycemia in these patients. Instead, insulin regimens containing both basal and prandial insulin are preferred in order to achieve better glycemic control. The purpose of this project was to implement and evaluate the effect of an inpatient pharmacist-driven insulin optimization program on glycemic control and associated outcomes. **Methods:** This was a single-center, institutional review board approved, quasi-experimental study evaluating the implementation of a pharmacist intervention to optimize insulin therapy in hospitalized general practice unit patients. The pharmacist's interventions included optimization of correctional insulin per institutional guidelines, resumption of home basal insulin, initiation of new basal insulin, as well as measuring hemoglobin A1c based on predetermined criteria. Patients in this study were identified by age  $\geq 18$  years, admission to select medical general practice units, a documented past medical history of type I or type II diabetes, and the absence of basal insulin on the medication administration record (MAR). Exclusion criteria included pregnancy, cognitive impairment, inmate status, admission with DKA, administration of glucocorticoids, end-stage renal disease, insulin pump use, U-500 insulin use, history of pancreas transplant, TPN administration, endocrinology consult, and transfer from the intensive care unit. The primary outcome was glycemic control, defined as the percentage of blood glucose readings 70-180 mg/dL. Secondary endpoints included length of stay, adverse effects, compliance with the correctional insulin protocol, and time-to-initiation of any basal insulin. Categorical data was analyzed using chi square and Fisher's exact where appropriate. Continuous parametric data were analyzed using the t-test, and non-parametric data were analyzed using the Mann-Whitney U test. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define hyperglycemia in the inpatient setting

Describe preferred inpatient blood glucose management strategies in non-critically ill patients

### Self Assessment Questions:

Which of the following is the correct definition of hyperglycemia for patients admitted to the hospital according to the American Diabetes Association?

- A A1c  $>6.5\%$
- B: Blood glucose  $> 140$  mg/dL
- C: Blood glucose  $> 180$  mg/dL
- D: 2 or more blood glucose readings  $> 140$  mg/dL

MT is a 55 year-old male with a past medical history of type II diabetes, hypertension, and gout admitted to the medical general practice unit for shortness of breath and chest pain. His diabetes is managed with:

- A Short-acting insulin scheduled three times daily before meals
- B Correctional insulin every 4-6 hours
- C Long-acting basal insulin + short-acting correctional insulin
- D Continue outpatient oral medications

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECTS OF OPIOID ADMINISTRATION ON FALL RISK IN PATIENTS ADMITTED TO A COMMUNITY HOSPITAL

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**Purpose:** Opioids are commonly used for pain management in patients admitted to the hospital, but have central nervous system effects that can increase the chances of a patient falling. Outpatient opioid use in elderly patients has been associated with increased risk of falls, however many inpatient fall risk assessment models do not factor opioids in risk scoring. The objective of this study is to quantify the effects of opioids on a patient's risk of experiencing a fall while admitted to the hospital.

**Methods:** After submission and approval by the Institutional Review Board, a retrospective chart review was performed on all patients over the age of 18 with a documented fall while admitted to the hospital over a 12-month period. Data collected includes any opioids received within 24 hours of fall event, Hendrich II Fall Risk stratification, previous fall history, concomitant medications, age, and gender. The primary endpoint was fall rate in patients administered opioids within 24 hours of event compared to patients who did not receive opioids and experienced a fall. Secondary outcomes measured include fall rates for individual opioids administered, and effects of opioids on fall rates stratified by age, gender, and fall risk stratification.

**Results:** Fall rates were not increased in patients receiving opioids within 24 hours of a fall event when compared to those not receiving opioids. Increased age was a strong predictor of falls, and extended-release opioids were associated with higher fall rates when compared to immediate-release opioids.

**Conclusions:** Administration of opioids was not directly associated with increased inpatient fall risk as an independent risk factor.

### Learning Objectives:

Identify patient populations at increased risk for falls with concomitant opioid use.

List established risk factors for increased falls as defined by the Hendrich II Fall Risk Model.

### Self Assessment Questions:

Which of the following is a risk factor for falls outlined by the Hendrich II Fall Risk Model?

- A Use of lisinopril
- B: Female gender
- C: Altered elimination
- D: Use of CNS stimulants

Which of the following opioids is expected to have the longest elimination half-life in a healthy adult?

- A IV fentanyl
- B Immediate-release PO morphine
- C PO hydrocodone-acetaminophen
- D Extended-release PO oxycodone

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACY TECHNICIANS TO ACHIEVE ORGANIZATIONAL STRATEGIC PRIORITIES

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**Background/Purpose:** Froedtert inpatient pharmacists are extensively involved in patient care activities from admission to discharge, and are challenged to prioritize medication management and transitions of care services needed. Decentral pharmacy technicians have been embedded within the clinical practice model and on patient-care units to assist with pharmacy services in the technical, non-clinical work of care transitions and medication access. The impact decentral technicians bring to our clinical practice model has not been evaluated, and is needed to further expand the program. The purpose of this study is to identify the impact through the prescription fill percentage of patients discharging home with at least one prescription medication filled at our outpatient pharmacy. This pharmacy strategic priority is one of our organization's initiatives identified to reduce the hospital's 30-day readmission rates. A previous internal review showed a reduction in 30-day readmissions when patient filled prescriptions at our onsite retail pharmacy.

**Methodology:** The study is taking place at Froedtert Hospital on select acute care medicine and surgery units. Decentral pharmacy technicians working on these units will assist pharmacists through prioritized tasks. Technicians will meet with current admitted inpatients to focus on the promotion and marketing of our outpatient pharmacy services, Meds-to-Beds program, collection of patient medication histories, and ensure appropriate demographic, insurance and payment information is updated in our electronic health record. Patients discharging with at least one prescription medication (new or refill) will be included in the data collection of this study and evaluated. Patients excluded from this study are those discharging to locations other than home, not warranting the opportunity to fill medications at our outpatient pharmacy; or patients discharged on a weekend or holiday when decentral technicians are not staffing.

**Results:** Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the responsibilities of decentralized pharmacy technicians embedded within the clinical practice model.

Describe the impact of pharmacy technicians on the pharmacy practice model.

### Self Assessment Questions:

What are some responsibilities of a decentralized pharmacy technician?

- A Collection of medication history, promotion of pharmacy services,
- B: Drug therapy recommendations.
- C: Verification of medications in the queue.
- D: Patient profile reviews.

What is the impact of pharmacy technicians on the pharmacy practice model?

- A Increased prescription utilization
- B Reduction of barriers at discharge for patients leaving the hospital
- C Increased communication between medical team
- D A, B, and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## BARRIERS TO SEPSIS FLUID RESUSCITATION COMPLIANCE: EVALUATING HIGH-RISK PATIENTS AND FLUID RESUSCITATION STRATEGIES

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**Purpose:** In conditions sensitive to blood volume, including congestive heart failure (CHF) and end-stage renal disease (ESRD), there is little guidance for fluid resuscitation in severe sepsis and septic shock. The objective of this study is to identify outcomes associated with complete fluid resuscitation in patients with CHF or ESRD presenting with severe sepsis or septic shock in the emergency department or intensive care unit. This study will identify the incidence of mortality in patients with CHF or ESRD who received complete or incomplete fluid resuscitation in accordance with 2016 Surviving Sepsis Campaign (SSC) standards. **Methods:** This study is approved by the Institutional Review Board. This study is a retrospective, single-center chart review of patients with CHF or ESRD presenting with severe sepsis or septic shock eligible for fluid resuscitation at OhioHealth Riverside Methodist Hospital in the emergency department or intensive care unit. Potential study subjects will be identified via ICD-10 codes among data collected by the Sepsis Care Coordinator. Patients age less than 18 or ineligible for fluid resuscitation will be excluded. The primary outcome of this study is incidence of mortality in patients with CHF or ESRD receiving complete versus incomplete fluid resuscitation in severe sepsis or septic shock. Investigators will determine the volume and time of fluid administration, and if patients expired during their hospital stay. Complete fluid resuscitation will be defined as 30 mL/kg administered within three hours of time zero. Secondary outcomes include the rate of adverse outcomes such as change in oxygenation, intubation, use of vasopressors, length of stay, and 30-day readmission rate, as well as type of fluid used, and fluid balance 12 and 24 hours following recognition of severe sepsis or septic shock.

**Results:** Data analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe guideline recommendations for patients who present with severe sepsis or septic shock according to the Surviving Sepsis Campaign

Identify patients with sepsis that are candidates for fluid resuscitation

### Self Assessment Questions:

What volume of fluid resuscitation does the Surviving Sepsis Campaign recommend for all patients with severe sepsis or septic shock?

- A 100 mL/kg total body weight
- B: 35 mL/kg ideal body weight
- C: 30 mL/kg total body weight
- D: 15 mL/kg ideal body weight

What characteristics imply that a patient is a candidate for fluid resuscitation per the Surviving Sepsis Campaign?

- A SIRS, suspected infection, MAP <55 mmHg or lactate <4 mmol/L
- B SIRS, MAP >60 mmHg, lactate >2 mmol/L
- C SIRS, suspected infection, MAP <80 mmHg, lactate >1 mmol/L
- D SIRS, suspected infection, plus MAP <65 mmHg or lactate >4 mmol/L

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A METABOLIC MONITORING PROTOCOL FOR PATIENTS PRESCRIBED ATYPICAL ANTIPSYCHOTICS AT A COMMUNITY MENTAL HEALTH CLINIC

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**Purpose:** Numerous studies have shown that individuals with serious mental illness (SMI) are at a greater risk of mortality from cardiovascular causes than those without SMI. This discrepancy has been attributed to a number of sources including genetic factors, lifestyle choices, barriers to healthcare, and medication side effects. Individuals with SMI are commonly prescribed atypical antipsychotic therapies, which are well known to lead to metabolic disorders that result in an increased risk of cardiovascular disease and death. Recommendations for appropriate monitoring of metabolic side effects exist; however, monitoring is rarely as frequent as recommended by guideline consensus. The purpose of this study is to determine whether implementation of a nurse and pharmacist-driven metabolic monitoring protocol will increase monitoring in patients prescribed atypical antipsychotics in an outpatient community mental health clinic.

**Methods:** A retrospective chart review was conducted on individuals with SMI who have been prescribed at least one atypical antipsychotic medication between October 1, 2017 and March 31, 2019. All included patients were cared for by the adult outpatient treatment team at the Eskenazi Health James Wright Center, an outpatient mental health clinic. The primary endpoint is appropriate monitoring for each variable being studied (weight, waist circumference, blood pressure, hemoglobin A1c, and low-density lipoprotein) before and after the implementation of the metabolic monitoring protocol on October 1, 2018. Secondary endpoints include the number of glucose or lipid laboratory tests ordered per protocol and the interventions made for abnormal study variables. This data will then be used to assess the effectiveness of the metabolic monitoring protocol as well as the frequency at which providers make interventions when a patient develops a metabolic disorder.

### Learning Objectives:

Identify the metabolic adverse effects associated with use of atypical antipsychotic therapies and their impact on cardiovascular outcomes  
Describe gaps in literature relating to metabolic monitoring of patients prescribed atypical antipsychotics

### Self Assessment Questions:

Which one of the following metabolic side effects is associated with atypical antipsychotic medications?

- A Hypotension
- B: Weight gain
- C: Neuropathy
- D: Hyperkalemia

There is a current lack of research surrounding which one of the following strategies for improving metabolic monitoring?

- A Providing education to physicians
- B Creating an order entry pop-up alert
- C Utilizing nurses and pharmacists
- D Implementing a clinical decision support tool

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PHARMACY RECOMMENDED ANTICOAGULATION POST ORTHOPEDIC SURGERY FOR PATIENTS ON DIRECT ORAL ANTICOAGULATION OR WARFARIN PRIOR TO SURGERY

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**Purpose:** Maintenance anticoagulation is necessary for select patients to reduce the risk of a life threatening medical event, such as a deep vein thrombus (DVT) or pulmonary embolism (PE). When these patients decide to have an elective surgery, it is often necessary to discontinue anticoagulation prior to the procedure to reduce the risk of bleeding. Initiation of anticoagulation post-operatively must be appropriately timed to limit risk of potential DVT/PE complications, while taking into account the patient's bleeding risk. This purpose of this study is to determine if pharmacists can be successful in implementing plans of anticoagulation by measuring the acceptance rate of pharmacist derived plans for anticoagulation post operatively.

**Methods:** This study is a retrospective review of all patients who had an individualized anticoagulation plan developed by a pharmacist from December of 2018 through March of 2019. A new monitoring form for assessing patients scheduled for elective orthopedic surgery was implemented in December of 2018. Upon identification of a patient receiving warfarin or a direct oral anticoagulant (DOAC), the monitoring form was filled out and subsequently reviewed on the day of the patient's surgery. After review of the patient the pharmacist made recommendations for resuming anticoagulation post-operatively. The primary endpoint is provider acceptance rate of pharmacist recommended anticoagulation plans.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize Recognize why patients are at increased risk of venous thromboembolism post-operatively  
Describe Describe assessment tools that can be used to identify patient at high risk for venous thromboembolism.

### Self Assessment Questions:

Which of the following statements is correct in regards to increased risk of thrombus post-surgery:

- A Veins can be damaged during surgery
- B: Blood flow is impaired and can pool during surgery
- C: Blood clots to quickly due to altered hemostasis due to surgery
- D: All of the above

Which of the following can be used to determine patient risk of venous thromboembolism:

- A SIRS criteria
- B CHA2DS2-VASc
- C Has-bled
- D Glasgow Coma Scale

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECTS OF IMPLEMENTING A PHARMACIST-LED SYSTEM FOR ORDERING PROCALCITONIN ON ANTIMICROBIAL STEWARDSHIP FOR PNEUMONIA

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**Purpose:** Antimicrobial resistance has become a common problem in healthcare facilities across the United States. Data even suggests that somewhere between 30-50% of antimicrobial use is inappropriate. Finding ways to improve antimicrobial stewardship has thus been highly emphasized and is an area of focus by the Centers for Disease Control. In recent years, procalcitonin has been a pro-inflammatory marker used to aid in antimicrobial de-escalation. It has been found to correlate with the severity of illness and potentially improve stewardship practices. Many other biomarkers (i.e. lactate, white blood cells, temperature, etc.) are not solely sensitive to infectious processes and are sometimes affected by immunosuppressive states. Patients with lower respiratory tract infections have benefited from procalcitonin guided antimicrobial stewardship with significant reductions in antimicrobial use and no significant differences in patient outcomes. Procalcitonin has also been found to be beneficial for patients with sepsis or septic shock. Studies show that procalcitonin correlates with mortality and may be beneficial to observe in the first 72 hours when considering appropriateness of antimicrobial therapy.

**Methods:** This study was a before-after cohort study comparing the length of antimicrobial therapy after implementation of a pharmacist led procalcitonin algorithm for pneumonia. This involved both a retrospective review of 30 patient's charts without utilizing procalcitonin and compare average length of antimicrobial therapy after implementation of a procalcitonin guided algorithm for 30 patients with pneumonia over the same time frame in two consecutive years. An initial procalcitonin was ordered on identification of pneumonia and recommendations made to providers followed a predefined algorithm based on the resulting procalcitonin level. This study was approved through expedited review by our institutional review board.

**Preliminary Results:** Data collection and analysis are currently in progress.

**Conclusion:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Translate procalcitonin results and make appropriate recommendations to providers accounting for patient specific factors.

List disease states and situations where procalcitonin may be elevated at baseline.

### Self Assessment Questions:

JJ is a 55 year old male admitted with shortness of breath and chest pain on inspiration for the past 3 days. He has a past medical history of hypertension, type two diabetes mellitus, and end-stage r

- A JJ's elevated baseline procalcitonin indicates he is likely suffering
- B: JJ's past medical history of end-stage renal disease makes procalc
- C: JJ's baseline procalcitonin is normal and antibiotics should be stop
- D: Regardless of JJ's procalcitonin, his elevated white blood cell cou

Which of the following may elevate a patient's baseline procalcitonin and diminish its clinical utility?

- A Diabetes
- B A viral infection
- C Hypertension
- D A major burn

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF IMPLEMENTING A PHARMACIST-LED TRANSITIONAL CARE PILOT PROGRAM ON THIRTY DAY READMISSIONS, MEDICATION APPROPRIATENESS, AND PATIENT SATISFACTION

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**Purpose:** Communication between the healthcare team and clear, appropriate patient discharge instructions are key to reducing readmissions and adverse health outcomes. Pharmacist-driven transitional care programs strive to reduce errors at discharge, ensure appropriate patient education, and promote communication between members of the healthcare team. With the involvement of a pharmacist in transitions of care, patients are more successful after discharge to maintain their health status and more compliant with their medications. The purpose of this project is to develop a pharmacist-led, interdisciplinary transitional care pilot program and subsequently permanent workflow to decrease thirty day readmission rates, increase patient satisfaction, ensure continuity of care and medication appropriateness, and improve communication within the healthcare team

**Methods:** The pilot program will consist of interviewing adult patients with congestive heart failure, chronic obstructive pulmonary disease, and/or pneumonia classified as moderate to high risk for readmission by the LACE readmission score. The LACE readmission score accounts for length of stay, acuity, comorbidities, and number of emergency department visits in the past six months. Interview questions will consist of immunization history, home medications, ability to afford medications, and management of medications at home. Answers to these questions will be communicated to other members of the healthcare team. Patients' responses will also be used to ensure continuity of care with the outpatient pharmacy by planning delivery of medications prior to discharge. Discharge medication reconciliation will be reviewed by a pharmacist for medication appropriateness. After discharge, the pharmacist will perform a follow-up phone call to answer any of the patient's questions regarding their medications. Based on the pilot program results, a permanent transitions of care workflow will be established for expansion to the rest of the hospital.

**Preliminary Results:** Data collection and analysis are currently in progress.

**Conclusion:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Recall appropriate medication therapy and immunizations with patients with congestive heart failure, chronic obstructive pulmonary disease, and pneumonia.

List areas where an inpatient pharmacist can expedite a clear, accurate discharge to decrease readmission and improve patient satisfaction and medication appropriateness.

### Self Assessment Questions:

Which of the following is correct regarding an inpatient pharmacist's role in transitions of care?

- A Fill and prepare outpatient prescriptions
- B: Administer vaccinations
- C: Ensure accurate discharge instructions
- D: Schedule home health visits

A 65 yr old patient with reduced ejection fraction congestive heart failure is being discharged from the hospital. Which of the following should be included in your recommendations?

- A Metoprolol tartrate
- B An ACE-I or ARB
- C Shingrix
- D TDaP

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF VANCOMYCIN LOADING DOSES ON CLINICAL OUTCOMES IN COMPLICATED INFECTIONS

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**Purpose:** To achieve rapid attainment of a target trough of 15 to 20mg/L for complicated infections, a vancomycin loading dose of 25 to 30mg/kg can be considered. Vancomycin loading doses have been shown to improve early achievement of therapeutic levels. In addition, higher vancomycin trough concentrations have been associated with improved outcomes in patients with complicated infections. However, the direct effect of vancomycin loading doses on clinical outcomes in complicated infections is not well understood. The purpose of this study is to compare clinical outcomes of complicated infections treated with and without a vancomycin loading dose.

**Methods:** This is a retrospective, observational, single-center study. Patient visits will be identified using ICD-10 codes for bacteremia, endocarditis, osteomyelitis, meningitis and pneumonia. The following data will be collected: age, gender, weight, height, body mass index (BMI), infection type, serum creatinine, creatinine clearance, initial vancomycin dose, first trough level, number of days from admission to white blood cell count less than  $12 \times 10^9$  cells/L and temperature less than 100.4°F, length of hospital stay, duration of vancomycin therapy, nephrotoxicity, positive culture results, minimum inhibitory concentration survival at 30, 90 and 180 days and readmission 30 days post-discharge. The two study groups will be patients that received an initial vancomycin dose of greater than or equal to 20mg/kg and those that received an initial vancomycin dose of less than 20mg/kg. Exclusion criteria includes less than 3 days of vancomycin therapy, age less than 18 years old, BMI greater than 40kg/m<sup>2</sup>, impaired renal function, pregnancy and patients leaving against medical advice. The primary outcome will be mortality. The secondary outcomes will be length of hospital stay, readmission, nephrotoxicity and number of days from admission to resolution of infection.

**Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the American Society of Health-System Pharmacists, Infectious Diseases Society of America, and Society of Infectious Diseases Pharmacist consensus statement recommendations for vancomycin loading doses in complicated infections.

Discuss current literature regarding vancomycin loading doses, therapeutic vancomycin levels, and clinical outcomes.

### Self Assessment Questions:

Which of the following is NOT considered a complicated infection in the 2009 consensus statement by ASHP, IDSA, and SIDP?

- A Meningitis
- B: Osteomyelitis
- C: Endocarditis
- D: Cellulitis

The 2009 consensus statement by ASHP, IDSA, and SIDP recommend a loading dose of \_\_\_\_\_ in seriously ill patients with complicated infections.

- A 15-20mg/kg
- B 20-25mg/kg
- C 25-30mg/kg
- D > 30mg/kg

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## VALUE OF PHARMACY TECHNICIAN CLINICAL SUPPORT ROLE IN PRIMARY CARE

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**Purpose:**

A pharmacy technician practicing at the top of their license is a valuable asset that supports medication optimization and access. At Northwestern Medicine, a pharmacy technician was added to the Care Coordination team to support outpatient primary care clinics in May 2018. Evaluating the success of this position may set a valuable precedent for a non-dispensing pharmacy technician role in team-based care. The purpose of this project is to describe the role and assess the interventions of a pharmacy technician added to the Care Coordination team.

**Methods:**

The role, workflow, and responsibilities of the pharmacy technician will be described. Care Coordination team members will be surveyed to assess their perception of the role of the pharmacy technician and the value of this role in Care Coordination. A retrospective review of all interventions and patient interactions recorded by the technician from May 2018 to December 2018 will be completed. Descriptive statistics will be used to evaluate the interventions. Additionally, cost savings to the patient, when applicable, will be reported.

**Preliminary Results:**

The pharmacist and pharmacy technician identified the workflow and responsibilities for the role. A majority of the interventions were related to medications for diabetes and interventions took the pharmacy technician a median of 30 minutes to complete. From May to December 2018, the technician reported a total of 608 interventions. These interventions resulted in cost savings to our patients of at least \$50,000 per month.

**Conclusions:**

A clinical support pharmacy technician was successfully added to the Care Coordination team at Northwestern Medicine in May 2018. The pharmacy technician role has provided significant financial benefit to our patients. Future addition of clinical support pharmacy technicians to multidisciplinary teams in primary care is a cost effective way to extend the reach of clinical pharmacy services.

### Learning Objectives:

Describe the responsibilities and scope of practice of the clinical support pharmacy technician.

List challenges encountered in the implementation of the clinical support pharmacy technician position.

### Self Assessment Questions:

Which of the following is NOT within the scope of practice of a clinical support pharmacy technician?

- A Completing medication formulary investigation
- B: Completing patient assistance program applications
- C: Providing medication counseling to a patient
- D: Providing a list of covered therapy alternatives to providers

Which of the following were challenges encountered in implementing the clinical support pharmacy technician role?

- A Ensuring funding to support the position
- B Finding a qualified technician
- C Slow start to referrals from off-site care coordinators
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE EFFECTIVENESS OF COMMUNITY PHARMACIST-PERFORMED ADHERENCE INTERVENTIONS ON LONG-TERM MEDICATION ADHERENCE RATES

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**Objectives:** The primary objective of this study is to evaluate long-term adherence patterns on pharmacist-performed initial adherence intervention with and without follow-up. Patient adherence is essential to improving health outcomes and preventing hospital readmission. Community pharmacists have been using a variety of MTM platforms to perform adherence interventions; however, data demonstrating long-term impact of these interventions is limited. The secondary objective is to assess adherence patterns at specific follow-up intervals (month 1, 3, 6, 12 and 24) in patients that received pharmacist-performed follow-up adherence interventions with or without additional pharmacy adherence enhancement services. The study hopes to identify an improvement in adherence rates with community pharmacist-performed initial and follow up adherence interventions. The study also hopes to identify adherence patterns to propose a standard follow-up timeline to improve long-term adherence rates.

**Methods:** A retrospective cross-sectional study will be conducted. Successful adherence interventions completed by Jewel-Osco community pharmacists from January 2016 to January 2018 will be reviewed. Included interventions are those focused on adult patients (18 years or older). Data from all available MTM platforms used by the company will be collected. Patient dispensing records will be used to assess adherence rates and any additional services that patients received from Jewel-Osco pharmacies for adherence enhancement. Proportion of days covered (PDC) will be used to measure adherence rates.

**Results/Conclusion:** Research is currently in progress and will be presented at the Great Lakes Conference.

### Learning Objectives:

Describe the impact of pharmacist-performed adherence interventions on long-term adherence rates.

Identify adherence patterns with pharmacist-performed follow-up timeline

### Self Assessment Questions:

What is reported average adherence percentage by WHO and CDC in 2003?

- A: 30%
- B: 80%
- C: 50%
- D: 40%

Which of the following options is proportion of days covered (PDC)?

- A The sum of the day's supply for all fills of a given drug in a particular period divided by the number of days in the period
- B The number of days in the period "covered" of a given drug, divided by the number of days in the period
- C The number of days in period divided by the number of days in period
- D None of the above

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PROCALCITONIN TESTING AT A TERTIARY CARE HOSPITAL

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**Purpose:** The purpose of this study is to evaluate the compliance with the University Hospitals Cleveland Medical Center's (UHCMC) procalcitonin recommended usage criteria per the study protocol and to further characterize the patient population ordered procalcitonin testing.

**Methodology:** This study is an IRB approved, single-center, retrospective chart review including patients 18 years of age and older who were ordered procalcitonin from March 1st, 2018 and October 1st, 2018. Descriptive statistics were utilized for primary and secondary outcomes.

**Results:** Of the 100 patients included in this study, a mean  $1.75 \pm 1.23$  procalcitonin levels were drawn with a mean value of 2.0 ng/mL. A single level was drawn in 59% of patients. The most common primary sources of sepsis included pneumonia (58%) and urinary tract infections (17%). The primary outcome of inappropriate testing was identified in 33 (18.9%) levels. Eighteen levels resulted before initiation of antibiotics, 14 levels were drawn after pre-specified antibiotic stop dates, and 1 level specified a non-sepsis etiology. The majority of levels were drawn in the intensive care units (ICUs) specifically the neuroscience ICU and medical ICU. Overall, the median antibiotic days were 12 [7-17], antibiotic duration 7 [4-11] days, and average number of antibiotics of 3.1. When comparing appropriate vs inappropriate use of procalcitonin testing, the median antibiotic days were 12 [7-17] vs 13 [7.5-17.5] and antibiotic duration were 7 [4-11] vs 8 [5.5-13.5].

**Conclusions:** A total 18.9% of procalcitonin levels were deemed inappropriate. There was a difference in one day for antibiotic days and duration when used per the procalcitonin recommended usage criteria. Similarly to previous literature, when used appropriately procalcitonin testing can decrease antibiotic exposure. Therefore, utilizing procalcitonin testing for the discontinuation of antibiotics in appropriately identified sepsis could reduce antibiotic days and duration thus indirectly reducing cost and length of stay.

### Learning Objectives:

Discuss the use of procalcitonin testing to discontinue antibiotic therapy in patients with sepsis and septic shock

Identify opportunities to optimize institutional procalcitonin testing to assure proper use and improve outcomes

### Self Assessment Questions:

To effectively use procalcitonin testing to reduce antibiotic days and duration in sepsis, it is recommended to...

- A Acquire a baseline level without regards to antibiotics then serially
- B Initiate antibiotics, draw a baseline level, and discontinue antibiotic
- C Acquire a level when clinical suspicion of infections becomes low
- D Acquire a baseline level before initiating antibiotics

Which of the following are opportunities to optimize procalcitonin testing in sepsis?

- A Use in conjunction with clinical judgement for infectious signs and symptoms
- B Acquire a baseline and serial levels until  $< 0.5 \text{ ng/mL}$
- C Cease drawing serial levels after pre-specified antibiotic stop dates
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RETROSPECTIVE REVIEW OF 30-DAY READMISSION RATES IN PULMONARY EMBOLISM PATIENTS TREATED WITH A DIRECT-ACTING ORAL ANTICOAGULANT WITH AND WITHOUT FOLLOW-UP

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**Purpose:** Current studies report 30-day readmission rates after pulmonary embolism (PE) from 12.8 to 15.8% with identified risk factors such as female sex, Medicaid insurance, and severity of illness; however, impact of follow-up has not been investigated. The objective of this study was to determine if patients discharged on a direct acting anticoagulant (DOAC) with follow-up had had lower readmission rates.

**Methods:** A single-center retrospective cohort study was conducted between 7/1/2015 and 6/30/2018 including patients with a PE who were discharged on a DOAC. Outcomes compared 30-day readmission rates in patients with and without follow-up. Follow-up was defined as anticoagulation monitoring by their physician, hematologist, or at an anticoagulation clinic. Statistical analysis compared patients with and without follow-up, and a primary logistic regression model will evaluate independent risk factors for readmission.

**Preliminary Results:** The study included 400 patients; 249 (62.3%) discharged on rivaroxaban, 144 (36.0%) on apixaban, 5 (1.3%) on dabigatran, and 2 (0.50%) on edoxaban. The overall readmission rate was 13.0% (n=52) and median time to readmission was 11 days (IQR 8-21). Patients were less likely to be readmitted if they attended a follow-up appointment within 30 days from discharge (n=6/74 (8.1%)) compared to those without a follow-up appointment within 30 days (n=46/326 (14.1%)).

**Conclusion:** Readmission rates after a PE are high and although DOACs are advertised as requiring no monitoring, follow-up may be necessary to decrease readmissions in this patient population. Guidelines do not recommend specific follow-up for patients discharged with a PE, except in relation to drug monitoring. Since there is no recommended laboratory testing to monitor DOACs, the absence of monitoring recommendations may lead to a decrease in close follow-up for patients discharged on a DOAC. Consider scheduling follow-up to mitigate readmissions in patients with a PE discharged on a DOAC.

### Learning Objectives:

List the current oral treatment options for patients with a pulmonary embolism.

Recognize current risk factors for readmission in a patient with a pulmonary embolism.

### Self Assessment Questions:

Which of the following is the first line treatment recommendation for oral anticoagulation in non-cancer related pulmonary embolism (PE)?

- A Aspirin
- B: Warfarin
- C: Ticagrelor
- D: Direct acting oral anticoagulants (DOAC)

Which of the following is an identified risk factor for readmission in pulmonary embolism?

- A Increased severity of illness
- B Younger age
- C Medicare insurance
- D Male sex

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE IMPLEMENTATION OF PREMEDICATIONS PRIOR TO PEGASPARGASE INFUSIONS IN PEDIATRIC ACUTE LYMPHOBLASTIC LEUKEMIA PATIENTS

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**Purpose:** Asparaginase is an integral component in the treatment of pediatric acute lymphoblastic leukemia (ALL). Hypersensitivity reactions to asparaginase products are common and often result in switching from pegaspargase, the first line product, to asparaginase Erwinia chrysanthemi, a more expensive product that must be administered more frequently. Currently, the Children's Oncology Group recommends against premedicating for pegaspargase infusions, for concern of masking inactivation to pegaspargase. This study will evaluate the rates of hypersensitivity reactions to pegaspargase and rates of switching to Erwinia pre-and post-implementation of a premedication protocol.

**Methods:** Pediatric patients (<25 years of age) with ALL that received pegaspargase after January 1, 2008 will be screened for inclusion in the study. Patients who meet inclusion criteria will be divided into two cohorts: those that received premedications prior to pegaspargase infusions and those that did not receive premedications. Premedications include acetaminophen, diphenhydramine, ondansetron, and steroids. The following data will be collected: patient age, sex, ethnicity, ALL diagnosis, ALL risk stratification, number of doses received, number of doses intended, dose reaction occurred with, when switch to Erwinia occurred, study protocol, prior exposure to pegaspargase, and months since last pegaspargase exposure. The primary outcome of this study is to determine the rates of grade three or four hypersensitivity reactions to pegaspargase. Secondary outcomes will evaluate the rate of switching to Erwinia, rate of any grade hypersensitivity reactions, and presentation of hypersensitivity reactions. The cost of asparaginase therapy will also be evaluated between the two cohorts. Finally, we will describe the number of patients who were re-challenged with pegaspargase and report any hypersensitivity reactions and grade of reaction in those that were re-challenged.

**Results:** in progress

**Conclusion:** in progress

### Learning Objectives:

Describe the role of pegaspargase in the treatment of pediatric acute lymphoblastic leukemia

Recognize the rationale and concern behind premedicating pediatric patients prior to pegaspargase infusions

### Self Assessment Questions:

Which of the following best describes the mechanism of action of pegaspargase?

- A Inhibits microtubule formation
- B: Depletes asparagine in leukemic cells
- C: Inhibits dihydrofolate reductase
- D: Inhibits topoisomerase II

Which of the following is the primary concern of the Children's Oncology Group with premedicating pediatric patients prior to pegaspargase infusions?

- A Reduced efficacy
- B Drug interactions
- C Masking inactivation
- D Over medicating

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF 340B DRUG PRICING ON FORMULARY DECISION MAKING IN A MIXED COVERED ENTITY HEALTH-SYSTEM

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**Purpose:** The Health Resources and Service Administration created the 340B program in 1992 to allow eligible healthcare facilities, providing care disproportionately to underserved populations, to purchase medications at discounted prices. This study will determine the financial impact of 340B discount pricing on changes to formulary approvals of therapeutically equivalent medications. Within a mixed-model health-system, containing both 340B covered entities and non-covered entities, current formulary decisions of medications with identical therapeutic effects are dependent on lowest group purchasing organization prices. A comparison of 340B discount pricing to group purchasing organization pricing and wholesale acquisition cost, with the utilization of individual medications at each care site will determine the financial opportunities for creating multiple system formularies as well as the impact of considering 340B pricing for future formulary approvals.

**Methods:** A quality improvement study will be implemented at OhioHealth, a community health-system with eleven care sites, of which six facilities and two child sites are 340B covered entities. An analysis will be performed on the current system formulary and any therapeutically equivalent medications, as identified by the organization's therapeutic interchange master. The assessment of each drug will include the determination of the organization's preferred national drug code, group purchasing organization pricing, 340B discount pricing, medication utilization at each of the eleven care sites, and quantity of charges to 340B or group purchasing organization accounts between January 1, 2018 and December 31, 2018. Conversion of equivalent therapeutic utilization and 340B discount pricing of formulary alternatives will determine the potential financial impact of 340B discount pricing considerations prior to formulary approvals of therapeutically interchangeable medications as well as the impact of the creation of additional system formularies for use at 340B covered entities.

**Results and Conclusions:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the benefit of alterations in formulary medications within 340B covered entities.

Discuss the value of considering 340B discount pricing prior to medication approval to formulary.

### Self Assessment Questions:

Which of the institutions listed would benefit from alterations in formulary medications based on 340B discount pricing?

- A: Community hospital ineligible for 340B discounts
- B: Disproportionate share hospital with abundant outpatient services
- C: Large health-system with limited outpatient services
- D: Critical access hospital that opened within the past year

Which of the following drug pricing models is the primary consideration for health-systems when identifying the most cost effective medication for formulary use?

- A: Group purchasing organization pricing
- B: 340B discount pricing
- C: Wholesale acquisition cost
- D: Average wholesale price

Q1 Answer: B    Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF HIGH-DOSE INTRAVENOUS VITAMIN C FOR TREATMENT OF SEPSIS ON POINT-OF-CARE BLOOD GLUCOSE READINGS

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**Purpose:** Intravenous vitamin C is utilized as adjunct therapy to reduce mortality in septic patients. With minimal research published on use in this patient population, potential risks are not well established. A concern of intravenous vitamin C therapy is falsely elevated point-of-care blood glucose readings, with most publications focused specifically in burn patients. It is unclear if this is an issue in septic patients, who receive comparatively lower daily doses of vitamin C than burn patients. The purpose of this study is to compare point-of-care and laboratory analyze blood glucose measurements in patients with sepsis receiving intravenous vitamin C therapy.

**Methods:** This is a single center, retrospective review of patients who received intravenous vitamin C for treatment of sepsis from January 2017 to December 2018 at a large, 519-bed community hospital. Patients included for statistical analysis were admitted during the study period for the treatment of sepsis, received at least two doses of intravenous vitamin C, and were 18 years of age or older. Subjects that were pregnant or wards of the state were excluded. The primary endpoint of this study is the difference between point-of-care and venipuncture blood glucose measurements. Secondary endpoints include the comparison of point-of-care and venipuncture blood glucose measurements between patients with and without renal dysfunction and occurrence of hypoglycemic events throughout vitamin C therapy. The accuracy of point-of-care blood glucose measurements will be determined using criteria set forth by the International Organization for Standardization (ISO) 15197:2013. Primary and secondary endpoints will be analyzed using descriptive statistics. Both collection methods will be compared and assessed for clinical impact using the Parkes consensus error grid analysis.

**Results and Conclusion:** Data collection and analysis is on-going with 15 patients identified for inclusion. Full results and conclusion will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the mechanism in which vitamin C interferes with point-of-care blood glucose measures

Discuss the clinical impact of point-of-care blood glucose management in septic patients receiving intravenous vitamin C therapy

### Self Assessment Questions:

Which of the following describes the mechanism in which intravenous vitamin C demonstrates falsely elevated point-of-care glucose measures

- A: Increase of NADH that is measured by glucometer electrodes
- B: Increase of electron donation to glucometer electrodes
- C: Increase of free oxygen radicals measured by glucometer electrode
- D: Decrease of peripheral vascular blood flow

Which of the following is an accurate degree of risk analysis of the Parkes consensus error grid zones?

- A: Zone A: altered clinical action that could have significant medical r
- B: Zone B: altered clinical action that could have dangerous consequ
- C: Zone C: altered clinical action likely to affect clinical outcome
- D: Zone D: no effect on clinical action

Q1 Answer: B    Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMAL SEQUENCING OF DARATUMUMAB AND ELOTUZUMAB IN RELAPSED AND REFRACTORY MULTIPLE MYELOMA

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**Purpose:** This study aims to determine if overall response rates (ORR) and time to myeloma progression are different between patients treated with daratumumab before elotuzumab compared to elotuzumab before daratumumab.

**Methods:** The study (n=37) includes patients aged 18 or older with measurable disease at the time of initiating therapy with a monoclonal antibody who have relapsed or refractory MM after at least one prior line of therapy; received both daratumumab and elotuzumab; and discontinued the first monoclonal antibody due to disease progression, failure to respond, or toxicity. The overall response rates are compared using a Student's t-test. Time to progression after the first and second monoclonal antibody is analyzed using Kaplan-Meier survival analysis. Baseline characteristics of patients in each study group are also compared. In order to reach 80% power to detect a difference in progression free survival with an alpha of 0.05, the necessary sample size of this study is 227 patients.

**Results:** When daratumumab is used first, the ORR is 56.5% and the average time to progression is 4.5 months. When daratumumab is used second, the ORR is 64.3% and the average time to progression is 3.3 months. When elotuzumab is used first, the ORR is 64.3% and the average time to progression is 8.1 months. When elotuzumab is used second, the ORR is 34.8% and the average time to progression is 4.7 months.

**Conclusions:** For both antibodies, the ORRs are higher and the time to progression is longer when used as an earlier line of therapy compared to later.

### Learning Objectives:

State the current place in therapy for daratumumab and elotuzumab according to national guidelines

Describe qualitatively how the primary outcome of this study was analyzed

### Self Assessment Questions:

In relapsed and refractory multiple myeloma, current guidelines recommend using

- A daratumumab prior to elotuzumab
- B: elotuzumab prior to daratumumab
- C: either antibody with no sequencing preference
- D: neither antibody due to proven lack of efficacy

The primary outcome of this study compares the ORR and time to progression when

- A daratumumab is used earlier vs. later
- B elotuzumab is used earlier vs. later
- C daratumumab is used earlier vs. elotuzumab is used earlier
- D A and B are both correct

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF VERIGENE GRAM-POSITIVE BLOOD CULTURE ASSAY IN COMBINATION WITH ANTIMICROBIAL STEWARDSHIP INTERVENTIONS AGAINST GRAM-POSITIVE BLOODSTREAM INFECTIONS

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### Statement of the purpose

Gram-positive (GP) bloodstream infections (BSI) are prevalent in the acute setting and associated with poor outcomes. The timely administration of appropriate antibiotic therapy is vital for reducing mortality. Thus, the rapid identification of organism and resistance patterns is important for the initiation of optimal treatment. The Verigene® gram-positive blood culture assay (GP-BC) is a rapid, nucleic acid test FDA-approved in 2015 that allows for the identification of common GP organisms and resistance patterns in about 2.5 hours versus 24 – 48 hours for conventional methods. The primary objective of this study is to evaluate the clinical impact of the Verigene GP-BC and coordinated intervention by the Antimicrobial Stewardship program on the care of patients.

### Statement of methods used

A retrospective, observational study will be performed on adult patients with a positive GP blood culture who were treated at Indiana University Health. The pre-group will consist of patients from February 2017 to July 2017 while the post-group will consist of patients from February 2018 to July 2018. Exclusion criteria include patients that were discharged, died, or entered hospice before 48 hours after BC collection; patients that did not initiate antibiotic therapy; and subsequent positive blood cultures in a single visit. The primary outcome will be time to destination therapy, defined as the time from collection of the blood culture to the administration of the antibiotic with the narrowest spectrum-of-activity used during the first seven days of treatment for a GP BSI. Secondary outcomes include time to effective therapy, total antibiotic usage, mortality at 30 days, and length of stay.

Summary of (preliminary) results to support conclusion  
Data, outcomes, and conclusions will be discussed.

### Conclusions reached

Data, outcomes, and conclusions will be discussed.

### Learning Objectives:

Recognize the capabilities of the Verigene Gram Positive Blood Culture Assay

Name the treatments of choice for the organisms detected on the Verigene Gram Positive Blood Culture Assay

### Self Assessment Questions:

Which of the following organisms can be detected by the Verigene Gram Positive Blood Culture Assay?

- A Bacillus spp.
- B: Enterococcus faecalis
- C: Enterobacter spp.
- D: Corynebacterium spp.

Which of the following drugs is a treatment of choice for methicillin-susceptible staphylococcus aureus?

- A Vancomycin
- B Nafcillin
- C Ampicillin
- D Azithromycin

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INCIDENCE OF HOSPITAL-ACQUIRED CLOSTRIDIODES DIFFICILE INFECTION AFTER INTERVENTION BY INFECTION PREVENTION AND ANTIMICROBIAL STEWARDSHIP

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**Purpose:** Healthcare facility-onset Clostridioides difficile infection (HO-CDI) is defined as a positive test for CDI collected on hospital day 4 or later by the Centers for Disease Control and Prevention's National Healthcare Safety Network. Testing to detect toxigenic C. difficile is used to confirm a suspected case of CDI. However, inappropriate testing can lead to false positive results in patients who are colonized with non-pathogenic C. difficile presenting with CDI-related symptoms. This study aims to determine if review of orders for CDI testing after day three of hospital stay for appropriateness by an infection prevention (IP) team reduces the reported rate of HO-CDI. IRB approval was obtained to conduct a retrospective chart review.

**Methods:** This is a single-center retrospective cohort study of patients with orders for CDI testing at a 450 bed community hospital. The IP review process, implemented in November 2016, required the IP team to review all testing orders placed after day three of hospital stay for appropriateness. Inappropriate tests were cancelled after discussion with the ordering physician. Subjects were identified using computer-generated reports of orders for testing. The study included inpatients with a length of stay of greater than three days with an order for testing placed after day three of stay. The order for testing must have been placed in the nine-month period falling prior to November 1, 2016 (pre-intervention group) or after November 30, 2016 (post-intervention group). Patients under the age of eighteen were excluded from the study. The primary outcome measure is the incidence of HO-CDI in each group. Secondary measures include the standardized infection ratio at our institution and the number of tests cancelled.

**Results and Conclusions:** Results and conclusion to be presented at the Great Lakes Pharmacy Resident's Conference.

### Learning Objectives:

Define healthcare facility-onset Clostridioides difficile infection  
List measures that can be taken to prevent the misdiagnosis of Clostridioides difficile infection

### Self Assessment Questions:

Which of the following defines a case of healthcare facility-onset Clostridioides difficile infection per NHSN criteria?

- A: A positive CDI test collected on hospital day 4 or later
- B: Onset of CDI symptoms on hospital day 3 or later
- C: A positive CDI test collected on hospital day 3 or later
- D: Onset of CDI symptoms on hospital day 4 or later

Which of the following strategies is/are recommended by the IDSA to reduce misdiagnosis of CDI?

- A: Utilization of NAAT testing to screen asymptomatic patients for CDI
- B: Utilization of glutamate dehydrogenase testing alone for diagnosis
- C: Perform repeat testing as an assessment for successful treatment
- D: Utilization of stool toxin testing in addition to other tests for diagnosis

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PEDIATRIC EMERGENCY RESPONSE IN AN ADULT HOSPITAL

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**Purpose:** The Broselow-Luten System incorporates a color coded reference tape and an associated system to determine a pediatric patient's weight and assist with appropriate medication dosing during emergency response. Despite Northwestern Memorial Hospital (NMH) being an adult hospital, the pharmacy department maintains the Broselow Cart medications and supplies. The Broselow Cart is utilized for emergencies of pediatric visitors, any general public requiring immediate assessment and intervention, and for underweight adults defined as weighing less than 40 kilograms. Current gaps in literature for the Broselow-Luten System include accuracy of weight estimation and dose guidance compared to other systems, use in an adult hospital, and utility for cardiac arrests and airway management in underweight adults. The purpose of this analysis is to evaluate the necessity of maintaining Broselow Carts in an adult hospital.

**Methods:** This will be an operational and cost savings analysis to evaluate NMH's current process for use of the Broselow-Luten System, its appropriateness, and any safety concerns associated with adopting a new method. Factors that will be evaluated include use of the Broselow Carts over the past 5 years, cost of maintaining the Broselow Cart, role of other disciplines in emergency response, and emergency response methods utilized at other institutions. The goal of this analysis is to propose and implement a new or modified system for emergency response in pediatrics and underweight adults.

**Results:** To be presented at the conference.

**Conclusion:** To be presented at the conference.

### Learning Objectives:

Explain Explain the current process and use of the Broselow-Luten System at NMH  
Identify Identify and discuss a new or modified system for emergency response in pediatrics and underweight adults

### Self Assessment Questions:

Which of the following does the Broselow-Luten system use to help determine medication doses?

- A: Weight & Height
- B: Weight
- C: Height
- D: Age

Based on current practice at NMH, what patient population can the Broselow Cart be applied to?

- A: Patients less than 40 kg
- B: Patients less than 50 kg
- C: Pediatric patients
- D: Both A & C

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A PEDIATRIC HANDSHAKE ANTIMICROBIAL STEWARDSHIP PROGRAM TO IMPROVE ANTIMICROBIAL UTILIZATION

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**Purpose:** Antimicrobial stewardship (AMS) programs emerged to mitigate the rising rates of antimicrobial resistance and unintended consequences such as adverse effects and *Clostridioides difficile* infection associated with antimicrobial overuse. To expand upon traditional AMS strategies including preauthorization and prospective audit and feedback (PAF), we implemented Handshake Stewardship, a rounding-based strategy. This program began in July 2018 and is comprised of a multidisciplinary team including a pediatric infectious diseases (ID) physician, ID pharmacists, PGY2 ID pharmacy residents, and PGY1 pharmacy residents. Limited data on handshake stewardship exist, and optimal metrics for AMS remain to be elucidated. This study aims to evaluate the impact of implementing Handshake Stewardship or antimicrobial utilization and prescribing practices.

**Methods:** This was a quality improvement, single-center, retrospective descriptive study at a community teaching Children's Hospital in a suburban setting. Patients were included if they were receiving antimicrobial therapy and admitted to the pediatric intensive care unit, neonatal intensive care unit, or general pediatrics unit between July 2011 and December 2018. Once identified, the multidisciplinary AMS team prospectively audited and provided feedback via handshake rounding service to the primary prescriber. AMS interventions included escalation, de-escalation, dose/duration optimization, IV to PO conversion, ID consultation, and education. Interventions and acceptance rates were documented electronically by members of the pediatric antimicrobial stewardship team.

**Results and Conclusions:** Data collection and analysis are ongoing. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify how antimicrobial prescribing is impacted by a handshake stewardship program

Describe interventions and provider acceptance rates of a pediatric handshake stewardship program

### Self Assessment Questions:

What are advantages to prospective audit and feedback via handshake stewardship compared to alternative antimicrobial stewardship strategies?

- A: Optimizes empiric antimicrobial agents chosen
- B: Provides direct control over antimicrobials use
- C: Can address de-escalation of antimicrobials and duration of therapy
- D: Both A and C

According to Infectious Diseases Society of America (IDSA) guidelines, which of the following antimicrobial stewardship interventions should be paired with other strategies to increase likelihood of success?

- A: Didactic education
- B: Preauthorization
- C: Prospective audit and feedback
- D: Antibiotic timeouts

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## USE OF WARFARIN VERSUS DIRECT ORAL ANTICOAGULANTS IN OBESE INDIVIDUALS FOR THE TREATMENT OF VENOUS THROMBOEMBOLISM

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**Purpose:** Venous thromboembolism (VTE) is a blood clot that originates in a vein and has two subtypes: deep vein thrombosis and pulmonary embolism. Current oral anticoagulation therapy includes warfarin or a direct oral anticoagulant (DOAC). DOACs are increasingly being utilized due to their fixed dosing, limited dietary and medication interactions, and lack of routine monitoring. Providers are selecting DOACs over warfarin in obese individuals despite limited clinical data supporting their efficacy and safety in this population. The purpose of this study is to evaluate the differences in clinical outcomes between obese individuals that received warfarin compared to DOACs for VTE treatment.

**Methods:** A retrospective chart review evaluating patients > 100 kg receiving warfarin and those receiving a DOAC for treatment of initial VTE. DOACs included in this study are apixaban, dabigatran, edoxaban, and rivaroxaban. Initial VTE will be defined as no prior history of VTE (deep vein thrombosis or pulmonary embolism). Excluded patients are those on chronic anticoagulation prior to initial VTE and those on warfarin for initial VTE with an INR goal different than 2-3. Additionally patients receiving either hemodialysis or continuous renal replacement therapy are excluded. Data for the study is obtained from admitting diagnoses relating to VTE using appropriate ICD-10 codes during the period of December 1, 2012 to April 1, 2018. The clinical outcome that will be evaluated for the primary objective is the rate of VTE recurrence. Clinical outcomes that will be evaluated for the secondary objectives include the rate of major bleeding and the proportion of patients who received appropriate parenteral bridging anticoagulation (when applicable). The International Society of Thrombosis and Haemostasis' definition of major bleeding will be used in this study.

Results: Pending

Conclusions: Pending

### Learning Objectives:

Outline oral pharmacologic treatment options available for VTE treatment  
Review clinical literature and current recommendations regarding the use of DOACs for VTE treatment in obese individuals

### Self Assessment Questions:

An 81 year-old female is admitted for an acute pulmonary embolism. She weighs 112 kg and has a BMI 41 kg/m<sup>2</sup>. Her serum creatinine is 1.6 mg/dL (CrCl 25 mL/min). Which would be an appropriate apixaban

- A: 10 mg BID
- B: 5 mg BID x 7 days, then 2.5 mg BID
- C: 10 mg BID x 7 days, then 5 mg BID
- D: 20 mg BID x 7 days, then 10 mg BID

The International Society of Thrombosis & Haemostasis (ISTH) recommends against the use of DOACs in patients with a BMI > 40 kg/m<sup>2</sup> or in patients with which weight cutoff?

- A: > 100 kg
- B: > 120 kg
- C: > 150 kg
- D: > 200 kg

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**PAIN MANAGEMENT PHARMACOTHERAPY CLASS FOR VETERAN:  
(UNDERSTANDING PAIN THROUGH MEDICATIONS)**

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The purpose of this project is to empower and equip veterans to take charge of their health and well-being through an educational class. Veterans enrolled at the Aleda E. Lutz Veteran Affairs Medical Center (VAMC) will be informed of the class and can voluntarily be scheduled to "Understanding Your Pain Through Medications" class offered once monthly. The class discussion will include information on the pathophysiology of musculoskeletal and neuropathic pain. The discussion will also focus on an overview of drug classes used for pain management that include; mechanism of action, efficacy, and side effects, and efficacy of complementary/alternative therapies for pain. The duration of this class will be one hour with an additional 30 minutes for surveys and questions. Each veteran will receive a packet with the lecture handout and a pre and post survey. The pre and post survey scores will be reviewed to determine if the class was beneficial in improving knowledge and changing perspective to complementary/alternative therapies for pain management. The survey results will aid in assessing if the class would be beneficial to offer permanently to Aleda E. Lutz VAMC.

**Learning Objectives:**

Recognize the rationale for implementing a pain medication education service to patients

Identify barriers for adequate patient participation in the educational service

**Self Assessment Questions:**

Which of the following statements best describes the rationale for implementing a pain medication education service to patients?

- A To empower patients to take charge of their health
- B: To decrease the use of opioids
- C: To equip patients to take charge of their health
- D: Both A and C

Which of the following could be a barrier to patient participation in the educational service?

- A Lack of interest
- B Scheduling barrier
- C Weather barrier
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**THE SAFETY AND CLINICAL OUTCOMES OF  
PIPERACILLIN/TAZOBACTAM ADMINISTERED AS AN IV PUSH  
COMPARED TO IV PIGGYBACK STANDARD AND EXTENDED-  
INFUSION**

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Purpose: Puerto Rico was a key American manufacturing hub for medical supplies before Hurricane Maria struck in September 2017. As a result, critical shortages ensued for many months thereafter affecting medications and IV fluids that were essential for patient care. Jewish hospital's pharmacy department was tasked with devising strategies to mitigate the IV fluid shortage while maintaining best practice. There is data comparing antimicrobial IV push to IV piggyback administration that shows cost savings, minimizing administration time for optimal scheduling, and nursing satisfaction when using IV push. Currently, literature supporting the efficacy of IV push piperacillin/tazobactam (Zosyn) is lacking. The purpose of this study is to evaluate clinical outcomes with use of Zosyn administered IV push compared to traditional standard infusions. Outcomes evaluated will be the impact on clinical and safety outcomes, reduction in time to antimicrobial administration, difference in pharmacy preparation preference and nursing administration preference. Zosyn, is a broad spectrum beta-lactam that follows time-dependent pharmacodynamic properties that have been shown to support extended infusion administration.

Methods: A retrospective chart review will be conducted for the time period after the implementation of an IV push antimicrobial protocol. Data will be collected from June 2017 to June 2018. Included will be patients who presented to Jewish Hospital and received IV push piperacillin/tazobactam (Zosyn) for at least 5 days of therapy with a positive culture sensitive to piperacillin/tazobactam. Clinical outcome an safety, reduction in time to antimicrobial administration, as well as nursing and pharmacy satisfaction with IV push preparation and administration will be examined.

Results/Conclusions: Data collection is in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Discuss the antimicrobial properties of Zosyn and its administration  
Report clinical outcomes when comparing extended infusion and IV piggyback to IV push

**Self Assessment Questions:**

Piperacillin/tazobactam has \_\_\_\_\_-dependent pharmacodynamics which supports extended infusion administration over \_\_\_ hours.

- A concentration; 4
- B: time; 6
- C: time; 4
- D: concentration; 6

Which of the following pathogens is within Zosyn's spectrum of activity?

- A Mrsa
- B Pseudomonas sp.
- C Atypicals
- D Vre

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF IMPLEMENTATION OF PHARMACIST-DRIVEN PROCALCITONIN PROTOCOL AND ALGORITHM IN PATIENTS WITH LOWER RESPIRATORY TRACT INFECTIONS AND/OR SEPSIS

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**Purpose:** Procalcitonin is a clinical biomarker of bacterial infection and can be used by clinicians to guide management of antibiotic therapy in a time where antibiotic over-utilization has become a problem in the healthcare system. Pharmacists are uniquely positioned to ensure appropriate use of antibiotic therapy. Development and adherence to protocols and algorithms designed to assist with provider decision making in de-escalating and discontinuing antibiotics are a valuable tool pharmacists can utilize to intervene on inappropriate antibiotic use. The purpose of this study is to determine the impact of pharmacist-led antimicrobial interventions based on implementation of a procalcitonin protocol and algorithm for patients with lower respiratory tract infections or sepsis. **Methods:** This study was approved by the local Institutional Review Board. This study is a single-center, retrospective, electronic chart review of patients with an admitting diagnosis of a lower respiratory tract infection or sepsis from time periods of May 1, 2018 through July 31, 2018 at St. Mary's Hospital in Madison, WI. Patients were eligible for inclusion if they were: >18 years of age and had an admitting diagnosis of either a lower respiratory tract infection or sepsis. Patients were excluded if they had: positive blood cultures, presence of only localized infection (cellulitis, osteomyelitis, abscesses), comfort cares initiated during admission, recent surgery or trauma, pregnancy, chronic renal impairment, or age <18 years old. Primary outcomes are duration of antimicrobial therapy, frequency of antibiotic-related adverse drug reactions, and 30-day readmission rates. **Results & conclusions:** Data analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Explain the role of procalcitonin monitoring and what levels would indicate the likely presence of bacterial infection in patients with lower respiratory tract infections or sepsis

Discuss the impact a pharmacy-driven protocol can have on duration of antibiotic therapy and clinical outcomes

### Self Assessment Questions:

Which indications would measuring procalcitonin be especially valuable in determining the presence of a likely bacterial infection?

- A Lower respiratory tract infections
- B: Sepsis
- C: Osteomyelitis
- D: A & B only

In what ways can pharmacists play a role in interpreting procalcitonin levels with regards to antibiotic therapy?

- A Recommending discontinuation or de-escalation of antibiotics based on
- B Ensuring appropriate procalcitonin levels are ordered serially and
- C Decreasing incidence of antibiotic-related adverse events by
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF MULTIDISCIPLINARY CLASSES AND PHARMACY TELEPHONE FOLLOW-UP APPOINTMENTS FOR TARGETED WEIGHT MANAGEMENT IN VETERANS WITH PREDIABETES (TRIM PROJECT)

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**Purpose:** Prediabetes is defined as a glycated hemoglobin (A1c) of 5.7 to 6.4% and is a main risk factor for developing diabetes mellitus. Diabetes is associated with significant morbidity and mortality related to microvascular and macrovascular complications. Lifestyle changes are crucial to reducing risk of diabetes. This project assessed change in A1c and weight with interventions made by the Pharmacy Resident in collaboration with dietitians, whose role includes providing education and support regarding diet, physical activity, and behavioral change.

**Methods:** This quality improvement project assessed impact of a pharmacy resident on avoidance of progression to diabetes and weight loss through pharmacotherapy intervention and lifestyle education. Veterans with prediabetes and body mass index above 25 were recruited from Battle Creek Veterans Affairs Medical Center MOVE! program. MOVE! is a weight management and health promotion program which encourages healthy eating behavior and increased physical activity. Veterans were educated on prediabetes by the Pharmacy Resident during initial group sessions. Follow-up calls were made monthly to assess medication tolerability, document weight changes, and provide ongoing, personalized education. This served as added accountability to regular MOVE! follow up. The Pharmacy Resident worked under the scope of Clinical Pharmacy Specialists in assessing and adjusting medication therapy. Documentation was completed in electronic health record after phone visits.

**Results:** Twenty-one Veterans were identified as meeting criteria for prediabetes based on A1c level in the last twelve months and were included for enrollment. Nine Veterans consented to be followed by Pharmacy Resident for duration of their participation in MOVE!

**Conclusions:** Addition of a pharmacy resident-run prediabetes clinic is an effective way to help prevent progression to diabetes. Implementation of this type of clinic enables pharmacy residents to collaborate with other disciplines, including dietitians and kinesiologists, which aligns with residency objectives set forth by the American Society of Health System Pharmacists.

### Learning Objectives:

Describe diagnostic criteria for prediabetes

Discuss factors which reduce risk of diabetes in patients with prediabetes

### Self Assessment Questions:

Which criteria for diagnosing prediabetes is correct?

- A Fasting blood glucose of 100 to 125 mg/dL
- B: A1c of 6.5 to 7%
- C: Post-prandial blood glucose of 200 mg/dL
- D: 2 hours plasma glucose of over 200 mg/dL during 75 gram OGTT

Which of the following has been shown to lower risk of developing diabetes?

- A Loss of 4 inches in waist circumference
- B Appetite suppressants
- C 80 minutes per week of strenuous physical activity
- D Metformin

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INTRAVENOUS PUSH VERSUS INTRAVENOUS INFUSION CEFTRIAZONE FOR THE TREATMENT OF URINARY TRACT INFECTIONS: A RETROSPECTIVE, COHORT STUDY

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**Purpose:** To alleviate the effects of an intravenous (IV) fluid shortage, many health systems changed administration of select antibiotics, such as ceftriazone, to the IV push route. Despite several pharmacoeconomic studies that have demonstrated cost and staff satisfaction benefits with IV push administration, a gap in data surrounding clinical outcomes remains.

**Methods:** A retrospective, cohort study evaluated patients receiving IV push over five minutes versus IV infusion ceftriazone over 30 minutes for the treatment of urinary tract infections (UTIs). Patients were excluded if they received less than two doses of ceftriazone, had no urine culture, grew an organism not susceptible to ceftriazone, or had hardware in the urinary tract.

The primary outcome of this study was treatment failure. Secondary outcomes included degree of antibiotic exposure, rate of de-escalation, recurrent UTI within 30 days, and in-hospital mortality. A final bivariate analysis was conducted to determine association between treatment failure and baseline characteristics. A convenience sample of 150-200 patients was estimated prior to the start of the study.

**Results:** One-hundred sixty patients were included in the analysis, 50 received IV push, and 110 received IV infusion. The groups were similar at baseline. Treatment failure rates were similar between IV push and IV infusion (6.0% vs. 6.4%,  $p=0.792$ ). Total median duration of all antibiotics was 7 days in both groups ( $p=0.839$ ), however patients receiving IV infusion received three days of ceftriazone compared to four days in patients receiving IV push. Bivariate analyses suggest that patients with a concomitant infection were more likely to fail treatment.

**Conclusions:** There was no difference in treatment failure rates between groups. No differences existed in overall duration of antibiotics or rates of de-escalation between groups. Patients with a concomitant infection were more likely to fail treatment. A prospective trial is needed to expand upon these results.

### Learning Objectives:

Recognize advantages of intravenous push administration of antibiotics.

Identify clinical outcomes of patients receiving IV push and IV infusion ceftriazone for the treatment of urinary tract infections.

### Self Assessment Questions:

All of the following are examples of advantages of intravenous push antibiotics when compared to intravenous infusion, except:

- A: Increased staff satisfaction
- B: Decreased supply costs
- C: Decreased all-cause mortality
- D: Decreased time to subsequent antibiotics

In this study, intravenous push ceftriazone was associated with which of the following outcomes when compared to intravenous infusion ceftriazone?

- A: Decreased rate of treatment failure
- B: Increased rate of treatment failure
- C: Similar rate of treatment failure
- D: Decreased length of entire antibiotic course

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## RATES OF SURGICAL SITE INFECTIONS IN POST-OPERATIVE PATIENTS WITH BETA-LACTAM ALLERGIES

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**Purpose:** Patients undergoing coronary artery bypass grafting (CABG) and hip/knee arthroplasty require prophylactic antimicrobials given at the right dose, via the right route at the right time to decrease the risk of post-operative surgical site infections (SSIs). Current guidelines list beta-lactam antibiotics as the preferred regimens for these procedures. However, patients with self-reported beta-lactam allergies often receive alternative agents, which have been associated with adverse outcomes and increased costs. The objective of this study was to determine if patients with a reported beta-lactam allergy were at higher risk for development of SSIs.

**Methods:** This retrospective study was approved by the Indiana University Health Institutional Review Board. Adult patients who underwent CABG or hip/knee arthroplasty at IU Methodist or University Hospitals between 09/01/15 and 06/30/18 were included in the study. Patients were excluded if the procedure was emergent, dirty, or contaminated or if there was an infection present at the time of surgery. Cases were identified via an infection prevention database. Data points were extracted through a data warehouse, and reported reactions to beta-lactams were collected manually via electronic medical records. The primary outcome was the difference in incidence of SSIs among patients with a beta-lactam allergy who received alternative agents, versus patients without a beta-lactam allergy who received a beta-lactam. The secondary outcome was the percentage of beta-lactam allergic patients without a type-I reaction who received prophylaxis with alternative antibiotics. Normal continuous data points will be reported as mean  $\pm$  standard deviation and analyzed via t-test. Non-normal continuous data will be reported as median with a range and analyzed using a Mann-Whitney U test. Nominal data will be reported as N (%) and analyzed via Chi-squared or Fisher's Exact test.

**Results & Conclusions:** Data collection is ongoing, and results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the difference between a drug allergy and a drug intolerance or side effect.

Identify appropriate antibiotic agents for peri-operative prophylaxis for coronary artery bypass grafting and hip/knee arthroplasties.

### Self Assessment Questions:

Which of the following reactions is a manifestation of an IgE mediated allergic reaction?

- A: Itching
- B: Nausea & Vomiting
- C: A rash that appears 12 hours after drug administration
- D: Angioedema

Which of the following antimicrobials are recommended as a preferred agent to administer prior to a hip arthroplasty?

- A: cefuroxime
- B: vancomycin
- C: cefazolin
- D: clindamycin

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPACT OF A DIRECT ORAL ANTICOAGULANT (DOAC) ORDER SET ON PRESCRIBING HABITS

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**Purpose:** In the last decade, FDA approval of several direct acting oral anticoagulants (DOACs) has significantly impacted the management of non-valvular atrial fibrillation (NVAf) and venous thromboembolism (VTE). Although the DOACs have proven benefit in these patient populations, it is imperative to appropriately dose these medications to maximize therapeutic successes and minimize adverse events. Consequently, an opportunity has been recognized at Ascension Genesys Hospital to investigate prescribing habits of the DOACs to ensure alignment with evidence-based approaches to anticoagulation. **Methods:** This study will be a retrospective chart review performed before and after implementation of a DOAC initiation order set at Ascension Genesys Hospital. The primary purpose of the study is to assess how frequently a DOAC is dosed outside of package insert recommendations when starting therapy for NVAf or VTE in a general teaching hospital. Appropriateness of dose selection will be determined according to relevant patient information such as age, renal function, indication for receiving DOAC therapy, and relevant bleeding or clotting history. Patients shall be included in the study if they were started on a DOAC while inpatient for the treatment of NVAf or VTE and were at least 18 years of age at that time. Exclusion criteria are limited to patients that received any doses of a DOAC prior to admission, were pregnant, or prisoners. A follow up study team will collect and assess the data after implementation of the order set. **Results/Conclusion:** Initial results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Outline an appropriate direct acting oral anticoagulant treatment plan given indication and patient specific characteristics

List patient populations that were not included in the direct acting oral anticoagulant phase 3 trials

### Self Assessment Questions:

Which of the following is the most appropriate first dose of apixaban to give to a patient being treated for a new pulmonary embolism that has previously received heparin for 3 days, is 82 years of age

- A: 2.5 mg twice daily
- B: 10 mg twice daily
- C: 5 mg twice daily
- D: 5 mg once daily

Which of the following patient populations were included in the ROCKET AF trial?

- A: Hemoglobin < 1 g/dL
- B: Uncontrolled hypertension
- C: CrCl <30 mL/min
- D: Recent use of aspirin 81 mg daily

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A COMPARISON OF METHYLENE BLUE VERSUS HYDROXOCOBALAMIN FOR POST-OPERATIVE HYPOTENSION AND VASOPLEGIA: A RETROSPECTIVE ANALYSIS

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**Background:** Vasoplegic syndrome is characterized by a low systemic vascular resistance with normal or elevated cardiac output requiring high dose-vasopressor drugs to maintain blood pressure. Both methylene blue and hydroxocobalamin have been reported as salvage therapy in patients refractory to first-line vasopressors. There is no data directly comparing the effects of methylene blue versus hydroxocobalamin in this population and the literature supporting use for each individual agent is limited. The objective of this study is to evaluate the effect of methylene blue and hydroxocobalamin on mean arterial pressure (MAP) in vasoplegic syndrome.

**Methods:** Adult patients age > 18 years admitted to IU Health Methodist Hospital from August 1, 2013 to July 31, 2018 and who received > 1mg/kg of methylene blue or 5g of hydroxocobalamin as an IV push or infusion within 72 hours of cardiothoracic surgery for post-operative vasoplegia were assessed for inclusion. Vasoplegia was defined as patients on vasopressor doses of norepinephrine >0.2mcg/kg/min; vasopressin >0.4units/min or epinephrine >0.5mcg/kg/min; with persistent hypotension defined as either a MAP <65 mmHg, a CVP <5, normal or elevated cardiac output, or low peripheral vascular resistance (<800 dynes/cm<sup>5</sup>). Patients with hemorrhagic shock, non-cardiothoracic procedures and patients started on an additional vasopressor within 15 minutes of administration were excluded. The primary endpoint was a 20% increase in MAP within 2 hours of receiving the intervention. Secondary outcomes evaluated morbidity, mortality and hospital length of stay. Baseline characteristics and outcomes were assessed using descriptive statistics. Nominal data was compared using the Fischer exact test and continuous data was assessed using Student T-test as appropriate.

**Results/Conclusions:** Data collection is ongoing and results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe Describe the unique pathophysiologic mechanism by which cardiothoracic surgery causes post-operative vasoplegia.

Recognize Recognize the patient specific factors that increase risk for post-operative vasoplegia.

### Self Assessment Questions:

Which of the following mechanisms represent a unique pathway by which cardiothoracic surgery induces vasoplegic syndrome? (Learning objective 1)

- A: Lack of norepinephrine receptors on vascular smooth muscle cell
- B: Depletion of intracellular calcium during surgery leading to vasodil
- C: Increased production of inducible nitric oxide synthase
- D: Profound blood loss during cardiothoracic surgery

Which of the following risk factors have been demonstrated in current literature to increase a patient's risk for post-cardiothoracic surgery vasoplegia? (Learning Objective 2)

- A: Left ventricular ejection fraction < 45%
- B: Length of cardiopulmonary bypass
- C: Perioperative use of all classes of blood pressure medications
- D: Presence of a ventricular assist device (VAD) post-surgery

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF DIABETES OUTCOMES AFTER TRANSPLANT PRE- AND POST-PHARMACIST INITIATED MANAGEMENT

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**Purpose:** Diabetes in transplant patients can be categorized into two separate groups: patients with diagnosis of diabetes prior to transplant and patients who develop post-transplant hyperglycemia or diabetes. Post-transplant diabetes is a frequent complication of solid organ transplant associated with an increased risk of infection and higher mortality. Post-transplant diabetes (PTDM) in kidney transplant (KT) recipients is associated with a lower rate of 1-year patient and graft survival. In liver transplant (LT) patients, PTDM has been associated with increased risk of chronic renal failure, sepsis, impaired wound healing, and mortality. Pharmacists play an important role in the management of diabetes. The purpose of this study was to evaluate outcomes in kidney and liver transplant patients with PTDM among patients seen in a pharmacist medication management clinic compared to those who were not.

**Methods:** This study was a quasi-experimental study of KT and LT transplant patients. Subjects were grouped according to whether they were exposed to the intervention: pharmacist clinic visit for management of hyperglycemia or diabetes after discharge from index hospitalization for KT or LT. The pre-intervention group included patients transplanted from January 1, 2016 and December 31, 2016, and post-intervention included patients from August 1, 2017 to August 31, 2018. Additional data collected included patient demographics, disease characteristics, comorbid conditions, medication therapy, and patient outcomes. The primary outcome was to evaluate A1c at 3 months, 6 months, 9 months, and 12 months post index discharge or up until patient can follow-up with provider for diabetes management, whichever was longer. Secondary outcomes included readmission rates and time to first outpatient visit for glycemic management.

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

### Learning Objectives:

Describe the role of pharmacist in the management of post-transplant hyperglycemia or diabetes.

Recognize the role of immunosuppressants in causing hyperglycemia in transplant patients.

### Self Assessment Questions:

Which of the following mechanisms explains how corticosteroids can contribute to hyperglycemia post-transplant?

- A: Increasing insulin secretion
- B: Inducing insulin resistance
- C: Suppressing appetite
- D: All of the above are correct

Which of the following are complications of hyperglycemia in transplant patients?

- A: Delayed wound healing
- B: Increased risk for cardiovascular disease
- C: Decreased graft survival rates
- D: All of the above are correct

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF COAGUCHEK INR XS PT TEST STRIP RECALL IN PHARMACIST-RUN OUTPATIENT ANTICOAGULATION CLINIC

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**Purpose:** CoaguChek XS PT test strips manufactured by Roche Diagnostics are utilized to monitor warfarin therapy in numerous clinics and patient homes across the United States. In November 2018, the Food & Drug Administration issued a Class I recall on CoaguChek XS PT test strips due to inaccurate international normalized ratio (INR) results. Roche Diagnostics calibrated the test strips to the latest World Health Organization International Reference Preparation, a newly released INR standard. The purpose of this retrospective chart review is to evaluate the impact this recall had on patients who were having anticoagulation monitored at the pharmacist-run anticoagulation clinic in a family medicine center. **Methods:** The time in therapeutic range, number of dosage changes required, patient safety data, and cost of additional lab draws and appointments were retrospectively analyzed for patients on warfarin who tested in the clinic or at home using CoaguChek XS PT test strips from January 2018 to January 2019. **Results/Conclusion:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Classify the types of recalls based on the severity of adverse health consequences

Define the components involved in calibrating PT/INR test strips

### Self Assessment Questions:

In which class of recalls is there a risk for serious health consequences or death?

- A: Class I
- B: Class II
- C: Class III
- D: Class IV

Which value determined from thromboplastin calibration is used to calculate international normalized ratio (INR)?

- A: International Standard Range
- B: International Reference Preparation
- C: International Therapeutic Ratio
- D: International Sensitivity Index

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## POST IMPLEMENTATION ASSESSMENT OF CONTROLLED SUBSTANCE DIVERSION TECHNOLOGY

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**Purpose:** Controlled substance diversion in health systems can lead to serious patient and staff safety issues, resulting in significant liability to the organization. Healthcare organizations need controlled substance diversion prevention programs that include methods to monitor effectiveness of diversion prevention efforts and positively influence the medication use process. One tool to meet this need is through diversion monitoring software that assists with the management of controlled substance inventory control.

The primary objective of this study is to evaluate the implementation and impact of controlled substance diversion technology. Secondary objectives include sharing data to improve compliance of controlled substance documentation and creation of effective monitoring tools that key stakeholders can utilize to monitor staff documentation of controlled substance medications. These objectives will be achieved by describing the current state of controlled substance documentation practices, implementation of meaningful reports to be shared with stakeholders, analyzing the impact of implementation, and developing future recommendations for controlled substance tracking expansion.

**Methods:** An interdisciplinary team is being led to assess the implementation and impact of controlled substance diversion technology across Froedtert Hospital. Current controlled substance auditing and reporting practices for all inpatient nursing units with automated dispensing cabinets will be reviewed. Current controlled substance practices will be investigated to identify gaps and countermeasures to correct gaps will be identified through the use of a modified Delphi approach. Based on the results of controlled substance report intervention the workgroup will develop the framework for further implementation of controlled substance dispensing technology for other areas within the Froedtert Health Network.

**Results:** Expected results include newly defined controlled substance tracking mechanisms, data measuring the impact of post-intervention compliance of controlled substance documentation, and recommendations for future implementation of sharing meaningful data surrounding controlled substances. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the need for effective diversion prevention programs and review potential diversion touchpoints within the medication use process  
Describe a multidisciplinary approach to impact compliance of controlled substance documentation through the use of controlled substance diversion technology

### Self Assessment Questions:

Healthcare organizations without effective controlled substance diversion prevention programs are associated with which of the following?

- A Patient safety issues and liability for resulting damages
- B: Compliance with regulatory bodies
- C: Improved community confidence
- D: Appropriate and safe use of controlled substances

Implementation of controlled substance diversion technology and sharing data with key stakeholders is associated with an increase in which of the following?

- A Identification of controlled substance diversion
- B Staff turnover
- C Compliance with waste documentation
- D Diversion team workflow efficiencies

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF DIAGNOSIS AND PRESCRIBING PRACTICES BETWEEN VIRTUAL VISITS AND OFFICE VISITS FOR SINUSITIS WITHIN PRIMARY CARE PRACTICE

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**Purpose:** The majority of antibiotics prescribed in the outpatient setting result from upper respiratory tract infection diagnoses; however, these infections are often viral. Antibiotics prescribed inappropriately have negative consequences such as antibiotic resistance, unnecessary side effects, and increased costs to the patient. Greater than 70% of patients are prescribed antibiotics for sinusitis at outpatient visits, although current literature estimates sinusitis is viral in  $\geq 90\%$  of cases. The Centers for Disease Control and Prevention (CDC) and Infectious Diseases Society of America (IDSA) promote outpatient antimicrobial stewardship programs and have published guidelines to help improve appropriate prescribing for sinusitis. Virtual visits have emerged as a popular alternative to office visits for sinusitis complaints and are an important area for stewardship programs to target for intervention.

**Methods:** This retrospective cohort study was approved by the Institutional Review Board and was conducted utilizing the outpatient electronic medical record for Mercy Health Physician Partners and Zipnosis database for virtual visits. The primary objective was to compare rates of appropriate diagnosis of viral vs bacterial sinusitis between virtual visits and office visits, based on an IDSA and CDC supported diagnostic algorithm. Secondary objectives were to compare appropriateness of antibiotic prescribing and supportive therapy prescribing between virtual visits and office visits, as well as 24-hour and 7-day re-visits, hospital admissions within 30 days, or development of C.difficile within 30 days. Adult patients were included with a diagnosis code for sinusitis during the six month study period but excluded if they had HIV with a CD4 count  $< 200$ , active malignancy receiving chemotherapy or were receiving chronic steroid therapy. Data measured on a nominal scale will be assessed using a Chi-square or Fisher's exact test while data measured on a continuous scale will be assessed using student's t-test or a Mann-Whitney U test, as appropriate.

Results: In progress

Conclusion: In progress

### Learning Objectives:

Identify the first-line treatment options for bacterial sinusitis as defined by The Infectious Diseases Society of America (IDSA) guidelines  
Recognize the rate of inappropriate antibiotic prescribing within primary care for viral upper respiratory tract infections

### Self Assessment Questions:

According to IDSA guidelines, what is the most appropriate first-line treatment for bacterial sinusitis?

- A Levofloxacin 750mg daily for 5 days
- B: Amoxicillin-clavulanate 875-125mg twice daily for 7 days
- C: Azithromycin 500mg on day 1, then 250mg daily on days 2-5
- D: Amoxicillin-clavulanate 875-125mg twice daily for 10 days

It is estimated that approximately what percentage of patients receive inappropriate treatment with antibiotics for viral URIs?

- A 5-10%
- B 80-90%
- C 20-40%
- D 40-60%

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT ON ANTIMICROBIAL UTILIZATION WITH THE IMPLEMENTATION OF AN EARLY-ONSET SEPSIS RISK CALCULATOR INTO THE ELECTRONIC MEDICAL RECORD OF A LEVEL III NEONATAL INTENSIVE CARE UNIT

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**Purpose:** Neonatal early onset sepsis (EOS) is defined as a positive blood or cerebrospinal fluid culture which occurs within the first 72 hours of life. The incidence of EOS has decreased over time with the use of intrapartum antibiotic therapy; however, overutilization of antibiotic therapy in treatment of EOS continues. It can be a challenge for clinicians to identify neonates who are at the highest risk due to lack of specific biomarkers and delayed onset of clinical signs of sepsis. The Centers for Disease Control and Prevention provides guidance to evaluate EOS risk; however, the recommendations can lead to overutilization of antibiotics and laboratory tests. Thus, Kaiser Permanente developed and validated an EOS risk calculator which utilizes maternal risk factors and clinical presentation of the newborn to provide recommendations for increased monitoring and/or initiation of antimicrobials. Utilization of this calculator has proven to reduce antimicrobial usage and laboratory testing for EOS. The purpose of this study is to identify the incidence of EOS and rate of antibiotic use and to evaluate the impact of applying an EOS risk calculator into our health system's electronic medical record.

**Methods:** This retrospective chart review identified all infants  $\geq$  34 weeks gestation with a blood culture drawn within 72 hours of life over a nine-month study period. The data was used to determine baseline EOS incidence and antimicrobial usage. The EOS risk calculator was then applied to the retrospective data to demonstrate its potential impact on antimicrobial utilization. The sepsis risk calculator was then implemented into the EMR and applied observationally to all patients  $\geq$  34 weeks gestation with a blood culture drawn within 72 hours of life over a four-month period.

**Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define neonatal early onset sepsis.

List positive outcomes of the implementation of the neonatal EOS risk calculator.

### Self Assessment Questions:

What is the definition of neonatal early onset sepsis?

- A Positive blood or cerebrospinal fluid culture within the first 28 days
- B: Positive blood or cerebrospinal fluid culture within the first 72 hour
- C: Positive blood or cerebrospinal fluid culture within the first year of life
- D: Baby born to mother with chorioamnionitis

Which of the following outcomes result from implementation of a neonatal early onset sepsis risk calculator?

- A Overutilization of antimicrobials
- B Increase in blood culture testing
- C Statistically significant increase in readmissions for culture-confirmed
- D Decrease in empiric antibiotic administration

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## SAFETY AND EFFICACY OF EPTIFIBATIDE FOR LEFT VENTRICULAR ASSIST DEVICE THROMBOSIS

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### Purpose

Pump thrombosis is a significant complication in left ventricular assist device (LVAD) patients. Eptifibatide has been used off-label for medical management of LVAD thrombosis with mixed results. The aim of this study is to evaluate the safety and efficacy of eptifibatide for the treatment of suspected or confirmed LVAD thrombosis.

### Methods

This single-center retrospective study utilized the electronic medical record to identify patients who received eptifibatide for suspected or confirmed LVAD thrombosis between January 1, 2012 and May 31, 2018.

### Results

A total of 30 patients (26 HeartMate II, 4 HeartWare) with 38 separate administrations of eptifibatide (1-2 mcg/kg/min) were identified with suspected or confirmed LVAD thrombosis defined as any of the following: lactate dehydrogenase (LDH)  $>$ 2.5 times baseline, haptoglobin  $<$ 10 mg/dL, plasma free hemoglobin  $>$ 40 mg/dL and/or LVAD dysfunction. The mean age was  $55 \pm 12$  years and the median time from LVAD implantation to eptifibatide administration was 297 days (interquartile range 76-628 days). The median LDH prior to eptifibatide administration was 1,086 units/L (interquartile range 897-2,395 units/L). Overall, 21 (55%) patients were successfully treated with eptifibatide, defined as avoidance of pump exchange, emergent transplant, tissue plasminogen activator administration or death. Pump exchange occurred in 10 (26%) patients and death occurred in 8 (21%) patients. Major bleeding events occurred in 3 (8%) patients, with subarachnoid hemorrhage occurring in 2 patients and intraparenchymal hemorrhage in 1 patient. Minor bleeding events occurred in 5 (13%) patients.

### Conclusion

Our experience suggests that eptifibatide may be effective at medically managing suspected LVAD thrombosis, but may be associated with life-threatening bleeding.

### Learning Objectives:

Describe the mechanism of action of eptifibatide.

Recognize serious adverse effects of eptifibatide when used for LVAD thrombosis.

### Self Assessment Questions:

Which of the following correctly describes the mechanism of action of eptifibatide?

- A Reversibly inhibits platelet aggregation by binding to platelet receptors
- B: Reversibly inhibits platelet activation and aggregation by selective
- C: Irreversibly inhibits platelet aggregation through inhibition of prostaglandin
- D: Irreversibly inhibits platelet aggregation through inhibition of adenosine

Which of the following is a serious adverse effect associated with eptifibatide?

- A Pump thrombosis
- B Elevated LDH
- C Lactic acidosis
- D Major bleeding events

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## FIXED DOSE 4 FACTOR PROTHROMBIN COMPLEX CONCENTRATE IMPLEMENTATION AND MONITORING WITHIN A MULTI-HOSPITAL HEALTH SYSTEM

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### Purpose:

Life threatening hemorrhagic events resulting from oral anticoagulant therapy require immediate anticoagulant reversal in order for patients to remain hemodynamically stable. Four factor prothrombin complex concentrate (4FPCC) is used for reversal of warfarin therapy or as off-label treatment of hemorrhage associated with direct oral anticoagulants (DOACs). High drug costs and inconsistent dosing strategies are current barriers to its use. The purpose of this study is to determine if a fixed dose strategy of dosing 4FPCC is successful in treating hemorrhagic events while remaining financially and operationally efficient.

### Methods:

This quality improvement study updated current Froedtert and the Medical College of Wisconsin (F&MCW) system guidelines for the reversal of oral anticoagulants. For reversal of warfarin, 1500 units were used. For reversal of DOACs, 2000 units were used. Pharmacists and physicians were educated on changes to the guideline and order set. Monthly retrospective use of all 4FPCC is being analyzed through electronic health record generated reports.

### Results:

A total of 50 patients received 4FPCC for anticoagulation reversal, 37 patients received fixed dosing since guideline implementation. Twenty-five of 28 patients who received 4FPCC for warfarin reversal had INR values of  $\leq 1.7$  post-administration. One of the seven patients who received a fixed dose for DOAC reversal required re-dosing. Two patients received fixed dosing but were not on an anticoagulant. Average time from verification to administration was 44 minutes. Use of fixed dosing saved 34,437 units of 4FPCC compared to previous weight base dosing strategies. Cost saving was approximately \$55,000 over 2.5 months.

### Conclusion

A 4FPCC fixed dose strategy implemented within the F&MCW system has been shown to be as effective as previous trials have suggested. This new dosing strategy has reduced costs while remaining effective in reversing hemorrhagic events.

### Learning Objectives:

Explain the changes to the Froedtert & the Medical College of Wisconsin anticoagulation reversal guideline

Discuss the impact the fixed dosing strategy has had on reversing anticoagulation in the setting of life threatening hemorrhagic events, as well as the associated cost-savings

### Self Assessment Questions:

What fixed doses were used for warfarin and DOAC reversal?

- A Warfarin: 1000 units DOAC: 500 units
- B: Warfarin: 1500 units DOAC: 1000 units
- C: Warfarin: 1500 units DOAC: 2000 units
- D: Warfarin: 2000 units DOAC: 3000 units

About what percent of patient were considered reversed after receiving fixed dose 4FPCC?

- A 25%
- B 40%
- C 80%
- D 99%

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## STANDARD VERSUS HIGH-DOSE ENOXAPARIN FOR VENOUS THROMBOEMBOLISM PROPHYLAXIS IN MORBIDLY OBESE PATIENTS

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**Purpose:** Currently there are no FDA-approved thromboprophylaxis dose adjustments for obese patients. Although the Chest Guidelines and additional literature support the notion to increase prophylactic doses of enoxaparin in obese patients, there is no consensus on dosing or the weight, body mass index (BMI), or BMI threshold to use. The primary objective of this study is to evaluate the incidence of venous thromboembolism and bleeding events in morbidly obese patients with a BMI of 40 kilograms per meter squared ( $\text{kg}/\text{m}^2$ ) or greater who received either high-dose thromboprophylaxis enoxaparin 40 milligrams twice daily subcutaneously versus standard dose thromboprophylaxis enoxaparin 40 milligrams once daily or 30 milligrams twice daily subcutaneously.

**Methods:** This is a retrospective chart review. Patients aged 18 to 89 years who were admitted to an inpatient service at one of three pre-defined community hospitals between January 1, 2014 and June 30, 2018 will be reviewed for eligibility in the study. To be included, a patient must have a BMI of 40  $\text{kg}/\text{m}^2$  or greater, admitted for 48 hours or longer received either high-dose or standard-dose enoxaparin for thromboprophylaxis, and were not receiving hemodialysis, continuous renal replacement therapy, or have a creatinine clearance less than 30 milliliters per minute. The primary outcome is incidence of venous thromboembolism and bleeding events, which will be gathered via International Classification of Diseases tenth revision codes. Secondary outcome measures include type of venous thromboembolism and severity of bleeding, which will be determined by manually reviewing the patient's chart and using the major and minor bleeding criteria, as well as a length of stay for those patients that experienced a venous thromboembolism or bleeding event versus those that did not.

**Results:** To be determined and presented at Great Lakes

**Conclusions:** To be determined and presented at Great Lakes

### Learning Objectives:

Recall FDA-approved prophylactic enoxaparin doses for patients with normal renal function

Review Current literature regarding prophylactic enoxaparin dosing in obese patients

### Self Assessment Questions:

Which dose regimen is an FDA-approved prophylactic dose of enoxaparin for a patient with normal renal function ( $\text{CrCl} > 30 \text{ ml}/\text{min}$ )?

- A 30 mg SC every 24 hours
- B: 30 mg SC every 12 hours
- C: 40 mg SC every 12 hours
- D: 60 mg SC every 24 hours

Which statement regarding literature addressing enoxaparin prophylactic dosing in obese patients is correct?

- A The Chest Guidelines recommend a dose of 40 mg every 12 hours
- B The consensus BMI cutoff for dose adjusting is 40  $\text{kg}/\text{m}^2$
- C Lower anti-Xa levels were achieved with 40 mg every 12 hours versus 30 mg every 12 hours
- D VTE events were significantly less in patients receiving 40 mg twice daily versus 30 mg twice daily

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## MELATONIN IN DECREASING THE USE OF ANTIPSYCHOTICS FOR NON-CRITICALLY ILL HOSPITALIZED PATIENTS

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**Purpose:** Delirium is associated with increased morbidity and mortality, cognitive and functional disturbances, and prolonged length of stay (LOS). Antipsychotics are commonly used inpatient for the treatment of delirium, however can have serious adverse effects. Some studies have noted a decrease in serum melatonin levels in hospitalized patients with delirium, suggesting a role for melatonin in place of antipsychotics in the management and prevention of delirium. The effect of other sleep aids, both benzodiazepine (BZD) and non-BZD sedative hypnotics (e.g. zolpidem), on delirium is not well established. Furthermore, most of the literature on melatonin and delirium are in the elderly population, especially in the intensive care unit (ICU) setting. This study will evaluate the role of melatonin compared to BZD and zolpidem in delirium by examining antipsychotic use in adults admitted to non-ICU units.

**Methods:** This is a retrospective cohort analysis of non-ICU patients with an order for as needed (PRN) antipsychotic since August 2016 for the melatonin arm and from August 2012 until September 2016 for both the BZD and zolpidem arms. The primary outcome is any PRN antipsychotic administered within 5 days after the subject receives their first dose of melatonin, BZD, or zolpidem. Other data collected include the use of breakthrough BZD for agitation, PRN antipsychotic given in patients at least 65 years of age, any scheduled antipsychotic ordered after the first dose of the study medication, number of days and total doses an antipsychotic is administered, dose of the medication in each arm, diagnosis of delirium, and LOS.

Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review delirium and the place for antipsychotics in delirium.  
Discuss the potential role for melatonin in managing delirium.

### Self Assessment Questions:

Which of the following is not a major drawback of antipsychotics when utilizing them as treatment for delirium?

- A: Extrapyramidal symptoms
- B: QTc prolongation
- C: Drastic increase in hospital cost
- D: Sedation

The mechanism of action for melatonin is:

- A: It works at the H1 receptor
- B: It is a natural hormone that regulates the circadian rhythm
- C: It enhances the inhibitory effect of GABA
- D: It blocks dopamine and serotonin receptors

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT OF PREOPERATIVE USE OF CLINDAMYCIN AND SURGICAL SITE INFECTION RATES

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**Purpose:** Surgical site infections currently account for 40% of healthcare associated infections in the inpatient setting, and over half of these may be preventable. Current guidelines recommend the use of cefazolin for the majority of surgeries requiring single-antibiotic prophylaxis.

Clindamycin is recommended as an alternative agent for patients with type 1 IgE-mediated reactions to beta-lactam antibiotics. Retrospective clinical trials have supported the use of beta-lactams, demonstrating at least a 50% increase in the incidence of surgical site infections when clindamycin is used in place of cefazolin. Epidemiological studies show that 90% of reported penicillin allergies are not true allergies. The goal of this study is to evaluate the appropriateness of the current use of clindamycin for antimicrobial prophylaxis and determine potential need for pharmacist intervention in antibiotic selection.

**Methods:** A single-center retrospective chart review will be conducted analyzing general surgery and vascular surgery procedures which used clindamycin as surgical prophylaxis from 2017 through 2018 at Froedtert Hospital. Patients will be excluded if they received additional antibiotics prior to or during the procedure, if their procedure required multiple pre-operative antibiotics, or if the clindamycin was administered after incision time. The primary outcome will be the percentage of cases in which clindamycin is selected in accordance with current surgical prophylaxis guidelines. The secondary outcome will be surgical site infection rates in the study population versus matched service lines. The data will be used to assess current practice and surgical site infection rates in order to justify implementing pharmacist intervention in antibiotic selection.

**Results:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the risks and advantages of using beta-lactam antibiotics in patients with documented allergies or intolerances.  
Identify opportunities for pharmacist involvement in antibiotic selection for surgical prophylaxis.

### Self Assessment Questions:

AT is a 26 year old female presenting for a planned procedure. Upon assessment you notice she has a documented allergy to amoxicillin.

Which of these reactions might require use of a non-beta lactam a

- A: Headache
- B: Hives
- C: Upset stomach
- D: Nausea

What services could a pharmacist provide to ensure appropriate antibiotic selection prior to planned surgeries?

- A: Evaluation of patient allergies
- B: Antibiotic recommendation to surgeon
- C: Patient education
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF AN OUTPATIENT ANTIMICROBIAL STEWARDSHIP PROGRAM ON PRESCRIBING HABITS IN PRIMARY CARE SETTING

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### PURPOSE:

Antimicrobial resistance is a growing problem in the United States. In order to reduce antimicrobial resistance, the Centers for Disease Control has created the Core Elements of Outpatient Antimicrobial Stewardship. These elements provide guidance for outpatient settings such as primary care offices and urgent care centers to develop outpatient antimicrobial stewardship programs. The objective of this study is to evaluate the impact of an outpatient antimicrobial stewardship program on prescribing habits in primary care settings.

### METHODS:

This study was submitted to the Institutional Review Board for approval. The purpose of this study is to evaluate antibiotic prescribing patterns in primary care settings before (December 2017 - January 2018) and after (December 2018 - January 2019) the implementation of an outpatient antimicrobial stewardship program. The primary endpoint is total antibiotics prescribed before and after implementation of an outpatient antimicrobial stewardship program. Secondary endpoints include duration of therapy for all antibiotics, total number of fluoroquinolones and macrolides prescribed, total number of first line antibiotics prescribed, and total number of antibiotics prescribed per prescriber compared between groups.

An outpatient antimicrobial stewardship program was implemented during the months of October and November 2018. The program consisted of educational posters "Viruses or Bacteria- What's got you sick" from the Centers for Disease Control and Prevention for each exam room, Be Antibiotics Aware word searches for patients while they wait to see the provider, prescriber pocket cards with common adult treatment regimens for acute respiratory infections and urinary tract infections, delayed prescribing and watchful waiting prescription pads, "A Commitment to Our Patients About Antibiotics" proclamation with provider signatures, and prescriber score cards to illustrate trends in antibiotic use.

### RESULTS:

Data collection and analysis is ongoing. To be completed in spring 2019

### CONCLUSION:

Data collection and analysis is ongoing. To be completed in spring 2019

### Learning Objectives:

Recognize the prevalence of unnecessary outpatient antibiotic prescriptions

Define a pharmacist driven outpatient antimicrobial stewardship (AMS) program and how it can improve prescribing habits

### Self Assessment Questions:

Based on the 2015 CDC data what percentage of all outpatient antibiotic prescriptions are unnecessary?

- A: 10%
- B: 5%
- C: 30%
- D: 60%

Which of the following is/are ways that an outpatient AMS program can have an impact on prescribing patterns?

- A: Educational posters and handouts for patients
- B: Educational pocket cards for provider reference
- C: Provider antibiotic prescribing feedback comparing similar practice
- D: All of the above

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## INTERVENTIONS FOR THE OPIOID EPIDEMIC: A SYSTEMATIC REVIEW

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### Purpose

Opioid misuse is a public health crisis in the United States (US). Over 100 people die each day of opioid overdose. The US Department of Health & Human Services (HHS) announced five strategies to fight the epidemic, including improving access to and supporting addiction treatment and overdose-reversal agents; enhancing public health surveillance; and advancing better pain management practices. However, these strategies do not directly address patient education on opioid medications' effects and risks when prescribed. Though there are examples in the literature on the impact of opioid-related education on healthcare providers' prescribing practices, little exists about the impact of patient education on opioids and the outcomes of the education. The purpose of this systematic review is to describe educational intervention focusing on patients who were prescribed opioid medications and the outcomes of these interventions.

### Methods

The search used Boolean terms, combining the concepts of opioids, patient education, and healthcare practitioner. Each concept included thesaurus terms, like MeSH (when available), and free text terms (title, abstract, and keyword). Five databases (PubMed, IPA, CINAHL, Academic Search Premier, and Health Source: Nursing/Academic Edition) were searched. English language and date filters were used in all databases. The original search was conducted October 5, 2017, and updated on October 22, 2018. A validated de-duplication process resulted in a final set of 4,394 citations. Titles and abstracts were evaluated independently by two investigators to determine inclusion in the review. Full-length, English language peer-reviewed articles were included if they were about medication-related patient education geared toward adults 18 years of age or older, written within the past 25 years. Discrepancies were resolved by the two investigators. Unresolved discrepancies were reviewed by a third investigator to determine whether they met inclusion criteria.

### Results/Conclusion

Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe current trends in the opioid epidemic in the United States.

Recognize strategies used by healthcare practitioners to educate patients receiving opioid prescriptions.

### Self Assessment Questions:

From 1999 to 2017, the number of overdose deaths involving prescription opioids:

- A: decreased
- B: stayed the same
- C: increased
- D: increased, then decreased

Which of the following is a strategy HHS is using to combat the opioid epidemic?

- A: Discouraging use of overdose-reversal agents
- B: Improving access to treatment and recovery services
- C: Encouraging incarceration for opioid-related crimes
- D: Reducing opioid-related research efforts

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## **CAPTURING 'NEAR MISSES' AND MEDICATION EVENTS IN THE INPATIENT PHARMACY SETTING**

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**Purpose:** The objective of this Quality Improvement (QI) project is to collect information about inpatient pharmacy "good catches" and medication events to identify potential areas for improvement at the Jesse Brown VA Medical Center. On the outpatient pharmacy side, many "good catches" and interventions are reported and reviewed at the weekly Medication Event Meetings. Many of them are reported by a pharmacist whose position is dedicated to resolving and intervening on prescribing issues identified at the point of verification. As a result, multiple projects and process improvements have been implemented across the medical center to prevent recurrence of these errors. However, on the inpatient pharmacy side, there is no counterpart to this designated outpatient pharmacist, and many "good catches" and interventions are not reported because of time constraints and workflow. The goal is to facilitate and maximize the amount of reporting, and ultimately identify opportunities to implement systematic process changes to improve patient safety.

**Methods:** Inpatient pharmacists reported their medication events and "good catches" to a project lead. Each event was investigated by reviewing the patient's electronic medical record. Project leads met with the Patient Safety representatives periodically to determine which events were beneficial and/or applicable to enter into Joint Patient Safety Reporting (JPSR). Once the data is analyzed, project leads will determine which aspects of pharmacy workflow or system processes can be improved based on the reported "good catches" and events.

Improvements may include: creating or modifying a standard operating procedure, creating or modifying an ordering screen, and providing training and education to healthcare professionals.

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

### **Learning Objectives:**

Describe barriers to reporting medication events

Explain the key components to an effective event reporting system

### **Self Assessment Questions:**

What are some barriers to reporting medication events?

- A Lack of time and/or difficulty with reporting
- B: Incident seemed insignificant
- C: Forgot to report
- D: All of the above

What are key components to an effective event reporting system?

- A Institution should have a "just culture"
- B Anonymous reports (i.e. reporter's privacy is protected)
- C Mechanism in place for reviewing reports and developing action plan
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **PAIN CONTROL DURING THE IV OPIOID SHORTAGE – A NATURAL EXPERIMENT**

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**Purpose:** In February of 2017, the FDA cited Hospira, a major manufacturer of intravenous (IV) opioids, for failure to comply with good manufacturing practices. All Hospira sterile drug products were deemed adulterated which resulted in a significant production delay. Additionally, the Drug Enforcement Agency (DEA) mandated a 20% reduction in opioid production to decrease drug diversion and abuse. The combination of these events has resulted in a critical IV opioid shortage. In response to this shortage, our hospital initiated an IV opioid restriction. After 24 hours, pharmacists switched eligible patients to enteral opioids. The intent of this study was to determine whether the implemented intravenous opioid restriction affected acute pain control.

**Methods:** A retrospective chart review was conducted at a single, academic medical center near Chicago, Illinois. Adult patients were eligible for inclusion if they received IV opioids during a minimum 24 hour hospitalization. The pre-intervention group was defined as any patient who was admitted up to two months prior to March 27, 2018. The post-intervention group was defined as any patient who was admitted up to two months after August 20, 2018. Patients admitted from March 27th- August 20th, 2018 were excluded to account for the implementation of opioid restriction policies. Patient populations exempt from the IV opioid restriction were also excluded. Patients were selected for chart review via a random number generator, until a total of 100 patients were reviewed (50 patients from each time period), and data collection was capped at one week. Quality of analgesia as measured by pain scores, average daily morphine equivalents, multimodal pain regimens, and safety endpoints were collected. Baseline characteristics were analyzed using descriptive statistics. Categorical data were analyzed by the Chi-square or Fischer's exact test. Continuous data were analyzed by t-test or by the Mann-Whitney U test.

Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Identify the contributing factors that lead to the current intravenous opioid critical shortage

Recognize the effect of the current intravenous opioid shortage on the ability to adequately control acute pain, as well as the role of the pharmacist in mitigating this challenge

### **Self Assessment Questions:**

Which of the following is a major factor that contributed to the current intravenous opioid shortage?

- A Physician over-prescribing of IV opioids for acute pain
- B: A DEA mandated decrease in opioid production by 20%
- C: A production delay by Hospira due to noncompliance with good manufacturing practices
- D: B and C

Pharmacists can play an integral role in mitigating the current intravenous opioid shortage by:

- A Promoting opioid stewardship
- B Ensuring that physicians are effectively utilizing and maximizing morphine equivalents
- C Educating patients about opioid-sparing alternatives
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RISK FACTORS FOR INITIAL SUB- AND SUPRA-THERAPEUTIC TACROLIMUS TROUGH LEVELS IN RENAL TRANSPLANT RECIPIENTS

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### Purpose

Sub-therapeutic tacrolimus trough levels have been associated with increased risk of rejection in renal transplant recipients and supra-therapeutic levels with infectious risks and drug toxicities. The objective of this study is to identify risk factors for sub- and supra-therapeutic tacrolimus levels in renal transplant patients receiving an initial fixed dose of tacrolimus 2 mg twice daily based on institution protocol.

### Methods

This is a single-center, retrospective cohort study of adults who received a renal transplant from 2013-2017. Patients were classified into 2 groups: those with first appropriate tacrolimus trough level drawn post-transplant within the institutional target trough of 8-10 ng/mL and those with first trough <8 or >10 ng/mL. Logistic regression will be utilized to evaluate patient demographics and identify potential risk factors. Additional study endpoints will include biopsy proven acute rejection and renal function.

### Results and Conclusions

A total of 300 patients were included in the preliminary results. Only 13% of patients had an initial tacrolimus trough between 8-10 ng/mL. Of patients with an initial trough <8 ng/mL, a higher dose of 7 mg/day was required to achieve a level >8 ng/mL ( $p < 0.0001$ ). Patients with sub-therapeutic troughs on average had a higher BMI, showing fixed-doses may not achieve therapeutic levels in overweight patients early post-transplant. Patients with an initial trough <8 ng/mL required an increase in weight-based dose (0.08 vs 0.06 mg/kg/day,  $p < 0.0001$ ) to attain a level >8 ng/mL compared to patients with an initial trough of 8-10 ng/mL. Mean time from first dose to first trough >8 ng/mL among patients with an initial trough <8 ng/mL was  $7 \pm 1$  days. There was a trend towards statistical significance between lower age and sub-therapeutic tacrolimus trough levels. Additional patient analysis and logistic regression will aim to identify patient characteristics associated with sub-therapeutic levels.

### Learning Objectives:

Recognize the consequences of sub-therapeutic and supra-therapeutic tacrolimus trough levels in renal transplant recipients

Identify potential risk factors for sub-therapeutic and supra-therapeutic tacrolimus trough levels in renal transplant recipients

### Self Assessment Questions:

Which of the following are potential consequences of supra-therapeutic tacrolimus trough levels?

- A: Graft rejection
- B: Nephrotoxicity
- C: Hepatic dysfunction
- D: Obesity

Which of the following patient characteristics may affect initial tacrolimus trough levels?

- A: Body mass index
- B: Age
- C: Post-transplant urine output
- D: A and B

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EFFICACY OF FIDAXOMICIN VS ORAL VANCOMYCIN IN THE READMISSION RATES OF HIGH-RISK PATIENTS WITH CLOSTRIDIUM DIFFICILE

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Purpose: In 2018, the Infectious Disease Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA) published new guidelines for the treatment of Clostridium difficile infections (CDIs) which changed the recommendations for initial treatment of a CDI from metronidazole to oral vancomycin or fidaxomicin. While several studies have demonstrated the effectiveness of both fidaxomicin and oral vancomycin, the acquisition cost of fidaxomicin has traditionally limited its use. The objective of this study is to compare the 30 and 60 day readmission rates of high-risk patients treated with fidaxomicin vs oral vancomycin for Clostridium difficile infections.

Methods: This is a retrospective, single center cohort of patients who received fidaxomicin or oral vancomycin between October 1, 2016 and September 30, 2018. The electronic medical record was used to collect patient demographics, history of CDI, concomitant antibiotics, surgical history, and laboratory data to identify patients considered high risk for recurrence of CDI. All high-risk patients who received fidaxomicin during the study period were included in the study. High-risk patients who received oral vancomycin during the study period were randomized and matched 1:1 with the fidaxomicin group to allow both cohorts to have an equal number of patients. Data was reviewed 30 and 60 days after initial treatment to identify readmission rates and patient's length of stay. Additionally, the study also hopes to present the costs associated with CDI including cost of medication, hospitalization and readmission.

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

### Learning Objectives:

Review the 2018 IDSA/SHEA guidelines for the management of Clostridium difficile infections

Discuss the impact of Clostridium difficile infections on the health-care system

### Self Assessment Questions:

Which of the following is considered a first-line treatment for an initial Clostridium difficile infection (CDI) episode to ensure resolution of symptoms and sustained resolution?

- A: Fidaxomicin 200mg twice daily for 10 days
- B: Metronidazole 500mg twice daily for 10 days
- C: Fecal microbiota transplantation
- D: Vancomycin 500mg 4 times daily for 10 days

Clostridium difficile infections can have which of the following impacts on the health-care system?

- A: Increased reimbursement potential
- B: Higher patient satisfaction scores
- C: Higher readmission rates
- D: Decreased length of stay

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A MORPHINE MILLIGRAM EQUIVALENT (MME) METRIC TO GUIDE OPIOID STEWARDSHIP INITIATIVES IN A COMMUNITY TEACHING HOSPITAL

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**Purpose:** Opioid use and abuse is a national epidemic. Opioids are often over-prescribed or inappropriately prescribed for pain subjecting patients to unnecessary opioid exposure potentially leading to future medication dependence, abuse, and/or diversion. According to data published by the Centers for Disease Control and Prevention (CDC), overdoses involving opioids have killed more than 42,000 people in 2016, and 40% of those deaths were from prescription opioids. The National Institute on Drug Abuse reports that 21-29% of patients prescribed opioids for chronic pain misuse them, and in the Midwest opioid overdoses have increased by 70% from July 2016 through September 2017.

**Methods:** To improve patient outcomes, retrospective data collected from electronic medical records were evaluated to identify inappropriate prescribing and implement strategies to change current practice. The Institutional Review Board approved a two phase retrospective pre-guideline and prospective post-opioid prescribing initiative study that was conducted from November 2017 to December 2018. Study subjects included patients receiving CII to CV scheduled medications. Data collected included overall opioid usage measured in morphine milligram equivalents (MME), high dose opioid usage (MME>90), naloxone use, and methylnaltrexone use. Preliminary data were presented at the hospital's Pain Stewardship meeting and implementation of various opioid prescribing initiatives was submitted for Pharmacy and Therapeutics Committee review. Guidance for appropriate opioid prescribing is provided by the Society of Hospital Medicine's Consensus Statement, the Opioid Prescribing Guidelines published by IHHA, the Colorado ACEP Opioid Guidelines, and the CDC chronic pain guideline.

**Results:** By implementing opioid stewardship initiatives to target appropriate prescribing, the average hospital MME per patient per day was reduced 14.5% from 2017 to 2018. The number of patients receiving MME above 90 was reduced by 9%. Secondary outcomes addressed appropriate prescribing of methylnaltrexone, with a decrease in administration by 54%. Additional results to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss a multidisciplinary approach to manage acute pain appropriately based on national guidelines addressing the opioid epidemic.

Describe areas of improvement in prescribing practices where pharmacists can make interventions.

### Self Assessment Questions:

Which of the following interventions is supported by national guidelines to promote the safe use and prescribing of opioids

- A Utilize short acting opioids for acute pain
- B: Initiate appropriate alternatives to opioids (ALTOs) as first line for
- C: Avoid simultaneous prescribing and administration of benzodiazep
- D: All of the above

Which of the following guidelines provides extensive information and recommendations regarding alternatives to opioids (ALTOs)?

- A CDC Chronic Pain Guideline
- B IHHA Opioid Prescribing Guideline
- C Colorado ACEP Opioid Guideline
- D Society of Hospital Medicine Consensus Statement

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF PHARMACIST-LED COUNSELING ON READINESS TO CHANGE BEHAVIOR IN HEART FAILURE PATIENTS

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**Purpose:** The purpose of this study is to determine if pharmacist-led counseling of Bridge and Transition (BAT) patients at Northwestern Memorial Hospital (NMH) has an effect on patients' readiness to change behavior. Bridge and Transition is a comprehensive multidisciplinary program designed to improve outcomes for patients with heart failure. To determine this outcome, patients will receive a questionnaire upon consultation with the BAT team and prior to discharge after being counseled by a pharmacist.

**Methods:** This will be a single-center, prospective, pre/post intervention questionnaire given to BAT patients admitted between October 2018 and February 2019. The intervention includes counseling by a pharmacist at discharge with a personalized medication list. During this counseling, the pharmacist will highlight the purpose of each medication and how it helps in heart failure, go over any new medications or changes to the patient's existing medication regimen, and discuss the frequency and timing of medications with strategies to increase compliance. The questionnaire is designed to assess patients' readiness to change behavior, incorporating medication and lifestyle changes that are recommended in patients with heart failure. The questionnaire will use the Transtheoretical Model of Change (TTM) to assess patients' readiness to change behavior. Patients 18 years and older admitted to General Medicine floors and tagged as a BAT patient by the cardiology service, or consulted by the primary service, will be included in the analysis. Patients deemed to have cognitive deficits by the primary team and those discharged to acute rehabilitation or a skilled nursing facility will be excluded. The aim is to have a quantitative assessment of behavior change in heart failure patients counseled by inpatient pharmacists through the BAT program. The primary outcome measured will be percent change in readiness to change medication adherence behavior (questions 1-3). The secondary outcome measured will be percent change in readiness to change lifestyle behavior (questions 4-10).

### Learning Objectives:

Review lifestyle modifications recommended by the ACCF/AHA Guidelines for the Management of Heart Failure.

Describe a tool for measuring readiness to change behavior and review literature for Transtheoretical Model of Change's Utility.

### Self Assessment Questions:

Which of the following statements is NOT a stage of Transtheoretical Model of Change:

- A Maintenance
- B: Action
- C: Preparation
- D: Confirmation

2013 ACCF/AHA Heart failure guidelines recommends sodium restriction of less than \_\_\_ for patients with stage ACCF/AHA Stage C or D Heart Failure? (Level of Evidence: C)

- A 1.5 grams
- B 3 grams
- C 4 grams
- D 2 grams

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IS PAIN FIRST IN PAD CONTRIBUTING TO THE OPIOID EPIDEMIC: A MICU-CASE CONTROL STUDY

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Opioids are first line for the management of pain in a mechanically-ventilated patient according to the Society of Critical Care Medicine Pain Agitation, and Delirium (PAD) guidelines. Patients receiving continuous infusions of opioids are at high risk of developing tolerance, dependence and withdrawal. In December of 2017, Michigan legislature passed a series of laws in an attempt to limit opioid prescriptions and reduce opioid abuse. Presently there is no published literature investigating the association between opioid-focused sedation in an opioid-naïve intensive care unit (ICU) patient and new opioid prescriptions at discharge. The purpose of this study is to identify contributing factors that occur during a medical ICU-associated admission that could lead an opioid-naïve patient to being discharged with a new opioid prescription.

This was a retrospective case-control study at Henry Ford Hospital from November 1, 2016 to November 30, 2017. All patients were at least 18 years of age, admitted to the medical ICU, mechanically-ventilated for at least 48 hours and received an opioid in the ICU, and opioid-naïve on admission. Exclusion criteria included patient death, cardiac arrest, pregnancy, hospice, active cancer diagnosis, or received a recent surgery. Cases were defined as being discharged with a new opioid prescription while controls did not receive an opioid prescription on discharge. The primary endpoint is the cumulative narcotic exposure during hospitalization in morphine milligram equivalents (MME) per group. Secondary endpoints include type of narcotic exposure, average and cumulative quantity of narcotics in the ICU and general medicine floor in MME, type and number of procedures in hospital, and patient disposition. Data will be analyzed with descriptive statistics, Chi-square or Fisher's exact test as appropriate.

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe evidence-based treatment options for pain management in a mechanically ventilated ICU patient.

Identify factors that put a patient at an increased risk of chronic pain after an ICU admission.

### Self Assessment Questions:

According to the SCCM guidelines for the management of pain, agitation, and delirium in the ICU, what is a first line pain medication for a mechanically-ventilated patient in the MICU?

- A Oral Morphine ER scheduled every 12 hours
- B Acetaminophen IV continuous infusion
- C Oral methocarbamol scheduled every 6 hours
- D Fentanyl IV continuous infusion

According to the findings of Battle and colleagues, which of the following puts a patient at an increased risk of chronic pain, PTSD symptoms, and lower quality of life after an ICU admission?

- A Chronic kidney disease
- B ICU length of stay
- C Younger age
- D Asthma

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING REAL-WORLD TOLERANCE OF TRANSITIONING FROM PARENTERAL TO ORAL TREPROSTINIL THERAPY IN PATIENTS WITH PULMONARY ARTERIAL HYPERTENSION

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Purpose: Parenteral treprostinil is a prostacyclin analogue that improves exercise capacity and hemodynamic parameters in patients with pulmonary arterial hypertension (PAH), associated with functional class III and IV symptoms. Subcutaneous treprostinil is commonly associated with infusion-site pain and intravenous treprostinil increases the risk of bloodstream infections and venous thrombosis. Oral treprostinil, a prostacyclin analogue, and selexipag, a selective prostacyclin IP receptor agonist, are recently approved oral formulations for PAH. There are limited data to guide transitions from parenteral treprostinil to oral treprostinil or selexipag. The purpose of this study is to assess clinical outcomes and real-world tolerance of transitioning from parenteral treprostinil to oral treprostinil or selexipag in patients with PAH.

Methods: An Institutional Review Board (IRB) approved retrospective study was conducted in patients 18 years and older with PAH who transitioned from parenteral to oral treprostinil or selexipag during the period between 12/31/13 and 12/31/18. Patients were excluded if they had Child Pugh Class C liver disease or if they were nursing and/or pregnant. The primary outcome was 6-minute walking distance (6MWD) pre and post-transition. Secondary outcomes included side effects, functional class, common adverse effects of oral treprostinil and selexipag, and dose titration methods during the transition. Continuous data were analyzed using Wilcoxon signed-rank test and categorical data were analyzed using the McNemar test.

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

### Learning Objectives:

Discuss existing literature and indication for the utilization of oral treprostinil and selexipag in pulmonary arterial hypertension

Describe common adverse effects of parenteral treprostinil, oral treprostinil and selexipag

### Self Assessment Questions:

Oral treprostinil and selexipag are FDA approved for which of the following type of pulmonary hypertension?

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

Which of the following side effects and complications are associated with parenteral treprostinil?

- A Injection site pain, bloodstream infections
- B Hyperglycemia, rhabdomyolysis
- C Hypertension, memory loss
- D Neutropenia, insomnia

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## MANAGING AGITATION AND SEDATION IN THE CRITICALLY ILL: INTRAVENOUS DEXMEDETOMIDINE TO ORAL CLONIDINE

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**Purpose:** Dexmedetomidine is a more selective  $\alpha$ -2 receptor agonist compared to clonidine and is commonly used for sedation in critically ill patients with minimal adverse effects on respiratory function. As both agents target these receptors, limited data suggests that oral clonidine can be an effective alternative to dexmedetomidine for sedation. Direct studies comparing dexmedetomidine alone and a transition to oral clonidine are currently lacking. The purpose of this study is to evaluate the effectiveness of an institutional protocol using clonidine to transition off dexmedetomidine.

**Methods:** An institutional protocol was created to allow a provider to transition a patient from dexmedetomidine to oral clonidine if order parameters were met. Primarily, ICU patients who were hemodynamically stable, on a consistent dexmedetomidine dose and maintaining a functioning GI tract were eligible for transition. ICU providers, nurses, and pharmacists received education over the protocol prior to the study period. Patients in the ICU who received dexmedetomidine between October 1, 2017 – December 31, 2017, before the protocol was widely implemented, were compared to those who were on the clonidine protocol from October 1, 2018 – December 31, 2018. Dexmedetomidine use, measured by the average use per patient, was evaluated between the two groups in addition to other outcomes, such as drug acquisition cost avoidance, sedation scores, ICU length of stay, and hemodynamic stability. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the potential benefits and risks of high dose clonidine for sedation.

Identify patients who may be appropriate to transition on clonidine from dexmedetomidine.

### Self Assessment Questions:

Which of the following is a potential benefit of using high-dose clonidine in the critically ill?

- A Decreasing use of opioids for analgesia
- B: Lowering blood pressure for hypertension
- C: Providing heavy sedation without propofol
- D: Waking up the patient from over-sedation

Which of the following would be an appropriate parameter to initiate an oral clonidine transition?

- A Patient is currently in septic shock on vasopressors
- B Patient requires variable rates of dexmedetomidine
- C Patient presents with ileus on the medical floor
- D Patient maintains MAP > 65 without vasopressors

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF HEMOSTATIC OUTCOMES IN ANTICOAGULATED PATIENTS RECEIVING FIXED DOSE VERSUS WEIGHT BASED 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE

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**Purpose:** 4-Factor Prothrombin Complex Concentrate (4F-PCC) is a blood coagulation product indicated for urgent reversal of vitamin K antagonists. Based on the package insert, 4F-PCC is administered as a weight-based dose, dependent upon the INR. 4F-PCC has also been utilized for reversal of factor Xa inhibitors as opposed to new and more costly alternative agents. Currently no studies have examined 4F-PCC with fixed doses to reverse vitamin K antagonists as well as factor Xa inhibitors.

**Methods:** This study takes place at a 433-bed community hospital in central Kentucky. Electronic medical records will be utilized to identify patients that received 4F-PCC for the reversal of warfarin, rivaroxaban, apixaban, or edoxaban from January 1, 2014 to December 31, 2018. Patients will be included if they are 18 years or older, receiving an oral anticoagulant, and administered 4F-PCC to achieve hemostasis. Patients will be excluded if they have known heparin-induced thrombocytopenia, disseminated intravascular coagulopathy, use of dabigatran, or death within 24 hours of triage. Patients will be stratified based upon the receipt of weight-based or fixed dose (~2,000 Factor IX units) 4F-PCC administration. The primary outcome is clinically effective hemostasis after receiving 4F-PCC. This is defined for warfarin as a post 4F-PCC INR of  $\leq 2$ . For factor Xa agents, defined as no further bleeding complications as identified via operative reports for surgical procedures, stabilization of bleeding on CT scans, no further significant decreases in MAP or hemoglobin, and no utilization of additional fresh frozen plasma or other agents after 4F-PCC administration. Secondary end points include cost savings, incidence of adverse events, length of stay, mortality, requirement for additional reversal agents, and the incidence of repeat dose of 4F-PCC. Appropriate statistical tests will be used to analyze data as needed. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the efficacy and safety of 4F-PCC administration using a fixed dose regimen for the reversal of warfarin

Identify potential benefits to utilizing a fixed dose 4F-PCC regimen to achieve hemostasis in patients on anticoagulation with life-threatening bleeding and/or in those who require emergent surgical procedures

### Self Assessment Questions:

Which of the following are possible options to aid in achieving hemostasis in patients anticoagulated with factor Xa inhibitors?

- A 4 Factor Prothrombin Complex Concentrate (4F-PCC)
- B: Fresh Frozen Plasma (FFP)
- C: Coagulation Factor Xa (recombinant), Inactivated-zhzo (Andexxa)
- D: All of the Above

Which of the following are potential benefits to utilizing a fixed dose 4F-PCC?

- A Reduced Acquisition Costs
- B Reduced Volume Overload
- C Simplicity of Calculations for Staff
- D All of the Above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CARVEDILOL VERSUS METOPROLOL SUCCINATE FOR HEART FAILURE WITH REDUCED EJECTION FRACTION AND CONCOMITANT COCAINE USE

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**Purpose:** In patients with heart failure with reduced ejection fraction (HFrEF), concerns for unopposed alpha-stimulation in the setting of concomitant cocaine use may influence the prescribing of beta-blockers. Because this medication class has demonstrated mortality benefit with the agents bisoprolol, carvedilol, and metoprolol succinate, the decision to withhold therapy should not be made lightly. When proceeding with beta-blocker administration in these patients, it remains unclear if the alpha-antagonism of carvedilol delivers any additional benefit over the selective beta-antagonism of metoprolol succinate. **Methods:** Between January 2013 and November 2018, 129 adult patients with HFrEF, cocaine use, and a prescription for carvedilol or metoprolol succinate were identified through a retrospective chart review. Parameters assessed in this study included the incidence of a composite outcome of no heart failure-related hospitalizations, improvement in left ventricular ejection fraction (LVEF) to >40%, and maintenance or improvement in New York Heart Association (NYHA) classification to I or II as well as the impact to each of these outcomes individually. **Results and Conclusions:** To be presented at the 34th Annual Great Lakes Pharmacy Resident Conference in 2019.

### Learning Objectives:

Identify the pathophysiology of unopposed alpha-stimulation  
Recall evidence on the safety and efficacy of beta-blockers in patients with cocaine use

### Self Assessment Questions:

Which of the following beta-blockers may be preferred in patients with concomitant cocaine use due to its mechanism of action?

- A Esmolol
- B: Labetalol
- C: Nebivolol
- D: Propranolol

Recent studies have demonstrated safety and efficacy with which of the following beta-blockers for use in patients with HFrEF and concomitant cocaine use?

- A Carvedilol and metoprolol
- B Carvedilol and propranolol
- C Carvedilol only
- D Metoprolol only

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A RETROSPECTIVE REVIEW OF VENOUS THROMBOEMBOLISM (VTE) PROPHYLAXIS ORDERING PRACTICES AMONG A GENERAL MEDICINE POPULATION AND THE INFLUENCE OF UTILIZING A RISK ASSESSMENT MODEL (RAM)

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Currently, there are no risk stratification tools used by providers at Franciscan Health Lafayette (FHLA) when determining VTE risk and prescribing prophylactic agents for general medicine patients. Guidelines recommend utilizing a risk assessment model (RAM) to determine a patient's baseline risk for developing VTE. Data will be collected from patients admitted on a general medicine unit for a minimum of 48 hours. Each patient's chart will be reviewed retrospectively to calculate a Padua Prediction Score (PPS), which includes: active cancer, previous VTE, reduced mobility, known thrombophilic condition, recent trauma and/or surgery, elderly age ( $\geq 70$  years old), heart and/or respiratory failure, acute myocardial infarction or ischemic stroke, acute infection and/or rheumatologic disorder, obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) and ongoing hormonal treatment. Additional data to collect includes: use of pharmacologic or mechanical prophylaxis, if prophylaxis was initiated within 24 hours, incidence of thromboembolic/bleeding events during hospitalization, adequate documentation if agent was not initiated, baseline serum creatinine, hospital length of stay and any chronic conditions requiring anticoagulation. Cost of VTE prophylaxis utilized in these patients will also be evaluated. This study is a retrospective chart review of patients on a general medicine unit at FHLA from June 1 – July 31st 2018. The primary objective is to assess current ordering practices of VTE prophylaxis for general medicine patients and secondarily analyze cost associated with current practices to determine if a stratification tool, particularly the PPS, needs to be implemented. Final results and conclusions will be presented at the 2019 Great Lakes Pharmacy Conference.

### Learning Objectives:

Review CHEST guideline recommendations for determining an individual's baseline venous thromboembolism (VTE) risk utilizing a risk stratification tool

Identify patients at risk for developing a VTE

### Self Assessment Questions:

According to the Padua Prediction Score, what score qualifies a patient as a high risk for developing a VTE?

- A <3
- B:  $\geq 3$
- C: <4
- D:  $\geq 4$

Which of the following patient characteristics would place a patient at an increased risk for developing a VTE when following the Padua Predictor Score?

- A Reduced mobility
- B BMI > 30 kg/m<sup>2</sup>
- C Age  $\geq 70$
- D Acute infection

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF GONORRHEAL AND CHLAMYDIAL INFECTIONS PRESENTING IN THE EMERGENCY DEPARTMENT OF A COMMUNITY HOSPITAL

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### Purpose:

Nearly 2.3 million cases of Gonorrhea and Chlamydia sexually transmitted diseases were diagnosed in 2017, a near 10% rise from 2016. Currently, nucleic acid amplification tests (NAAT) can take 24 to 48 hours to result. Clinical pharmacists staffed in the Emergency Department (ED) complete a daily review of microbiology results and notify patients of the results and necessary follow-up actions to take. Previous studies have shown, on average, 83% of patients tested for Gonorrhea or Chlamydia result in negative assays. The purpose of this study is to assess the frequency of laboratory confirmed Gonorrhea and Chlamydia infections compared to the total number of tests ordered for patients presenting to the ED.

### Methods:

This study is a single-center retrospective chart review of all patients tested for Gonorrhea or Chlamydia in the ED from February 1, 2016 through July 1, 2018. Data collected includes: age, sex, pregnancy status, laboratory results, date of ED visit, treatment date, and antibiotic administered. Inclusion criteria were patients 16 years and older. Exclusion criteria were sexual assault victims and patients whom were subsequently admitted to the hospital from the ED. Primary endpoints are the number of laboratory confirmed Gonorrhea and Chlamydia infections compared to the total number of tests ordered for patients presenting to the ED. Secondary endpoints include the number of patients who received empiric treatment of infections and the number of patients treated post-discharge from the ED.

### Results/Conclusions:

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recall Proper treatment of a suspected Gonorrheal or Chlamydial sexually transmitted infection

Discuss The risk factors for being empirically treated for a Gonorrheal or Chlamydial sexually transmitted infection

### Self Assessment Questions:

The standard treatment for a patient with no allergies who has a confirmed Gonorrheal sexually transmitted infection is

- A 250mg ceftriaxone IM
- B: 250mg ceftriaxone IM + 1000mg azithromycin PO
- C: 2.4 million units penicillin G benzathine IM
- D: 500mg metronidazole PO bid for 7 days

Which of the following patients is most likely to receive empiric treatment for a Gonorrhea or Chlamydia infection?

- A 19-year-old, sexually active, male with pus-like discharge
- B 50-year-old male with complaints of "passing gravel"
- C 28-year-old female with dysuria
- D 32-year-old female with unspecified pelvic pain

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## VALIDATION OF A VANCOMYCIN DOSING AND MONITORING PROTOCOL IN A COMMUNITY HOSPITAL

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Baptist Health Lexington has historically made use of a vancomycin dosing and monitoring protocol. A recent review of this protocol discovered goal trough concentrations were not consistently achieved and the protocol was revised accordingly. This study will determine the difference between the revised vancomycin dosing and monitoring protocol compared to the previous protocol in order to validate the efficacy of the revised protocol. The primary outcome of this study will evaluate the percent of therapeutic vancomycin troughs in comparison to the previous protocol. The secondary outcome will assess practitioner adherence to the revised protocol. This study has been submitted to and approved by the local Institutional Review Board. A retrospective chart review will be performed by collecting data from the electronic medical record. Data collected will include: initial trough level, initial loading dose serum creatinine at initiation of therapy, maximum serum creatinine while receiving therapy, age, height, total body weight, sex, indication for vancomycin therapy, evaluation of trough level (supratherapeutic, therapeutic, subtherapeutic), maintenance dose and frequency. Data of patients receiving vancomycin will be collected monthly and to maintain randomization, every other patient, placed in an alphabetical fashion, will be selected for review to determine inclusion for the study. This data will be compared to historical outcomes in a one-to-one fashion. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the differences between two different vancomycin dosing strategies.

Select adequate loading doses to achieve initial therapeutic trough level:

### Self Assessment Questions:

The goal trough range(s) for vancomycin include which of the following:

- A 8 – 13 mcg/mL
- B: 10 – 15 mcg/mL
- C: 15 – 20 mcg/mL
- D: B and C

What patient factors should a practitioner take into consideration when dosing vancomycin?

- A Age
- B Body weight
- C Serum creatinine
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE SAFETY AND EFFICACY OF TRANEXAMIC ACID INSTILLED LOCALLY IN THE SETTING OF DIFFUSE ALVEOLAR HEMORRHAGE

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**Background:** Diffuse alveolar hemorrhage (DAH) refers to extensive bleeding in the lung that originates from alveolar microcirculation. Current treatment methods include instillation of cold normal saline, local vasopressors, balloon tamponade, or electrocautery through bronchoscope. These patients are also initiated on high dose steroids. Tranexamic acid is a synthetic antifibrinolytic agent that prevents fibrinolysis. Historically, it has been used in trauma and surgical procedures, and often administered intravenously. There are limited data that suggest potential benefit of local administration for diffuse alveolar hemorrhage. The purpose of this study is to evaluate the safety and efficacy of tranexamic acid instilled locally during diffuse alveolar hemorrhage.

**Methods:** Patients 18 years or older diagnosed with diffuse alveolar hemorrhage from 1/1/2013 through 12/19/2018 were assessed for inclusion in this retrospective analysis. IRB approval was obtained with waiver of informed consent. Patients were identified using ICD-9 and ICD-10 codes. Patients were then divided into those who received tranexamic acid and those who did not. The primary outcome was the incidence of adverse events with tranexamic acid administration. This was defined as a new documented VTE within 7 days of administration, immediate bronchodilator use within 24 hours, or documentation of seizure activity within 24 hours. Groups were compared using descriptive statistics. Continuous data points were analyzed using either the student t-test or Mann-Whitney U test, while the chi square test was utilized for nominal data.

**Results/Conclusions:** Data collection is being finalized and completion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe current methods used in the treatment of diffuse alveolar hemorrhage

Identify potential adverse effects of tranexamic acid when administered intravenously or locally to action site

### Self Assessment Questions:

Which of the following is the most preferred treatment modality in diffuse alveolar hemorrhage?

- A High dose corticosteroids
- B: IV epinephrine
- C: Inhaled albuterol
- D: IV fluid resuscitation

Which of the following is a potential adverse effect with intravenous administration of tranexamic acid?

- A Altered mental status
- B Venous thromboembolism
- C Thrombocytopenia
- D Bronchospasm

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPROVING PHARMACY STAFF KNOWLEDGE OF A MEDICATION SYNCHRONIZATION PROGRAM AND IMPACT ON PROPORTION OF DAYS COVERED FOR MEDICARE PATIENTS IN A COMMUNITY PHARMACY CHAIN.

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**Purpose:** To improve knowledge and utilization of a medication synchronization program, SyncScript (SS), among pharmacy staff, and determine whether increased enrollment in SS results in improved medication adherence.

**Methods:** Pharmacy staff at three pilot pharmacies were provided a SS program knowledge assessment survey at baseline and project conclusion. In-person training was provided for pharmacy staff members using a standardized SS training module developed by the project team, and included demonstrations of various concepts within each pharmacy's respective SS performance metrics. Continued support for SS utilization was provided by the project team throughout the study period (October 2018 to April 2019). The following outcomes will be measured in a pre-post project fashion: 1) change in staff SS knowledge 2) change in overall pharmacy utilization of SS 3) change in the Adherence to Refills and Medication Scale (ARMS)-7 tool among randomly selected geriatric SS enrollees, and 4) change in measured proportion of days covered (PDCs) among select drug therapies.

**Preliminary Results:** Preliminary analysis of outcome 2 reveals an improvement in SS utilization at all three pilot pharmacies of 5.53% (range, 2.46%-8.43%). Results from outcome 1 and preliminary results for outcomes 3 and 4 will be available late April.

**Conclusions:** SS utilization is increasing across project pilot pharmacies. We hypothesize that staff knowledge of SS, medication adherence in geriatric SS enrollees, and PDCs will improve significantly at each pilot pharmacy at project end.

### Learning Objectives:

Describe how direct and indirect remuneration (DIR) fees affect pharmacy practice.

Describe how proportion of days covered (PDCs) are affected by filling 30 versus 90 day supplies of medication.

### Self Assessment Questions:

Which of the following scenarios would have the highest percentage of PDC (proportion of days covered)?

- A A patient picking up their medications every 30 days and does not
- B: A patient picking up their medications every 90 days and picks up
- C: A patient picking up their medications every 30 days and picks up
- D: A patient picking up their medications every 90 days and picks up

Which of the following is the best option for a pharmacy to help decrease their DIR (direct and indirect remuneration) fees?

- A Opt out of being a preferred network for a Medicare Part D plan
- B Provide a comprehensive medication review with every patient that
- C Increase medication adherence among all patients
- D Increase dispensing fees to compensate the DIR fees

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF RX FOR CHANGE CURRICULUM IMPLEMENTATION AND STUDENT PHARMACIST PERCEPTIONS

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**Purpose:** During the spring 2018 Sullivan University College of Pharmacy and Health Sciences (SUCOPHS) adopted Rx for Change in first-year student coursework. Prior to this study the Rx for Change curriculum impact on student perceptions was evaluated in four-year pharmacy programs but not accelerated programs such as Sullivan's. This study's purpose was to assess student pharmacists' perceived confidence and readiness to counsel on smoking cessation after completion of Rx for Change curriculum. **Methods:** Perceived confidence and readiness data were collected via student surveys that were conducted before and after participation in the Rx for Change curriculum at SUCOPHS. Data collected included demographic information, and answers to survey questions regarding perceived readiness to counsel on smoking cessation. Survey questions were based on similar trials conducted at 4-year pharmacy programs. Students' responses to 25 pre curriculum survey questions were directly compared to their answers after curriculum completion utilizing paired t-test. **Results:** A total of 57 students rated on a 5-point Likert scale their counseling skills as an average of 2.49 compared to 4.10 post curriculum ( $p < 0.001$ ), perception of impact 3.81 pre and 4.53 post ( $p < 0.001$ ), importance of training 4.28 pre and 4.53 post ( $p = 0.03$ ), and intent to counsel future patients as 3.81 pre and 4.53 post ( $p = 0.07$ ). When polled 47% of students rated the program as very good, 39% as excellent, 12% as good, and 2% did not complete the survey.

**Conclusion:** Results showed that students' self-perception of smoking cessation knowledge significantly increased after completion of this curriculum. Based on these results it can be concluded that the Rx for Change curriculum is just as impactful on students in accelerated programs as it is in 4-year programs. Future analysis after some form of testing such as objective structured clinical examinations would be beneficial to further support student's competency.

### Learning Objectives:

Explain Explain the counseling methods for tobacco cessation taught within the Rx for Change curriculum

Identify Identify smoking cessation skills improved upon by the Rx for Change curriculum

### Self Assessment Questions:

Which is a component of the "5 A's" utilized in the Rx for Change curriculum?

- A Assist
- B: Apply
- C: Accommodate
- D: Analyze

Students who complete the Rx for Change curriculum will have the knowledge to counsel on the following to aid in smoking cessation? (select all the apply)

- A Nicotine replacement therapy (gum, lozenge, patch)
- B Smokeless tobacco
- C Bupropion SR
- D A and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RECOGNITION AND MANAGEMENT OF ALPRAZOLAM WITHDRAWAL IN CRITICALLY ILL PATIENTS

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Alprazolam appears to display a unique withdrawal syndrome that can occur as early as one omitted dose and persist for several days or week if untreated. Withdrawal symptoms including delirium, agitation, and seizures may remain despite use of other analgesic and anxiolytic medications, including other benzodiazepines. Alprazolam withdrawal can be especially problematic in the care of mechanically-ventilated intensive care unit (ICU) patients that cannot verbalize symptoms experienced and may have multiple underlying causes for withdrawal symptoms. This may result in a delay of alprazolam reinitiation, persistence of difficult withdrawal symptoms, and higher alternative analgesic and anxiolytic medication requirements.

This retrospective, single-center study included patients 18 years of age or older who were mechanically ventilated for at least 24 hours and believed to have recent alprazolam use prior to admission to the ICU. All patients had alprazolam 'reinitiated' while mechanically ventilated. The primary objective was to compare the absolute difference in analgesia, sedation, and antipsychotic pharmacotherapy pre- and post-alprazolam reinitiation. An investigator-defined pharmacotherapy index (0-4 points for escalating agent-specific dosing ranges) was used to address differences in dosage units between agents (e.g., propofol 45 mcg/kg/min [3 points] and fentanyl 100 mcg/hr [3 points]) allowing for evaluation of total pharmacotherapy requirement changes between timeframes. Secondary objectives included comparison of pre- and post-alprazolam severity of illness and pain, agitation, and delirium assessments. Paired t-test or Wilcoxon signed rank test were performed as appropriate comparing absolute pharmacotherapy dosages, severity of illness, pain, agitation, and delirium assessments between 24 hours prior to reinitiation of alprazolam and up to 4 days post-reinitiation. Univariate and multivariate logistic regression analyses were performed to identify factors associated with and independent predictors of alprazolam response, a 50% decrease in total pharmacotherapy requirements.

Data collection and analysis are currently ongoing.

### Learning Objectives:

Discuss the clinical presentation and management of benzodiazepine withdrawal

Explain specific benzodiazepine pharmacodynamics

### Self Assessment Questions:

If MM is at risk for alprazolam withdrawal, when can symptoms be expected to be witnessed?

- A After 1 missed dose
- B: Within 4 days
- C: Within 7 days
- D: Within 14 days

Treating anxiogenic symptoms of alprazolam withdrawal during an inpatient stay can be successfully completed using which pharmacotherapy?

- A Lorazepam
- B Diazepam
- C Pregabalin
- D Alprazolam

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT OF BURNOUT WITHIN A HEALTH-SYSTEM PHARMACY DEPARTMENT

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**Purpose:** Burnout is a state of mental and physical exhaustion caused by one's professional life. Healthcare professional burnout has serious, wide-ranging consequences, from reduced job performance to medical errors and clinician suicide. Literature demonstrates the link between physician burnout, diminished patient satisfaction and increased medical errors, but is limited for assessing burnout among other healthcare professions including pharmacy. This study seeks to determine burnout levels among a health-system pharmacy department.

**Methods:** This Institutional Review Board approved survey assessed the perception of burnout and influence of key demographic characteristics on burnout within a health-system pharmacy. All participants were emailed an electronic REDCap® survey comprised of the validated Maslach Burnout Inventory (MBI), demographic information, and open-ended survey questions assessing causes and strategies to alleviate stress. During the three-week survey collection period, email reminders were sent weekly and our research team conducted site visits to encourage survey completion during allotted meeting time. Results from the MBI and demographic variables were analyzed via descriptive statistics.

**Results:** Total of 277 participants completed the MBI (40.5% response rate). Participants identified to have moderate levels of personal accomplishment (PA) and emotional exhaustion (EE), and low levels of depersonalization (DP). There were no statistically significant differences in any dimension of burnout between shift type, number of hours worked per week, or years of service. There was, however, a statistically significant difference ( $p=0.03$ ) in PA between males and females, as well as among role ( $p=0.004$ ) and region ( $p=0.004$ ). Participants identified workflow, control and community as being the greatest contributors of stress.

**Conclusion:** A health-system pharmacy department reported a moderate amount of burnout with the greatest variation in PA. Open-ended comments suggest that initial focus should be placed on staffing/workflow adjustments and creating a culture of well-being in order to become the workplace of choice for personal and professional fulfillment.

### Learning Objectives:

Define burnout and recognize its prevalence within the healthcare sector and implications on healthcare outcomes

Identify the perception of burnout among health-system pharmacy department associates, including overall level and key drivers (i.e. emotional exhaustion, inefficacy, and depersonalization)

### Self Assessment Questions:

Which of the following is a consequence of healthcare professional burnout?

- A Increased patient satisfaction
- B: Decreased healthcare costs
- C: Increased healthcare-associated infections
- D: Decreased medical errors

Which tool is considered the "gold standard" for measuring burnout?

- A Copenhagen burnout inventory
- B Maslach burnout inventory
- C Mayo Clinic well-being index
- D Oldenburg burnout inventory

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## STATINS FOR PRIMARY PREVENTION IN ELDERLY VETERANS (>75) WITH NEW-ONSET DIABETES MELLITUS (DM)

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Adults with diabetes have an increased risk of death from cardiovascular (CV) disease than those without. The American Heart Association/American College of Cardiology recommend the use of statins for primary prevention in patients with diabetes. A recent retrospective cohort study showed a diminished benefit of statins in older adults with diabetes beyond the age of 85 years and a lack of benefit in patients with diabetes beyond the age of 90 years. The purpose of this study is to determine if elderly veterans with new-onset diabetes initiated on a statin for primary prevention ages 75 and older will have a decreased rate of CV events.

This Quality Improvement (QI) project is a retrospective chart review approved by the Office of Privacy and Records Management. Veterans  $\geq 75$  years with new-onset diabetes, without a cardiovascular event prior to 2012 will be included and observed for a period of five years. Veterans will be organized into two groups, veterans with a new prescription for a statin and veterans without. The following data will be collected: patient demographics, comorbidities, medications affecting cardiovascular risk, pertinent lab values. This project will attempt to answer the following clinical questions: Do Veterans 75 years and older with a new diagnosis of diabetes on a statin for primary prevention have a decreased rate of CV events? Is there a decreased rate of all-cause mortality? What is the time to CV event from DM diagnosis? Appropriate statistical analysis will be utilized to analyze the outcomes.

The results and conclusions of this QI project will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the indication of statins for primary prevention of cardiovascular events.

Discuss the gaps in knowledge on the benefit of statins for primary prevention in elderly patients.

### Self Assessment Questions:

According to the American Heart Association/ American College of Cardiology, which of the following patients would be indicated for a statin for primary prevention?

- A A 65-year-old male being discharged from the hospital after a Myocardial Infarction
- B: A 46-year-old female with diabetes and an ASCVD risk score of 8%
- C: A 68-year-old male with a history of stroke, diabetes, hypertension
- D: A 19 -year-old male with asthma and an LDL cholesterol level of 190 mg/dL

Why may statin benefit be diminished in older adults with diabetes 85 years and older?

- A Decreased cardiovascular risk in elderly adults
- B A decrease in comorbid conditions in elderly adults
- C A weakened correlation between serum cholesterol levels and cardiovascular risk
- D A diabetes diagnosis later in life increases a patient's risk of cardiovascular events

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF MORTALITY WITH EMPIRIC VS. NO ENTEROCOCCUS SP. COVERAGE IN COMPLICATED INTRA-ABDOMINAL INFECTIONS

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Complicated intra-abdominal infections (IAI) represent a significant risk with world estimates of up to a 10.5% rate of mortality within 28 days of diagnosis. Empiric antibiotic selection in these patients is an important factor in management. Enterococcus species, in particular, have been implicated in up to 54% of treatment failures and have been isolated in 44% of patients who died from an IAI. Current practice guidelines provide conflicting recommendations on empiric agents such as vancomycin, which cause variable interpretation by clinicians resulting in inappropriate and/or inadequate antibiotic usage. The purpose of this study is to compare 28-day mortality rates in patients treated for complicated IAIs with empiric antibiotics that have Enterococcus sp. coverage versus those without Enterococcus sp. coverage.

This is a retrospective medical chart review of adult patients admitted to the Indiana University Health Adult Academic Health Center between January 1, 2014 and December 31, 2017 with a diagnosed IAI that received antibiotics for treatment. Inclusion criteria include patients diagnosed with IAI (identified via ICD10 and CPT4 codes) being treated with empiric antibiotics with appropriate gram negative bacteria coverage based on guideline recommendations. Exclusion criteria include patients less than 18 years old, diagnosis of uncomplicated appendicitis, and patients transferred from hospitals outside of the IU Health System with prior antibiotic administration. Patient characteristics being collected include age, gender, characteristics of infection (maximum WBC count, SOFA score, and microbiological culture results), and antibiotic regimens. The primary outcome is 28-day mortality rates. The secondary outcomes include duration of antibiotic therapy, 28-day mortality rates with delayed empiric Enterococcus sp. coverage (empiric regimen change within 48 hours of initiation), incidence of C. difficile infection, and total length of hospital stay.

### Learning Objectives:

Describe appropriate antibiotic regimens for empiric coverage of intra-abdominal infections based off of current guideline recommendations. Recognize the instances for when empiric antibiotic regimens for IAIs must be expanded to include Enterococcus sp. coverage.

### Self Assessment Questions:

Which of the following is an appropriate antibiotic regimen for a patient being treated empirically for an intra-abdominal infection?

- A Doxycycline and amoxicillin
- B: Ceftriaxone and ciprofloxacin
- C: Cefepime and metronidazole
- D: Vancomycin and sulfamethoxazole/trimethoprim

Which of the following is considered a risk factor necessitating empiric coverage of Enterococcus sp. based upon current guidelines?

- A Community-acquired IAI
- B Post-operative IAI
- C PMH w/ Type 2 Diabetes Mellitus
- D PMH w/ Child-Pugh B cirrhosis

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## SAFETY AND EFFICACY OF PUSH DOSE PHENYLEPHRINE IN ADULT ICU PATIENTS

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Purpose: The use of bolus doses of phenylephrine, also known "push dose phenylephrine", for the rapid correction of hypotension is rising in ICUs, with over 1,300 administrations at our institution in 2017. While there are theoretical risks associated with push dose phenylephrine use including extravasation and bradycardia, a paucity of evidence regarding the efficacy and safety of these agents exists. Published literature only describes the use of push dose phenylephrine in the emergency department. The proposed study will assess the safety and efficacy of push dose phenylephrine use in adult ICU patients at a 1,000 bed academic medical center.

Methods This study has been approved by the Institutional Review Board. It is a retrospective chart review. All patients who received a dose of push dose phenylephrine between January and July 2017 are included in the analysis. Data collected include demographic information including past medical history, cause of hypotension, dose of phenylephrine given pre- and post-administration vitals, initiation of vasopressor infusion, extravasation, cardiac arrest, and mortality.

The primary outcome will be incidence of a composite safety endpoint of extravasation, hypertension, bradycardia, and cardiac arrest. Secondary outcomes will include the fraction of patients remaining vasopressor infusion-free 24 hours after completing push dose phenylephrine, a dose response relationship following initial phenylephrine dose, and risk factors for adverse effects associated with phenylephrine use.

Results/Conclusion: Will be presented at 2018 Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Describe bolus dose vasopressors and the theories supporting their use in ICUs

Identify potential adverse effects associated with push dose phenylephrine and the frequency with which they occur

### Self Assessment Questions:

Which of the following is not a potential benefit of using push dose phenylephrine?

- A Excellent safety profile identified in multiple large clinical trials
- B: Rapid availability
- C: Spares the need of obtaining a central line for vasopressor infusion
- D: Rapid onset with titratable dose

Which of the following accurately describes a standard syringe of phenylephrine?

- A 100 mcg in 10 mL
- B 1000 mcg in 10 mL
- C 100 mcg in 5 mL
- D 1000 mcg in 5 mL

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST-LED B-LACTAM ALLERGY CLARIFICATION INTERVIEW ON OPTIMIZING PREOPERATIVE ANTIBIOTIC PROPHYLAXIS

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### Purpose:

Penicillin allergies are reported in 10% of the general population, however, 90%-99% of patients with a reported penicillin allergy can safely receive  $\beta$ -lactams. Patients with a reported  $\beta$ -lactam allergies (BLA) are often given second-line perioperative antibiotic prophylaxis. These alternatives are associated with increased adverse effects, surgical site infections (SSI), and antimicrobial resistance. The purpose of this study is to implement a systematic strategy for health care providers to optimize antibiotic selection for SSI prophylaxis in patients with reported BLA.

### Methods:

This study is a single center, quasi-experimental study. The control group includes patients with reported BLA prior to surgery from November 2017 to March 2018. The intervention group includes patient who received a structured allergy history interview by phone from the pharmacist prior to elective surgical procedure from November 2018 to March 2019. Based on the allergy history, the pharmacist recommends first line antibiotics, alternative antibiotics, or an allergy referral. The pharmacist documents patient interview, antibiotic recommendation, and updates the allergy label in the electronic medical record. Data collector includes patient demographics, reported allergen and reaction, surgery type, and appropriateness of antibiotics. The primary endpoint is the percentage of patients receiving first line preoperative antibiotics. Secondary endpoints include incidence of SSI, readmission and death from SSI, percentage of recommendations accepted, and adverse effects including Clostridium difficile, acute kidney injury, and allergy reactions. Statistical analysis will be conducted using Chi-Square test or Fisher's exact test for nominal data and student's t test and Mann-Whitney U-test for continuous variables. Multivariable regression will be used to analyze relevant endpoints.

Results and conclusions will be presented at the Great Lakes conference

### Learning Objectives:

Describe the importance of a comprehensive allergy history.  
Discuss the benefits and challenges associated with implementing a process for clarifying BLA in the perioperative setting.

### Self Assessment Questions:

JK is scheduled for a procedure, but has a penicillin allergy listed. What is a potential outcome associated with the penicillin allergy label?

- A Increased risk of chronic kidney disease
- B: Delayed time to surgery when using vancomycin
- C: Increased use of cephalosporins due to low cross-reactivity with penicillins
- D: Same risk of surgical site infection compared to someone with no allergy

What is a challenge associated with implementing a systematic process for BLA in the perioperative setting?

- A Cost
- B Side effects
- C Ownership of the allergy history
- D Delayed time to surgery

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF LEVOTHYROXINE THERAPY RELATED TO CONCURRENT SELENIUM CONSUMPTION

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### Statement of the purpose

The primary objective of this study is to evaluate the percentage of patients taking levothyroxine and selenium-containing supplements and/or foods concurrently. Selenium is an element that plays a vital role in the synthesis of thyroid hormones; therefore, changes in daily intake could potentially affect overall thyroid function. Secondary objectives include patient satisfaction with levothyroxine therapy related selenium consumption, patient awareness of selenium consumption and its effect on thyroid health, and analysis of patient pharmacologic management of hypothyroidism related to selenium consumption.

### Statement of methods used

A prospective, multi-site, survey-based study will be conducted from December 2018 to February 2019. Included are pharmacy patients or members of thyroid discussion boards 18 or older and included participants with documented hypothyroidism currently treated with levothyroxine. Patients will be identified via dispensing software at four Jewel-Osco pharmacies in Chicagoland, and a national drug code (NDC) report will be run to filter those taking levothyroxine. A survey will be administered including questions about current therapy and satisfaction, assessed by presence and severity of signs/symptoms of hypothyroidism. Daily intake of selenium and awareness of its role in thyroid function will be assessed, along with patterns surrounding therapy. Pharmacy patients may complete a paper survey or electronic version via SurveyMonkey. Patients who are members of either thyroidboards.com or Patient, an HON-certified forum overseen by clinicians may participate using SurveyMonkey. The survey will exclude those who report treatment with any thyroid management agent other than levothyroxine, active malignancy, surgery within 6 months of entry, post-complete thyroidectomy, bacterial/viral illness, HIV/AIDS, chronic steroid use, transplant, impaired digestion/absorption (Crohn's, IBD, chronic diarrhea, colitis, bowel/intestinal surgery), bile acid sequestrants/lipase inhibitor use, and active pregnancy. Data will be collected and analysis completed using SPSS software.

Summary of (preliminary) results to support conclusion  
In progress.

Conclusions reached  
In progress.

### Learning Objectives:

Identify two goals of administering this thyroid questionnaire to patients  
Discuss the main ways this project differs from those completed in this subject area to date

### Self Assessment Questions:

Which of the following is a goal of administering this survey?

- A Evaluating the percentage of patients taking levothyroxine and per
- B: Promoting the consumption of selenium-containing supplements/foods
- C: Gauging patient awareness of the effect of selenium on thyroid health
- D: Identifying pre-existing cardiac conditions that affect proper function

What is one way this research differs from prior studies?

- A This research seeks to gather information from patients regarding
- B This research involves administering a questionnaire to patients
- C This research looks at patients taking any type of thyroid medication
- D This research excludes those with active malignancy

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **BOOSTER BREAKS: THE EFFECT OF PHARMACY DEPARTMENT WORK BREAKS ON EMPLOYEES' SENSE OF COMMUNITY**

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**Purpose:** Booster breaks are work breaks taken as a group and are designed to improve physical and psychological health. These breaks can include a variety of activities such as stretching or meditation, which have been shown to improve employee mood and increase health awareness. Studies have also observed booster breaks may have a positive impact on comradery. The goal of this study is to assess the effect of group booster breaks on employee relationships.

**Methods:** This study was conducted at AMITA Saint Joseph Medical Center and included pharmacy department employees. Pharmacists and pharmacy technicians were asked to participate in 10 minute group activities, which focused on physical health, mental health, and fun. The breaks were scheduled on Mondays, Wednesdays, and Fridays at 2:00 PM for a duration of 3 months. Employees were encouraged to provide feedback and suggestions throughout the course of the study. This allowed the break schedule to be adapted to the activities employees feel are most valuable. Employees were asked to fill out an anonymous survey assessing their perspectives on coworker relationships before and after the intervention phase. Participation in the surveys and breaks was strongly encouraged but completely voluntary. The results of these surveys will be compared and the change in responses from baseline will serve as the primary endpoint. The secondary endpoints are the difference in responses between pharmacists and pharmacy technicians as well as the identification of specific activities that the employees found to be most valuable. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Discuss the challenges in assessing the effect of booster breaks on employee relationships

Identify barriers of implementation and potential solutions

### **Self Assessment Questions:**

Which of the following has been associated with the most mixed data regarding the potential benefits of booster breaks?

- A Comradery
- B: Health awareness
- C: Employee mood
- D: Employee health

Which of the following were potential confounding variables in this study

- A Some employees filled out the surveys despite not attending any c
- B Negative coworker interactions outside of the booster breaks may
- C Choosing to attend breaks based on personal interest may cause :
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **ANTIBIOTIC TREATMENT OF URINARY TRACT INFECTIONS AND ASYMPTOMATIC BACTERIURIA IN PREGNANT PATIENTS: A RETROSPECTIVE REVIEW**

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**Purpose:**

To assess the appropriateness of antibiotic prescribing for pregnant patients with urinary tract infections (UTI) or asymptomatic bacteriuria throughout Gundersen Health System in 2017.

**Methods:**

A retrospective review of electronic medical records of outpatient antibiotic prescriptions for urinary tract infection or asymptomatic bacteriuria during pregnancy was completed for all patients followed at Gundersen Health System in 2017. Prescriptions were selected for further review if they were prescribed for a patient with a prenatal encounter at Gundersen Health System within 12 weeks before or after the date of prescribing. 1342 prescriptions were selected for manual chart review. 358 prescriptions were prescribed for a UTI or asymptomatic bacteriuria, 266 of those were prescribed to women who were currently pregnant.

**Results:**

In 2017, no patients were treated with fluoroquinolones or tetracyclines for UTI or asymptomatic bacteriuria in any trimester of pregnancy. 97 patients were prescribed outpatient antibiotics for the treatment of UTI or asymptomatic bacteriuria during the first trimester of pregnancy. Of these 97 patients, 46 were treated with nitrofurantoin and 10 were treated with trimethoprim-sulfamethoxazole (TMP/SMX). The remaining 41 were treated with either a beta-lactam (38) or fosfomycin (3).

**Conclusion:**

More than half of the cases of UTI or asymptomatic bacteriuria in the first trimester of pregnancy treated at Gundersen Health System were prescribed nitrofurantoin or TMP/SMX. Both agents are not recommended by the American College of Obstetricians and Gynecologists when suitable alternatives are available. This review supports potential changes to practice via order sets and/or alternative alerts to better guide prescribing in high risk patients.

### **Learning Objectives:**

Identify appropriate treatment of urinary tract infections or asymptomatic bacteriuria in pregnancy.

Define the potential risks of using nitrofurantoin, trimethoprim-sulfamethoxazole, or fluoroquinolones in pregnancy.

### **Self Assessment Questions:**

A 28-year-old woman presents to urgent care with complaints of dysuria and polyuria. The patient is 12 weeks pregnant. A urinalysis is complete that is positive for leukocyte esterase and bacteria. S

- A Amoxicillin-clavulanate 875 mg – 1 tablet by mouth twice daily for :
- B: Trimethoprim-sulfamethoxazole DS (160/800 mg) – 1 tablet by mo
- C: Nitrofurantoin 100 mg tablet – 1 tablet by mouth twice daily for 5 d
- D: Ciprofloxacin 250 mg tablet – 1 tablet by mouth twice daily for 3 d

What condition is associated with using trimethoprim-sulfamethoxazole during the first trimester in pregnant patients?

- A No significant risks identified
- B Trisomy 21
- C Hypoplastic left heart syndrome
- D Hyperbilirubinemia

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CORRELATION OF MEASURED AND ESTIMATED CREATININE CLEARANCE IN HOSPITALIZED ELDERLY PATIENTS

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**Purpose:** Accurate assessment of renal function is paramount in hospitalized elderly patients. Few studies have examined the accuracy of Cockcroft-Gault (C-G) estimates of creatinine clearance (CrCl) compared to measured clearance in hospitalized elderly patients. The objective of this study was to determine the correlation between C-G estimates of CrCl and measured CrCl in hospitalized elderly patients.

**Methods:** This IRB-approved, single-center retrospective observational cohort study included all patients 65 years and older admitted at our medical center between January 2018 and September 2018 with either 8- or 24-hour urine collected during admission. The primary outcome was correlation, bias, and precision of C-G estimates of CrCl versus measured CrCl using Pearson correlation and Bland-Altman analysis. Linear regression was also performed. Outliers were determined using a cut-off of  $\pm 20\%$ . Data are presented as median [interquartile range] or percentages.

**Results:** 108 urine collections in 90 unique patients were included in the study. The patients were 51% female, median age was 71 [68-77] years and median body mass index was 26.6 [22.8-31] kg/m<sup>2</sup>. Most collection: were over 24 hours (66.7%), median BUN was 24.5 [17-36] mg/dL and median serum creatinine was 0.71 [0.55-1.09] mg/dL, with 38% in the intensive care unit at the time of urine collection. The median C-G estimation was 75.4 [48.2-110.6] mL/min, and the median measured CrCl was 79.1 [38.1-99.5] mL/min,  $r=0.77$  ( $P<0.001$ ),  $r^2=0.56$  ( $P<0.001$ ). Bland and Altman analysis showed large limits of agreement [-75.5-57.7], with a bias of  $-8.9\pm 34$  and precision of  $34\pm 45$ . Outliers were common at 55.6%, with C-G estimation higher in 38% and measured CrCl higher in 17.6%.

**Conclusions:** Measured CrCl varied significantly from C-G estimates in hospitalized elderly patients. It is important to recognize characteristics of patients who may benefit from measurement of true CrCl. Future studies should examine the impact of this variance on clinical outcomes.

### Learning Objectives:

Describe the importance of renally adjusted dosing for common classes of medications.

Identify characteristics of patients for whom estimated creatinine clearance is less likely to be accurate.

### Self Assessment Questions:

Which of the following is a possible risk of failing to renally adjust drug doses for elderly patients in whom true clearance is less than estimated clearance?

- A Higher incidence of hypersensitivity reactions
- B: Supratherapeutic serum drug levels leading to end organ damage
- C: Decreased efficacy of antimicrobial therapy
- D: Breakthrough seizures in patients on antiepileptic drugs

Which of the following patients would likely benefit most from an 8- or 24-hour urine collection to assess measured creatinine clearance?

- A An 87 year old female (Ht: 57 inches, Wt: 49 kg, SCr: 0.35 mg/dL)
- B A 65 year old male (Ht: 68 inches, Wt: 91 kg, SCr: 0.8 mg/dL) whc
- C A 71 year old female (Ht: 64 inches, Wt: 79 kg, SCr: 1.3 mg/dL) be
- D A 75 year old male (Ht: 70 inches, Wt: 72 kg, SCr: 0.97 mg/dL) wh

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## HIV VIREMIC REBOUND AFTER CESSATION OF ANTIRETROVIRAL THERAPY

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Undetectable=Untransmittable (U=U) is the message that HIV patients with undetectable viral load (VL), defined as  $<200$  copies/mL maintained for  $\geq 6$  months, cannot sexually transmit HIV. However, this goal can only be achieved when patients are adherent to antiretroviral therapy (ART). Clinical pharmacists at the Ruth M. Rothstein CORE Center of Cook County Health have observed patients whose previous viral load was undetectable, but have unintentional breaks in ART. Interruptions in ART can result in HIV viral replication, thus increasing the risk of viral transmissibility and the development of drug resistance. Purpose of this study is to evaluate if uninterrupted breaks in ART results in HIV viremia and thus the ability to transmit HIV, determine the reason for breaks in therapy, and document the success or failure of viral suppression after resuming therapy. This prospective, single-health center, observational study is being conducted from November 2018 to November 2019. Adult HIV-infected patients who present as a walk-in to the CORE clinic and self-report  $\geq 24$  hours since their last dose of ART will be included. Patients with a most recent HIV VL  $\geq 200$  copies/mL and/or obtained  $\geq 12$  months from study visit will be excluded. Data will be collected through face-to-face interview and electronic medical record. Primary endpoints include reason for breaks in ART and days from self-reported last dose of ART to the development of detectable HIV viremia. Secondary endpoints include patient's familiarity of U=U and HIV viral load re-suppression rates within 1 year of ART resumption. All patients will have a HIV VL obtained during or within 24 hours following the walk-in visit. Patients with detectable viral load at walk-in visit will have follow-up labs repeated after reinitiating ART at the discretion of the provider. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the Undetectable=Untransmittable (U=U) message

Identify potential outcomes associated with interruptions in HIV antiretroviral therapy

### Self Assessment Questions:

According to the literature supporting the Undetectable=Untransmittable message, undetectable viral load is defined as which of the following?

- A Viral load  $<300$  copies/mL maintained for  $\geq 1$  year
- B: Viral load  $<200$  copies/mL maintained for  $\geq 6$  months
- C: Viral load  $<300$  copies/mL maintained for  $\geq 6$  year
- D: Viral load  $<200$  copies/mL maintained for  $\geq 1$  year

Which of the following is/are potential consequence(s) of interruptions in HIV antiretroviral therapy?

- A Decreased risk of transmitting HIV to others
- B Increased CD4+ T cell counts
- C Decreased HIV viral load
- D Increased risk of HIV antiretroviral therapy resistance

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## Y-SITE COMPATIBILITY OF INTRAVENOUS LEVETIRACETAM WITH COMMONLY USED CRITICAL CARE MEDICATIONS

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**Purpose:** Levetiracetam is an antiepileptic medication commonly used in critical care for seizure treatment or prophylaxis. Compatibility data of levetiracetam with other critical care medications is limited, which can make administration problematic. This study aims to assess the physical Y-site compatibility of intravenous levetiracetam with commonly used critical care medications.

**Methods:** Levetiracetam was mixed with all tested medications during simulated Y-site administration. Y-site administration was simulated by mixing the medications in a 4 dram, colorless, screw cap, glass vial at a 1:1 ratio. Clinically used concentrations of each medication were compounded in 0.9% sodium chloride following USP <797> standards. Physical compatibility was observed and assessed at 0, 15, and 30 minutes after mixing. Each test was performed in triplicate. If a medication mixture showed evidence of visual incompatibility, the experiment was terminated for that mixture. Medication mixtures were considered physically incompatible if there was visual evidence of color change, gas evolution, haze, particulate formation, pH change of 10%, or an absorbance value greater than 0.010 AU. Medications were considered physically compatible if they passed all the physical compatibility tests.

**Results:** No evidence of physical incompatibility was observed during testing with cisatracurium 1 mg/mL, dexmedetomidine 4 mcg/mL, fosphenytoin 15 mg PE/mL, norepinephrine 16mg/mL, norepinephrine 3: mg/mL, norepinephrine 64 mg/mL, piperacillin-tazobactam 33.75 mg/mL propofol 10 mg/mL, vancomycin 5 mg/mL, and vasopressin 1 unit/mL when tested in 0.9% sodium chloride. Levetiracetam was incompatible with piperacillin-tazobactam 45 mg/mL. This mixture passed visual and pH analysis; however, turbidity, based on absorbance, was noted in 1 of the 3 tested samples.

**Conclusion:** Levetiracetam 5 mg/mL in 0.9% sodium chloride was found to be physically compatible for 30 minutes with 10 of the 11 tested medications tested during simulated Y-site administration. Piperacillin-tazobactam 45 mg/mL showed evidence of turbidity and was the only mixture that showed incompatibility.

### Learning Objectives:

Recognize commonly used testing methods and procedures to assess physical compatibility  
Classify parenteral medications which are physically compatible when co-administered through a Y-site with levetiracetam

### Self Assessment Questions:

Which of the following statements is correct?

- A Physical compatibility can be tested without laboratory equipment
- B: There is consensus on which tests to perform for evaluating comp
- C: Y-site contact time of medications is 30-60 minutes
- D: Samples should be tested only once

Levetiracetam can be safely co-administered through a Y-site with which of the following?

- A Cisatracurium 1 mg/mL
- B bAzithromycin 2 mg/mL
- C Phenylephrine 20 mcg/mL
- D Fentanyl 10 mcg/mL

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A RETROSPECTIVE REVIEW OF VANCOMYCIN DOSING IN NEONATES

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Vancomycin is used in neonates for the treatment of coagulase-negative staphylococci and methicillin-resistant *Staphylococcus aureus* infections. Current literature recommends various dosing regimens based on factors such as indication, age, and weight. Guidelines are available for children and adults, but may not be appropriate to extrapolate to neonates based on pharmacokinetic differences in this patient population. Without significant published guidance, prescribers often independently dose vancomycin in neonates with pharmacists conducting the necessary monitoring. This study aims to evaluate vancomycin dosing trends within a Level III neonatal intensive care unit (NICU) and compare outcomes between treatment approaches in hopes of forming a neonatal vancomycin dosing protocol. A quality assurance review of vancomycin use in a Level III neonatal intensive care unit was performed to identify trends in vancomycin dosing regimens. Patients from January, 2014 through December, 2018 were identified through electronic medical record medication utilization search tools, searching for "IV vancomycin," administered to patient-classes "newborn", "neonate", or "infant". Inclusion criteria are defined as neonates who received at least two doses of intravenous vancomycin and had at least one measured serum trough concentration. Patients were categorized by treatment indication and dosing regimen. Different treatment modalities identified will be compared using NICU length of stay and percentage of initial trough concentrations within goal range as outcome measures. Vancomycin dose, dosing weight, birth weight, corrected gestational age, serum creatinine, urine output, c-reactive protein, culture results, and duration of therapy were also collected from patient charts and will be included in the outcomes analysis. Conclusions will be made after completion of data collection, and the results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the physiological differences between neonates and adults that may affect drug absorption, distribution, metabolism, and elimination.  
Define the goal trough levels for children and adults based on the 2011 IDSA guidelines for MRSA infections.

### Self Assessment Questions:

Neonates undergo rapid physiologic changes in their first weeks of life. Which of the following correctly states the differences in neonates compared to adults?

- A Decreased total body water, decreased muscle mass, decreased fat
- B: Increased total body water, decreased muscle mass, decreased fat
- C: Increased total body water, decreased muscle mass, increased fat
- D: Increased total body water, increased muscle mass, increased fat

What is the goal trough concentration for severe infections (ie. osteomyelitis, meningitis) in children and adults based on the 2011 IDSA guidelines for MRSA infections?

- A 10-15 mcg/ml
- B 10-20 mcg/ml
- C 15-20 mcg/ml
- D >20 mcg/ml

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A RETROSPECTIVE ANALYSIS COMPARING THE EFFICACY OF GOLYTELY AND MAGNESIUM CITRATE WITH GOLYTELY AND BISACODYL FOR COLONOSCOPY PREPARATION AT THE JESSE BROWN VA MEDICAL CENTER

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**Purpose:** Colorectal cancer (CRC) is the second most common cause of cancer-related death in men. Colonoscopy procedures are the gold standard for CRC screening. Optimal bowel preparation is essential to ensure visibility and detection of potential CRC, and their efficacy is assessed with a validated tool called the Boston Bowel Preparation Scale (BBPS). The American Gastroenterological Association recommends 4-liter polyethylene glycol electrolyte lavage solution (brand name GoLYTELY) as standard practice for bowel preparation. However due to patient intolerance to GoLYTELY, literature supports the use of adjunctive therapy with either bisacodyl or magnesium citrate. The Jesse Brown Veterans Affairs Medical Center (JBVAMC) commonly utilizes both bowel preparation regimens – GoLYTELY with bisacodyl (GB) or GoLYTELY with magnesium citrate (GMC). To this date, there are no studies that directly compare these regimens. Therefore, the purpose of this research study is to compare the efficacy of GB and GMC bowel regimens for colonoscopies.

**Methods:** This study is a retrospective electronic chart review of patients who were dispensed either GB or GMC bowel regimens between January 1st, 2010 and December 31st, 2017 at JBVAMC. To determine the efficacy, the primary endpoint is the median total BBPS score at the time of colonoscopy procedure. The median BBPS scores for each group will be compared and analyzed. The secondary endpoints include the number of rescheduled or cancelled procedures, BBPS score  $\geq 6$ , and the median BBPS score per colon section.

**Results/Conclusion:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the role of bisacodyl and magnesium citrate in colonoscopy bowel preparation regimens

Explain the utility and interpretation of the Boston Bowel Preparation Scale (BBPS)

### Self Assessment Questions:

Which of the following is true regarding bisacodyl or magnesium citrate as adjunct therapies in bowel preparation regimens?

- A: Bisacodyl or magnesium citrate may improve bowel preparation
- B: Due to the renal excretion, bisacodyl should be avoided in patients
- C: There is no potential toxicity with magnesium citrate in patients with
- D: Patients who have had inadequate preparations with a standard bowel

Which of the following is true regarding the Boston Bowel Preparation Scale (BBPS)?

- A: An adequate bowel preparation is defined by a score of  $\geq 9$  and/or
- B: The highest possible score a region may be assigned is 4
- C: The BBPS was developed to limit subjectivity from previous rating
- D: The total BBPS score ranges from 1 to 10

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## TREATMENT OUTCOMES OF LONG-ACTING INJECTABLE NALTREXONE VERSUS ORAL NALTREXONE IN ALCOHOL USE DISORDER IN VETERANS

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**Purpose:** In the United States, twelve-month and lifetime prevalence of alcohol use disorder are 13.9% and 29.1%, respectively. Unfortunately, in veterans, this number is significantly higher. In a study done to assess the burden of alcohol use disorder on veterans, the prevalence of twelve month and lifetime alcohol use disorder was 14.8% and 42.2%, respectively. Alcohol use disorder can cause significant morbidity and mortality and treatment is often plagued by medication discontinuation or relapse. The objective of this study is to assess the efficacy, defined by time to relapse, of long-acting injectable naltrexone use versus oral naltrexone.

**Methods:** This study is a retrospective electronic chart review of patients with alcohol use disorder who were treated with long-acting injectable naltrexone or oral naltrexone at a Veteran's Affairs Medical Center from August 1st, 2016 to July 31st, 2018. Patients on oral naltrexone were randomized to match long-acting injectable naltrexone patients. Pertinent demographic and treatment related information was collected. The primary outcome assessed is time to relapse. Secondary outcomes include medication possession ratio, three-month treatment outcome, total length of medication therapy, and safety outcomes. All data was recorded without patient identifiers and maintained confidentiality.  
**Results and conclusion:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review treatment options for alcohol use disorder

Identify the place in treatment for long-acting injectable naltrexone

### Self Assessment Questions:

According to American Psychiatric Association practice guidelines, which of the following is the most appropriate first line treatment option(s) for patients with moderate to severe alcohol use disorder

- A: Acamprosate
- B: Naltrexone or Acamprosate
- C: Chlordiazepoxide
- D: Disulfiram

Which of the following is a side effect or adverse event caused by long-acting injectable naltrexone?

- A: Increased effectiveness of opioids
- B: Cardiac arrhythmias
- C: Increased serum ALT
- D: Stevens-Johnson syndrome

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## TRAMADOL PRESCRIPTION RATES IN PATIENTS WITH CHRONIC KIDNEY DISEASE

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**Purpose:** Analgesic control for chronic kidney disease (CKD) patients can be problematic due to their altered pharmacokinetics, increased risk for adverse effects, and the release of the 2016 Centers for Disease Control (CDC) Opioid Guidelines which are pushing prescribers away from ordering opioids. This can make it difficult to adequately manage moderate-to-severe pain, which is common in CKD patients. As a response to this, prescribers may lean towards tramadol use, as it is often viewed as a "safer" analgesic agent. The objective of this study is to assess healthcare providers' response to the CDC 2016 opioid guidelines by assessing the incidence of new tramadol prescriptions in CKD Stage IV-V patients pre- and post-CDC guidelines.

**Methods:** This retrospective cohort study was approved by the Institutional Review Board. Patients enrolled in the study will have a diagnosis of CKD Stage IV-V and a discharge from a St. Joseph Mercy Hospital in Michigan. Participants were divided into three groups – those who were discharged with a new prescription for tramadol, a new prescription for another opioid product, or no new opioid prescription at all. Data was collected using an internal data gathering program. The primary objective is to assess prescribing habits of providers discharging hospitalized CKD stage IV-V patients on a new opioid or tramadol-containing product prior to CDC pain management guidelines (2014-2015) and post-CDC guidelines (2017-May 2018). The year 2016 was used as a washout period to allow time for guideline implementation. The secondary objectives include incidence of severe drug-drug interactions and the percentage of tramadol prescriptions properly dosed based on renal function. Data on patient baseline characteristics, concomitant medications, renal function, and applicable co-morbidities was also collected.

**Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the effect the Centers for Disease Control and Prevention 2016 Opioid Guidelines had on the incidence of tramadol prescriptions in Chronic Kidney Disease Stage IV-V patients.

Identify dose reduction criteria and drug-drug interactions for tramadol in Chronic Kidney Disease patients.

### Self Assessment Questions:

Which of the following medication are contraindicated with tramadol use

- A Carbamazepine
- B: Gabapentin
- C: Levetiracetam
- D: Ketorolac

What is the recommended creatinine clearance cutoff for tramadol dose reduction?

- A ≤ 60 mL/min
- B ≤ 45 mL/min
- C ≤ 30 mL/min
- D ≤ 15 mL/min

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSOCIATION BETWEEN WARFARIN TIME IN THERAPEUTIC RANGE AND POST-TRANSPLANT OUTCOMES IN HEART TRANSPLANT RECIPIENTS

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**Purpose:** Demand for heart transplant continues to outpace supply of donor hearts, emphasizing appropriate patient selection to obtain optimal outcomes. Warfarin time in therapeutic range (TTR) has been associated with thrombotic and bleeding outcomes in patients on left ventricular assist device (LVAD) support and may be informally used as a marker of adherence. However, warfarin TTR as a predictor of post-transplant adherence and outcomes has not been assessed.

**Methods:** This retrospective study will be conducted at Michigan Medicine. Patients will be identified through the Organ Transplant Information System and International Normalized Ratios (INRs) will be extracted through an electronic database. Patients transplanted between January 1, 2006 and December 31, 2017 and bridged with LVAD support for at least 6 months will be included. Patients who were transplanted by the pediatric program or received dual organs will be excluded.

The primary outcome of this study is the association of pre-transplant warfarin TTR and post-transplant composite outcome of death, hospitalization, coronary artery vasculopathy (CAV) development and antibody and cellular-mediated rejection. Secondary outcomes include association between warfarin TTR and the following: all-cause mortality, all-cause hospitalization, CAV severity, antibody or cellular-mediated rejection.

The anticipated sample size is approximately 200 patients. Continuous data will be analyzed using student's t-test or Mann-Whitney test. Categorical data will be analyzed using Chi-square test or Fisher's exact test. An adjusted cox regression will be used to determine the relationship between warfarin TTR 6-months pre-transplant and the composite endpoint.

**Results:** Results are in progress.

**Conclusion:** Will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Discuss the use of warfarin time in therapeutic range as a marker for patient adherence.

Describe the correlation between warfarin time in therapeutic range and post-transplant outcomes.

### Self Assessment Questions:

1. Which of the following pre-transplant characteristics have been associated with poor outcomes?

- A Older age
- B: Depression
- C: Poor renal function
- D: All of the above

Warfarin time in therapeutic range in LVAD patients has been associated with which of the following outcomes?

- A Bleeding
- B Thrombosis
- C Organ Rejection
- D A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ORAL VANCOMYCIN FOR SECONDARY PROPHYLAXIS OF CLOSTRIDIODES DIFFICILE INFECTIONS AMONG HIGH RISK PATIENTS

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**Purpose:** Clostridiodes difficile infection (CDI) is a commonly identified hospital-acquired infection leading to significant morbidity and mortality, with a reported average recurrence rate of 20%. Risk factors for recurrent CDI include advanced age, prior CDI episode(s), antibiotic exposure, and use of acid suppressing medications. Retrospective studies demonstrated reduction in CDI recurrence using oral vancomycin for secondary prophylaxis, but were limited by prescriber bias and inconsistent drug selection, dose, and duration. Currently, the Infectious Diseases Society of America (IDSA) guidelines for CDI do not recommend for or against the use of secondary prophylaxis due to insufficient data. Thus, the primary objective of this study is to characterize the impact of secondary prophylaxis with oral vancomycin in reducing CDI recurrence among high risk patients.

**Methods:** This single-center, retrospective cohort study will evaluate the impact of oral vancomycin for secondary prophylaxis of CDI among high risk patients who have at least two episodes of CDI within the last year prior to broad spectrum antibiotic exposure. Case patients are defined as those who received oral vancomycin prophylaxis for at least 50% of the duration of broad spectrum antibiotic therapy, and control patients are defined as those who did not receive oral vancomycin prophylaxis while on broad spectrum antibiotics. The primary outcome is the occurrence of CDI within 12 weeks of discontinuation of systemic antibiotic therapy. Secondary outcomes include length of hospitalization, all-cause mortality, all-cause ICU admission, time to CDI within 12 weeks after discontinuation, need for colectomy or diverting loop ileostomy, and vancomycin-resistant Enterococcus infection and colonization. Descriptive statistics will be utilized for analysis, and a multivariable logistic regression will be used to adjust for confounders and test our primary hypothesis that vancomycin prophylaxis reduces the risk of subsequent CDI.

Site-specific data and conclusions from the University of Michigan Health System will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List risk factors associated with recurrent C. difficile infection.

Identify the recommendation classification the IDSA guideline provides for secondary prophylaxis of C. difficile infection based on the level of evidence.

### Self Assessment Questions:

Which of the following are risk factors associated with recurrent C. difficile infection?

- A Antibiotic exposure
- B: Elderly age
- C: Use of acid suppressive medications
- D: All of the above

What recommendation classification does the IDSA guideline provide for secondary prophylaxis of C. difficile infection based on the level of evidence?

- A No recommendation due to insufficient data
- B Weak recommendation, low quality of evidence
- C Weak recommendation, moderate quality of evidence
- D Strong recommendation, moderate quality of evidence

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A PROSPECTIVE AUDIT-AND-FEEDBACK TOOL TO DECREASE BROAD-SPECTRUM ANTIBIOTIC USE IN A COMMUNITY HOSPITAL SETTING

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**Purpose:** Misuse and overuse of antimicrobial therapy is a growing concern throughout hospitals across the United States. Exposure to extended durations of broad-spectrum antibiotics can give rise to many complications, including the development of multi-drug resistant organisms. Appropriate use of antimicrobial therapy leads to improved patient outcomes, reduced rates of adverse effects, such as Clostridium difficile infection (CDI), and reduced antimicrobial resistance. The purpose of this project is to implement a program to track duration of therapy of broad-spectrum antibiotics and promote regular clinician assessment of indication, duration, and opportunities for de-escalation.

**Methods:** Clinical pharmacists surveil broad-spectrum antibiotic use throughout the hospital. The duration of therapy of predefined antibiotics is evaluated daily for appropriateness based on indication. Antimicrobial stewardship progress notes are being published by clinical pharmacists in the patient's electronic medical record (EMR) on days 3, 5, 7, 10, and 14 of antimicrobial therapy. Progress notes include documentation of current antibiotic regimen, duration, indication, microbiology results, and indication-specific antibiotic duration recommendations based on Infectious Diseases Society of America (IDSA) guidelines. The aforementioned protocol was approved by the pharmacy and therapeutics (P&T) committee, and education regarding the antimicrobial stewardship progress notes and their purpose was provided to healthcare professionals, including pharmacists, physicians, physician assistants, and nurse practitioners. The primary outcome will be days of therapy (DOT) pre- and post-process implementation, comparing data from January through March of 2018 to January through March of 2019, respectively. Secondary outcomes include healthcare facility-onset (HO) CDI, antibiotic cost savings, standardized antimicrobial administration ratios (SAARs), and notes leading to an intervention within 48 hours of publication.

**Results and Conclusion:** Data collection and analysis are currently in progress. Results will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the purpose of antimicrobial stewardship programs and their role in antibiotic use reduction.

List two main strategies utilized for effective antimicrobial stewardship interventions.

### Self Assessment Questions:

Which of the following is an adverse effect associated with overuse of broad-spectrum antibiotic therapy?

- A Hypotension
- B: Clostridium difficile infection
- C: Increased antimicrobial sensitivity
- D: Maintenance of gastrointestinal flora

Which of the following is an appropriate definition of perspective-audit-and-feedback interventions?

- A Interventions that improve antibiotic use by requiring clinicians to
- B Interventions that allow the antimicrobial stewardship pharmacist to
- C Interventions that engage the provider after an antibiotic is prescribed
- D Interventions that assess the efficacy of an antibiotic regimen after

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PATIENT FINANCIAL ADVOCATES ON THE AFFORDABILITY OF INFUSION THERAPIES

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**Purpose:** Pharmaceutical company patient assistance programs (PAPs) have a record of helping patients with chronic disease states achieve therapeutic goals. Despite their financial advantages, PAPs can be difficult for patients to navigate. Complex application processes, lack of PAP transparency, and varying degrees of patient health literacy can limit the usefulness of drug company-sponsored PAPs. To support the needs of patients and providers, OhioHealth has employed patient financial advocates (PFAs) to navigate the PAP application process for patients and optimize OhioHealth's medication expenses.

**Objective:** Study objectives of the PFA program are to assess 1) the total net financial benefit to OhioHealth, 2) the expansion of medications captured with the program, and 3) patient satisfaction associated with PFA program.

**Methods:** This study is a quasi-experimental quality improvement project of all patients receiving pre-determined, high-cost infusion medications in order to determine the effectiveness of the implementation of PFAs in reducing OhioHealth's bad debt and charity care. This study will include patients that received a high-cost immunosuppressive or chemotherapy infusion drug at an OhioHealth infusion center and met OhioHealth's eligibility criteria for financial assistance. Data will be collected for consecutive one-year periods prior to the implementation of PFAs (7/1/2017 to 6/30/2018) and following the implementation (7/1/2018 to 6/10/2019). Secondary outcomes measures include the number of new medications captured in the post-implementation period and patient experiences captured by PFAs.

**Conclusions/Potential Outcomes:** Data collection is ongoing. Full results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the role of Patient Financial Advocates (PFAs) in helping patients navigate pharmaceutical company patient assistance programs (PAPs).

Recognize the financial impact that patient assistance programs (PAPs) have on organizational bad debt and charity care.

### Self Assessment Questions:

Which of the following statements is correct regarding pharmaceutical manufacturer patient assistance programs (PAPs)?

- A: Patients must pay to enroll in PAPs
- B: PAPs are typically easy to navigate for patients with low health literacy
- C: PAPs can provide substantial savings to patients and health systems
- D: All patients are eligible for PAPs if they are on the manufacturer's list

What impact has the patient financial advocate program had on OhioHealth and its patients?

- A: The number of OhioHealth patients enrolled in patient assistance programs has increased
- B: OhioHealth has experienced significant reductions in bad debt and charity care
- C: Patient coverage has been optimized as the program scope grows
- D: All of the above

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## STANDARDIZING A SPECIALTY PHARMACY WORKFLOW TO IMPROVE CLINICAL AND OPERATIONAL SERVICES

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**Background:** While accrediting bodies, such as Utilization Review Accreditation Commission (URAC) and Accreditation Commission for Health Care (ACHC), provide much guidance and oversight for the content and delivery of care in a specialty pharmacy, the actual workflow can be implemented at the discretion of the individual specialty pharmacy. Lack of a standardized workflow can impact the efficiency and quality of specialty pharmacy services which tend to be comprehensive and complex. Norton Specialty Pharmacy (NSP) has identified the need to improve workflow efficiency to narrow variability related to prescription turnaround time, task delegation, and clinical services. This project aims to standardize the workflow for NSP in order to improve clinical and operational pharmacy services.

**Methods:** This process improvement project utilizes the Define, Measure, Analyze, Improve, and Control (DMAIC) methodology to develop and implement a standardized workflow to improve NSP's services. The current workflow will be divided into stages and measured in a timeline format. A gap analysis will identify key stages for optimization. Improvements should encompass leveraging technology and managing work force resources while standardizing the workflow. Implementation of improvements sustains the new workflow resulting in optimized clinical and operational services.

**Results/Conclusions:** Results will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the importance of a standardized specialty pharmacy workflow  
Identify relevant steps necessary to develop and implement a standardized specialty pharmacy workflow

### Self Assessment Questions:

What is a consequence of wide variability in a specialty pharmacy workflow?

- A: Improved clinical services
- B: Increase in turnaround times
- C: Appropriate task delegation
- D: Efficient operational services

Which of the following actions are necessary to standardize a specialty pharmacy workflow?

- A: Measure current workflow
- B: Identify key areas for improvement
- C: Leverage technology
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PREVALENCE AND IMPACT OF AUGMENTED RENAL CLEARANCE IN THE NEUROCRITICAL CARE POPULATION: A PROSPECTIVE POINT PREVALENCE STUDY

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### Background

Augmented renal clearance (ARC) is a phenomenon that has been described in critically ill patients, defined as a creatinine clearance > 130 ml/min/1.73m<sup>2</sup>. Risk factors for ARC include sympathetic responses to critical illness and iatrogenic processes including fluid resuscitation and vasopressors. Neurocritically ill patients however, may also undergo neurohormonal alterations that can contribute. Previous studies have reported rates of ARC as high as 65% in the general ICU population, however prevalence in the neurocritically ill population has not been clearly elucidated. ARC can result in subtherapeutic concentrations of renally cleared medications such as antibiotics and antiepileptic drugs. Resulting treatment failures of these therapies may have a considerable effect on patient outcomes. The purpose of this study is to determine the prevalence of ARC as well as the impact on outcomes in the neurocritically ill population.

### Methods

The institutional review board approved this prospective, observational point prevalence study. Patients were included who were adults admitted to the neuroscience ICU with a Foley catheter in place. Patients who were incarcerated, pregnant, with anticipated ICU length of stay < 72 hours, or had serum creatinine > 1.5mg/dL were excluded. During the first 7 days of ICU stay, data collected includes baseline characteristics and up to three 8-hour urine collections. Measured creatinine clearance is calculated using the urine collections to determine presence of ARC. Additionally, any use of vasopressors, antibiotics and AEDs on urine collection days was noted. Primary endpoints include the presence of ARC and discharge Modified Rankin Scale score. Secondary endpoints include mortality, ventilator days and ICU length of stay.

### Results

At this point in data collection, 49 patients have been included and 57 urine collections completed. 43/49 (87.8%) patients fit the criteria for ARC. Mean creatinine clearance is 195.6 ml/min. Conclusions pending ongoing data collection and analysis.

### Learning Objectives:

Describe Describe the pathophysiology of augmented renal clearance including risk factors in the neurocritical care population  
Identify Identify the potential consequences of ARC on patient outcomes

### Self Assessment Questions:

Which of the following are risk factors for the development of ARC in ICU patients?

- A Aggressive fluid resuscitation
- B: Use of concomitant nephrotoxic medications
- C: Congestive heart failure
- D: Use of Foley catheter

Which of the following medications are potentially affected by the presence of ARC?

- A Beta-lactam antibiotics
- B Vancomycin
- C Levetiracetam
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A TRANSITION OF CARE PROCESS BY INPATIENT PHARMACISTS FOR PATIENTS ADMITTED WITH HEART FAILURE AT A COMMUNITY HOSPITAL

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Background: Heart failure is a complex clinical syndrome resulting from structural or functional impairment of ventricular filling or ejection of blood. Heart failure currently accounts for 17% of unplanned 30-day readmissions at Mercy Health Muskegon (MHM). Heart failure patients with an increased risk of mortality may require efficient coordination of care and follow-up. Patients admitted for a heart failure exacerbation often have medication regimens that fluctuate to manage their disease state. This introduces the potential for confusion and non-adherence. Baseline analysis at MHM revealed little to no pharmacist education being provided to patients admitted for heart failure.

Purpose: Implement a standard medication education process for patients admitted for heart failure to facilitate transitions of care and evaluate pharmacist impact on patient readmission.

Methods: A patient-focused heart failure education sheet was developed based on current heart failure guidelines and MHM heart failure resources. In addition, standard work and transitions of care processes were developed. Pharmacists utilized these materials to facilitate patient education, which included an overview of their heart failure disease state and treatments prior to discharge. Patients were identified for education via physician order upon patient admission for heart failure. Pharmacist then evaluated the patient record and documented interventions and education in the electronic medical record (EMR). Patients were included for education if they were to be discharged home or home with home care. Results were analyzed by review of the documented pharmacist interventions in the EMR.

Primary outcomes included the number of completed pharmacist educations and 30-day patient readmission rates or emergency room visits for heart failure. Secondary outcomes included the number of heart failure-related medications that were added or changed at discharge, utilization of a medication discharge service, referral to the heart failure clinic, and time spent on the intervention.

### Learning Objectives:

Identify clinical pharmacy services that have been shown to improve care for patients with heart failure.  
Describe barriers to performing inpatient heart failure medication education.

### Self Assessment Questions:

Which of the following pharmacy services are commonly recommended to reduce medication errors during transitions of care?

- A Medication reconciliation
- B: Patient education
- C: Order verification
- D: Both A and B

Which of the following represents a potential barrier to providing heart failure education to patients during their hospital admission?

- A Patient hearing/sight deficits
- B Time commitment to provide education
- C Patients on complex medication regimens
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**PUSHING THE ENVELOPE: HIGH RISK VENOUS THROMBOEMBOLISM PROPHYLAXIS USING BODY MASS INDEX II THE NEUROSCIENCE INTENSIVE CARE UNIT**

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**Purpose:** The incidence of venous thromboembolism (VTE) in the neurocritically ill population ranges between 1.5-60%. It is currently recommended to initiate VTE pharmacoprophylaxis within 48 hours of admission or when bleeding is controlled after injury or surgery in patients with aneurysmal subarachnoid hemorrhage (aSAH) or intracerebral hemorrhage (ICH). There is emerging data supporting more aggressive doses of unfractionated heparin (UFH) and low molecular weight heparin (LMWH) for VTE prophylaxis in patients greater than 100 kg or with a body mass index (BMI)  $\geq$  40 kg/m<sup>2</sup> without an increased risk of bleeding. However, there is limited evidence for utilizing aggressive dosing strategies based on BMI in the setting of a hemorrhagic stroke. The purpose of this study is to determine whether a BMI based dosing strategy and early initiation of VTE prophylaxis is safe and effective in hemorrhagic stroke patients at Rush University Medical Center (RUMC).  
**Methods:** This is a retrospective, cohort study of adult patients admitted to the RUMC neuroscience intensive care unit for aSAH and ICH who received UFH for VTE pharmacoprophylaxis between July 1, 2011 and September 1, 2018. The primary endpoint is major bleeding events. Secondary endpoints include minor bleeding, incidence of deep vein thrombosis (DVT), and pulmonary embolism (PE). Data collection and analysis are currently ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Discuss when it would be appropriate to initiate VTE pharmacoprophylaxis in patients after a hemorrhagic stroke.  
Identify adverse events related to UFH.

**Self Assessment Questions:**

How soon can venous thromboembolism (VTE) pharmacoprophylaxis be initiated in a patient after a hemorrhagic stroke?

- A: Less than 24 hours
- B: Within 24 to 48 hours
- C: Within 48 to 72 hours
- D: We should never give VTE pharmacoprophylaxis to hemorrhagic s

What is an adverse event of administering unfractionated heparin (UFH)

- A: Deep vein thrombosis (DVT)
- B: Pulmonary embolism (PE)
- C: Bleeding
- D: Nausea and vomiting

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**LONG-TERM OUTCOMES OF STEROID-FREE PANCREAS TRANSPLANT RECIPIENTS**

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Pancreas transplant recipients require lifelong immunosuppression to maintain their allografts, most commonly with tacrolimus, mycophenolic acid, and potential corticosteroids. Approximately 30% of pancreas transplant recipients in United States undergo early corticosteroid withdrawal (ECSWD) as a part of their immunosuppression regimens. Since 2003, the University of Illinois Hospital has utilized an ECSWD protocol after pancreas transplantation. In a 2012 internal review, ECSWD recipients had superior metabolic outcomes 1-year post-transplant with no difference in the incidence of rejection, allograft failure or patient death compared to those recipients on chronic corticosteroids (CCS). The purpose of this study is to compare the long-term clinical safety outcomes between pancreas transplant recipients receiving CCS or ECSWD immunosuppression regimens.

A single-center retrospective cohort study will be conducted on adult pancreas transplant or simultaneous pancreas-kidney transplant (SPK) recipients between 1/1/1997 and 3/15/2018. Patients will be excluded if they were lost to follow up 6 months post-transplant or had graft loss less than 30 days post-transplant due to technical failure. Patients will be followed for up to 10 years post-transplantation, or until 9/15/2018. The primary endpoint is to compare allograft survival 5 years post-transplant between CCS and ECSWD transplant recipients. Secondary efficacy endpoints include: comparing the incidence of allograft survival, patient survival, and rejection at 6 months, 1, 2, 5, and 10 years post-transplant between ECSWD and CCS recipients. Metabolic and infectious outcomes at 6 months, 1, 2, 5, and 10 years post-transplant will also be assessed between the two groups. Statistical analyses will be assessed using Chi-square or Fisher's exact test for nominal variables, student's t test for continuous variables, and Kaplan Meier curves with log-rank comparisons for time to event analyses.

**Learning Objectives:**

Identify long term complications of corticosteroids used in maintenance immunosuppression  
Select the appropriate immunosuppression strategy based on clinical efficacy and safety outcomes

**Self Assessment Questions:**

Which of the following is a complication associated with corticosteroid use?

- A: Deep vein thrombosis
- B: Hypotension
- C: Hypoglycemia
- D: Impaired wound healing

According to the UI Hospital protocol, which of the following indications merit chronic continuous steroids for pancreas or simultaneous kidney-pancreas transplant recipients?

- A: Positive cross-match
- B: Hispanic race
- C: Panel reactive antibody of 0%
- D: Negative cross-match

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF ACUTE KIDNEY INJURY WITH INTRAVENOUS COLISTIMETHATE SODIUM VERSUS INTRAVENOUS AMINOGLYCOSIDES IN ADULTS WITH CYSTIC FIBROSIS

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Cystic fibrosis (CF) is a disease that is associated with a high burden of multi-drug resistant (MDR) bacteria, particularly *Pseudomonas aeruginosa*, which colonizes approximately 80% of adult patients. Colistimethate sodium (CMS) is an antibiotic with activity against MDR gram-negative bacteria; however, its use is limited by nephrotoxicity. The toxicity of CMS has not been extensively studied in the adult CF population. The purpose of this study is to compare the frequency of acute kidney injury (AKI) in adult CF patients receiving CMS to those receiving standard aminoglycoside-based therapy and to identify risk factors for kidney injury in this patient population. This will be a single-center, retrospective, cohort study of patients with CF admitted to Michigan Medicine between 1/1/2008 and 6/30/2018. Patients aged 18 and older with a diagnosis of CF treated with either a beta-lactam and aminoglycoside or a beta-lactam and CMS for > 48 hours will be eligible for inclusion for all qualifying encounters. Patients with baseline serum creatinine (SCr) above 4 mg/dL, those receiving renal replacement therapy, or those with a history of kidney transplantation will be excluded. Data collected will include demographics (age, weight, height, sex, race/ethnicity, diagnosis, illness severity (Charlson Comorbidity Index, APACHE III, mechanical ventilation), laboratory information (SCr, albumin), medication administration data (beta-lactam, aminoglycosides CMS, concomitant nephrotoxic medications), and length of hospitalization. The primary outcome will be the frequency of AKI as defined by the RIFLE criteria. Secondary outcomes will include AKI stage, peak SCr, AKI recovery, and hospital length of stay. Mixed effects modeling will be utilized for analysis of repeated measures, including a linear model for continuous outcomes and a generalized model for binary outcomes.

### Learning Objectives:

Discuss AKI in CF patients treated with CMS compared to aminoglycosides

Describe risk factors for AKI in CF patients treated with CMS or aminoglycosides

### Self Assessment Questions:

What is the most common organism isolated from the respiratory tracts of adult cystic fibrosis patients?

- A: *Staphylococcus aureus*
- B: *Haemophilus influenzae*
- C: *Achromobacter*
- D: *Pseudomonas aeruginosa*

Which of the following is true of cystic fibrosis?

- A: Patients rarely have multiple exposures to drugs like tobramycin
- B: Patients tend to have increased clearance of renally eliminated drugs
- C: Pulmonary exacerbations associated with *Pseudomonas* are typical
- D: The CFTR only affects pulmonary physiology

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT AND IMPLEMENTATION OF PROTOCOLS FOR PHARMACY MANAGEMENT OF TYPE II DIABETES AND HYPERTENSION IN ADULT BEHAVIORAL HEALTH INPATIENTS

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Purpose: Diabetes and hypertension affect millions of people in the United States and are associated with increased cardiovascular risk. With appropriate intervention and monitoring, the risks for complications can be reduced; however, not all patients receive appropriate preventative care and may present after an event has occurred. Patients with co-morbid psychiatric conditions are particularly at risk for having gaps in preventative therapy in addition to suboptimal management of their chronic medical conditions often due to having fragmented medical care. Additionally, psychiatric medications have the potential to worsen hypertension and diabetes control, especially with second generation antipsychotics. The objective of this study is to enhance the management of chronic medical conditions and reduce time constraints on the medical team through the implementation of a pharmacist managed type II diabetes and hypertension service.

Methods: National consensus guidelines were utilized to develop protocols for the management of type II diabetes and hypertension. Additionally, existing protocols for internal medicine clinic pharmacists were referenced while developing these inpatient protocols. Protocols were assessed by hospitalists and medical providers within Gundersen Health System and were approved through Pharmacy and Therapeutics Committee. The electronic medical record was used to identify patients with type II diabetes and/or hypertension admitted to the adult inpatient behavioral health unit for this retrospective review. Data three months prior to implementation and three months post implementation will be collected to assess any changes in guideline adherence in medication regimens upon discharge, the volume of consults placed to a general medicine team for the management of these disease states, the number of interventions made by pharmacists, and the number of patients who met criteria but pharmacy was not consulted for chronic disease management.

Results/Conclusion: Data collection is ongoing. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review current national consensus guideline recommendations for treatment of type II diabetes and hypertension

Discuss the impact of pharmacist interventions on medical conditions in the adult behavioral health unit

### Self Assessment Questions:

In patients with suboptimal diabetes control and cardiac disease, which oral medication class may be the most beneficial addition to therapy?

- A: DPP-4 inhibitors
- B: SGLT-2 inhibitors
- C: Sulfonylureas
- D: Thiazolidinediones

Which of the following is a risk factor that would be an indication for a moderate intensity statin in a patient less than 40 years old with diabetes?

- A: LDL of 93 mg/dL
- B: Hemoglobin A1c >10%
- C: Albuminuria
- D: History of ASCVD

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A STANDARD HYPERTONIC SALINE ADMINISTRATION PROTOCOL FOR CEREBRAL EDEMA

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**Purpose:** To determine the impact of a hypertonic saline administration protocol on time to goal osmolality in patients with cerebral edema. **Methods:** This retrospective study compared patients receiving hypertonic saline independent of a protocol versus patients receiving either 23.4% saline boluses and/or 3% saline continuous infusions according to a standard protocol. Patients receiving 23.4% or 3% saline were selected consecutively and screened for inclusion and exclusion criteria before and after implementation of the protocol. The primary endpoint was time to goal osmolality. Other endpoints related to efficacy and safety were collected. **Preliminary Results:** Thirty-six patients were analyzed, 19 in the pre-protocol and 17 in the post-protocol group. Patients were well matched in relation to indication for hypertonic saline and surgical interventions, however there was a significant difference in GCS between the pre-protocol and post-protocol group (11.6 vs. 8.5;  $p=0.01$ ). A significant difference in the primary outcome of time to goal osmolality was found (68.5 hours vs. 26.4 hours;  $p=0.03$ ). There was also a difference observed in percent of osmolality levels within goal (20.9% vs. 49.9%;  $p=0.01$ ). No significant differences in safety outcomes including AKI (0 vs. 2;  $p=0.22$ ), hypernatremia (2 vs. 3;  $p=0.65$ ), hyperchloremia (1 vs. 4;  $p=0.17$ ) and death (5 vs. 8;  $p=0.2$ ) were seen. **Preliminary Conclusions:** Instituting a hypertonic saline administration protocol for cerebral edema can decrease time to goal osmolality. Finalized results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize To recognize appropriate current treatments for cerebral edema

Identify To identify the benefits of a standard hypertonic saline administration protocol for cerebral edema

### Self Assessment Questions:

Which of these agents is commonly utilized to treat cerebral edema?

- A 5% dextrose in water
- B: Ketorolac
- C: Normal Saline
- D: Hypertonic Saline

What potential benefit of instituting a standard hypertonic saline administration protocol for cerebral edema was observed in this study?

- A Decreased drug costs
- B Decreased mortality
- C Decreased time to goal osmolality
- D Increased physician satisfaction

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## UTILITY OF RAPID CEREBROSPINAL FLUID POLYMERASE CHAIN REACTION TESTING IN GUIDING ANTIMICROBIAL DE-ESCALATION IN CULTURE-NEGATIVE PATIENTS WITH SUSPECTED MENINGITIS OR ENCEPHALITIS

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**Purpose:** Meningitis, which can be caused via bacterial, fungal, or viral pathogens, is associated with high rates of both morbidity and mortality. Acute bacterial meningitis is rare, but symptoms can occur suddenly and escalate quickly, causing blindness, brain damage, hearing loss, and/or death. Viral meningitis, on the other hand, is more prevalent, and often milder and non-fatal. However, distinguishing the type of causative organism is challenging, as patients typically present with comparable symptoms. Using only 0.2 mL of cerebrospinal fluid (CSF), the BioFire polymerase chain reaction (PCR) meningitis/encephalitis (ME) panel can detect, within one hour, 14 of the pathogens most commonly known to cause bacterial, fungal, and viral central nervous system infections. Recent studies have shown that this panel has a sensitivity of 94.2% and a specificity of 99.8%, but there have been few studies evaluating its clinical impact. This study seeks to evaluate the impact of implementing an in-hospital CSF PCR panel on antimicrobial use for culture negative bacterial, fungal, and viral meningitis.

**Methods:** This study is a single-center, retrospective chart review of patients who were suspected to have meningitis, and whose cultures yielded no growth. Patients who were pregnant, prisoners, or under 18 years of age were excluded. The primary objective was to compare days of antimicrobial therapy before and after implementation of the CSF PCR ME panel at Miami Valley Hospital. Secondary objectives include length of stay, time to de-escalation, and agent-specific days of therapy.

**Results/conclusions:** Final results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify common causative pathogens of meningitis and select the most appropriate empiric antimicrobials for the treatment of meningitis/encephalitis based on IDSA Practice Guidelines for the Management of Bacterial Meningitis.

Recognize the potential benefits of implementing a CSF PCR ME panel at a large, in-patient facility.

### Self Assessment Questions:

Which of the following is a common causative pathogen of bacterial meningitis that the PCR panel tests?

- A Enterobacter cloacae
- B: Haemophilus influenzae
- C: Klebsiella pneumoniae
- D: Staphylococcus epidermidis

Which is a potential advantage of implementing a CSF PCR ME panel?

- A Greater antimicrobial costs of therapy
- B Longer hospital length of stay
- C Reduced antimicrobial days of therapy
- D Earlier reporting of susceptibilities

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE INCIDENCE AND OUTCOMES OF HEPATITIS C THROUGH PHARMACIST-LED SCREENINGS IN AN OPIOID-USE DISORDER PROTOCOL PROGRAM

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**Purpose:** The objectives of this study are to 1) evaluate the incidence of hepatitis C among patients in an opioid-use disorder (OUD) protocol through pharmacist-led screenings, and 2) determine if patients who test positive receive treatment from the referred physician. The opioid crisis and increasing rates of injection drug use have led to a Hepatitis C epidemic in Kentucky. Hepatitis C becomes chronic in 75-85% of cases and 10-20% will go on to develop cirrhosis over a period of 20-30 years. Therefore, the CDC recommends regular hepatitis C screening of patients with a history of injection drug use. The recent Kentucky Board of Pharmacy approved OUD naltrexone therapy protocol provides an opportunity for pharmacists to test for hepatitis C while monitoring liver enzymes.

**Methods:** This study has been approved by the Sullivan University Institutional Review Board. Informed written consent will be obtained from each subject prior to the start of the study. Patients who were previously started on the extended-release naltrexone protocol at St. Matthews Community Pharmacy, that have not been tested and/or treated for hepatitis C before will be put into the research group along with new starts of the protocol; if they have been tested/treated, their information will be collected as the control group. Demographic information will be collected from pharmacy intake forms. Patients' lab results for hepatitis C will be sent to the pharmacy. If positive, patients will be referred to a local specialized physician for treatment. A follow-up questionnaire will be given to patients to determine if they were diagnosed and if treatment was initiated. Baseline demographics and results will be analyzed using descriptive statistics and Chi-square/Fisher's exact test as appropriate.

**Results/Conclusions:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify patients who should be screened for hepatitis C  
Discuss appropriate treatment regimens for someone diagnosed with hepatitis C

### Self Assessment Questions:

Which of the following patients should be screened for hepatitis C?  
A A 35 YO male treated for hepatitis C two years ago  
B: A 45 YO female who works as a nurse in an emergency department  
C: A 55 YO female who has injected heroin since her last opioid-use  
D: A 65 YO male who had a negative screen five years ago

What is the correct duration of therapy to treat hepatitis C with glecaprevir/pibrentasvir in a treatment-naive patient without cirrhosis?  
A 6 weeks  
B 8 weeks  
C 12 weeks  
D 24 weeks

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF NEONATAL GENTAMICIN LEVELS WITH MATERNAL HISTORY OF TRADITIONAL VS EXTENDED INTERVAL DOSING OF GENTAMICIN

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**Purpose:** Gentamicin is commonly used to treat bacterial infections in neonates. It is associated with many adverse effects, including nephrotoxicity and ototoxicity. Short courses of gentamicin therapy in healthy newborn infants can lead to auditory or vestibular impairment, which can be permanent. Blood levels should always be monitored as hearing loss is more prevalent in neonates born <32 weeks gestation. Because the half-life of gentamicin in neonates is 5.4-10 hours, once daily administration is recommended to reduce toxicity. The traditional approach for dosing gentamicin in adults involves a weight-based dose divided two to three times daily. In contrast, extended interval gentamicin dosing utilizes a higher weight-based dose at an extended interval, generally every 24 hours. Because aminoglycosides are concentration dependent, larger doses with longer dosing intervals provides the appropriate concentration above the MIC while reducing toxicity. Additionally, approximately 50% of the drug crosses the placenta unchanged. There are few existing studies looking at neonatal gentamicin levels making it difficult to standardize neonatal dosing. Therapeutic drug monitoring in neonates after their mothers' receive a dose of gentamicin can assist in determining an appropriate neonatal gentamicin dosing regimen. The primary objective of this study is to assess gentamicin levels in neonates to determine the optimal dose adjustment, if necessary, in neonates born to moms who received gentamicin within 24 hours of delivery.

**Methods:** This retrospective single-center, chart review assessed gentamicin levels of neonates born to mothers' who received gentamicin according to the pre (traditional) and post (extended-interval) protocol modification. Data was collected using the electronic health record from Northwestern Memorial Hospital from May 2015 through February 2018 encompassing both maternal dosing strategies. Collected data included: time of maternal gentamicin, maternal gentamicin dose, time of first neonatal gentamicin administration, neonatal gentamicin dose, and neonatal gentamicin level.

### Learning Objectives:

Identify toxicities associated with gentamicin use  
Define concerns with gentamicin use in pregnant women

### Self Assessment Questions:

Which of the following is a toxicity associated with gentamicin use?  
A Hepatic dysfunction  
B: Vestibular impairment  
C: Neurotoxicity  
D: Hallucinations

Which of the following is NOT a concern of using gentamicin in pregnant women?  
A The half-life of gentamicin is longer in neonates than in adults  
B 50% of the administered gentamicin dose crosses the placenta un  
C Aminoglycosides are concentration dependent drugs which allows  
D Toxicities are seen most frequently in neonates receiving gentamicin

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A PILOT EVALUATION OF POST-OPERATIVE PAIN MANAGEMENT IN ELECTIVE TOTAL JOINT REPLACEMENT PATIENTS AND IMPLEMENTATION OF AN OPIOID DISPOSAL SYSTEM

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The 2018 Annual Surveillance Report of Drug-Related Risks and Outcomes by the Centers for Disease Control (CDC) showed that 17.4% of the population in the United States filled at least one opioid medication in 2017. The CDC opioid epidemic data from 2017 showed that Vanderburgh County, where St. Vincent Evansville is located, is one of the top three prescribing counties of opioids in Indiana. The objectives of this study are to evaluate post-operative pain management in elective total joint replacement and give patients a safe way to dispose of unused opioids. A retrospective chart review to obtain baseline prescribing and patient characteristics will occur. Deterra Drug Deactivating System will be the disposal system utilized. Adult patients will be identified for inclusion via the electronic medical record. A visit between the resident and patients during Joint Camps on the orthopedic floor will occur, and a flier with a survey link and information regarding the study will be given. Patients will receive their disposal bag during this timeframe. Patients will be informed they will be receiving a phone call at 7-10 days post discharge. The purpose of the follow up will be to evaluate the patients' pain management, opioid use, and therapy attendance. After three attempts made for follow up, a value of lost to follow up will be documented. Variables to be included for analysis are: patient age, gender, physician name, opioid name, quantity prescribed, amount used in 7-10 days, and the amount remaining on the destruction date. The final piece of patient participation will be when the disposal bag is used. The survey link will answer the following questions: the date their unused opioid medication is destroyed, the number of tablets destroyed, and the date of their surgery. Results will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize current post-operative pain management practices in elective total joint replacement patients in Vanderburgh County.

Recall how to use Deterra Drug Deactivating System

### Self Assessment Questions:

How does Deterra Drug Deactivating System work?

- A: Makes the medication inside the bag less desirable
- B: Irreversibly deactivates the medication, rendering them inert
- C: Emulsifies medications placed in the bag
- D: Allows patients to mail in their unused medication to a destruction

In relation to Indiana as a state, where does Vanderburgh County fit into the overall prescribing of opioids?

- A: Number ten
- B: Number one
- C: One of the top three
- D: Low prescribing of opioids

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT OF AN ORDER COMPLEXITY SCORE USING MACHINE LEARNING

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Purpose: Pharmacy productivity metrics are important for benchmarking and workload assessment. Pharmacy-specific metrics, both clinical and operational, can be used to assess pharmacist's workload, including verified orders per hour, doses dispensed, and intervention scores. However, orders vary greatly in their complexity and counting these activities as equal from order to order is insufficient to determine the analysis needed to address these orders. The goal of this study is to develop and implement an order complexity scoring model for inpatient orders at Cleveland Clinic Main Campus. Methods: A single-center retrospective order review will be conducted for all verified inpatient orders within a one month period between September 1, 2018 and September 30, 2018. Pharmacists were surveyed to determine order characteristics. The following characteristics will be collected: patient age, weight, renal function, comorbid conditions, use of patient supply, allergies, use of prior to admission list, order set use, type of order, order entry type, ordering provider, drug-drug interactions, route of administration, order frequency, duration of therapy, therapeutic monitoring, renal dosing, medication cost, dispense location, patient location, medication therapeutic class, REMs status, medication formulary restrictions, duplicate orders, and pregnancy category. A logarithmic regression analysis using machine learning methods will compare the characteristics. Reference values will then be used to include or exclude characteristics from final analysis based on if they contribute to the orders complexity or not. Included characteristics will then be assigned an individual complexity weight. Using the weights assigned, a relative value will be calculated for each order. Reference values that will be used include documented clinical interventions, drug expense, and outcomes from other productivity studies. The data will be utilized to assess the productivity and workload of pharmacists, shift groups, and hospitals. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List characteristics of orders that contribute to their complexity

Identify weight that characteristics have on order complexity

### Self Assessment Questions:

What is the importance of identifying the complexity of orders?

- A: Ability to compare pharmacist to pharmacist productivity
- B: Cost reduction opportunities
- C: Formulary evaluation
- D: Operational optimization

What is a characteristic that was considered possibly complex based on expert opinion?

- A: Pill shape
- B: Refrigeration requirements
- C: Therapeutic drug monitoring
- D: Drug manufacturer

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE EFFECT ON IMPLEMENTING AN OPIOID DISCHARGE PRESCRIPTION STEWARDSHIP

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**Purpose:** The opioid epidemic has become a major concern within the United States. More than 115 people die every day due to overdosing on opioids. Prescription pain medications are included within the group of opioids that are commonly misused. The prescription abuse has been associated with the over prescribing of pain medications due to lack of addictive potential information back in the 1990s. The objective of this study is to review opioid discharge prescriptions during a three-month period to determine the appropriateness of the prescription compared to guidelines, then reassess opioid discharge prescribing following opioid stewardship implementation.

**Methods:** This study is a retrospective, electronic chart review of patient who received opioid prescriptions upon discharge from the emergency department (ED), outpatient surgery, and inpatient units from May 2018 to July 2018. The following data was collected: location (ED, outpatient surgery, inpatient (surgical/nonsurgical)), weight, age, gender, admission diagnosis, discharge diagnosis, discharge prescription drug, discharge prescription drug dose, discharge prescription dispensed quantity, discharge prescription medication directions, inpatient prescription drug, inpatient prescription drug dose, inpatient pain level, home prescription opioid use, home prescription drug, home prescription drug dose, and home prescription directions. The data was compared to current recommendations of a three-day opioid supply law for acute pain, current post-surgical guideline recommendations, and morphine milligram equivalents for cases with no guideline recommendations. The initial data was reviewed with the hospital's BOSE committee to assess current opioid prescribing upon discharge and discuss with providers. A reanalysis of the data will be collected for December 2018 to assess any changes prior to a hospital wide opioid stewardship initiative implementation. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review Review the literature and current guidelines on appropriate opioid discharge prescribing  
Discuss Discuss a multidisciplinary approach to address over prescribing of opioids and the impact pharmacists can have to reduce diversion

### Self Assessment Questions:

Which of the following interventions can be completed by a hospital to assist in reduction of opioid prescribing?

- A Limit the day supply of opioids prescriptions
- B: Counsel patients on the appropriate use of pain medication
- C: Monitor a patient's opioid use while inpatient
- D: All the above

Morphine milligram equivalents are used to assess the patient's risk of opioid overdosing, which value of MME/day puts the patient at an doubled increased risk of overdosing?

- A 10MME/day
- B 30MME/day
- C 40MME/day
- D 50MME/day

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## AN EVALUATION OF THE METHODS IMPLEMENTED BY OUTPATIENT PROVIDERS TO DISCONTINUE BENZODIAZEPINE THERAPY IN PATIENTS ON CONCURRENT OPIOIDS

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With the implementation of a new policy aimed at decreasing the prevalence of opioid and benzodiazepine co-prescribing, it would be noteworthy to see how benzodiazepine discontinuation was approached by physicians. Additionally, there is a focus on reducing benzodiazepine use in high-risk populations; therefore, the objective of this quality improvement project aims to establish common methods used in discontinuation of benzodiazepines and to assess the appropriateness of the taper strategy used. The hope is to find potential areas where additional provider education may be warranted in order to promote safe and more effective benzodiazepine discontinuation for future initiatives. This is a retrospective, single-center, quality improvement project. Data will be extracted from the Computerized Patient Record System (CPRS) and from the national Opioid Safety Initiative dashboard. The dashboard report will identify patients who have been on both opioids and benzodiazepines for greater than three days and initiated on a taper of either the opioid or the benzodiazepine. Data collected will be used to assess the duration of taper commonly used. The following data will be collected: patient age; medication chosen to be discontinued; duration of taper chosen by provider; presence of an antidepressant prior to taper; whether an antidepressant was initiated at the time of taper; benzodiazepine indication; whether the patient had a history of a substance use disorder; length of time on the benzodiazepine prior to taper initiation; whether the discontinuation failed, succeeded or still ongoing; and presence of post-traumatic stress disorder, dementia, or traumatic brain injury. Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize the risks and potential consequences associated with benzodiazepine use  
Identify potential areas of improvement with regards to benzodiazepine tapering

### Self Assessment Questions:

Which comorbid conditions increase risks associated with benzodiazepine use

- A PTSD, Substance use disorders, Catatonia
- B: Panic disorders, Dementia, Catatonia
- C: Panic disorders, PTSD, Dementia
- D: PTSD, Substance use disorders, Dementia

Based on The Substance Abuse and Mental Health Services Administration (SAMHSA) TIP 45 protocol for the Detoxification and Substance Abuse Treatment, benzodiazepines should be tapered

- A Regardless of dose and duration
- B Regardless of dose and duration unless the medication was used
- C When prescriptions are written only as scheduled doses and not P
- D When switching between benzodiazepines

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PHARMACIST INVOLVEMENT IN OUTPATIENT TRANSITIONAL CARE MANAGEMENT

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**Purpose:** The annual expenditure for hospital readmissions is estimated to be \$41 billion which is a significant healthcare burden. However, studies have shown a decrease in hospital readmission rates with provision of Transitional Care Management (TCM). TCM is a group of services provided to ensure coordination and reduce gaps in care when a patient discharges from an acute care setting and returns to a community setting. TCM services are reimbursable and have three required components: an interactive contact, certain non-face-to-face services, and a face-to-face visit with a physician or midlevel provider. Additional analyses of TCM services have demonstrated a further decrease in unplanned hospital utilization when involving a pharmacist in TCM. At the time of this study's initiation, Parkview Health had two primary care offices providing TCM services, one with and one without pharmacy involvement.

**Methods:** This retrospective quality improvement study includes adult patients discharged from the hospital and contacted to receive TCM services between October 2018 and January 2019 at both primary care offices. Patients at highest risk for readmission based on the MEDCOINS score, a readmission predictive tool based on medication count, comorbidity count, and health insurance status at discharge, were included in the study. Demographic and clinical data will be collected for assessment of the effectiveness of pharmacist involvement in TCM. Outcome measures include the number of hospital readmissions and emergency department utilizations, number and type of pharmacist interventions, fulfillment of required components of TCM, and billing code used. The incidence of these outcomes will be compared between the cohort of patients receiving TCM services involving a pharmacist and the cohort of patients receiving TCM services without a pharmacist.

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

### Learning Objectives:

Describe the impact of providing Transitional Care Management (TCM) services.

Identify the required components of Transitional Care Management (TCM).

### Self Assessment Questions:

Which of the following is a potential benefit of providing Transitional Care Management (TCM) services as demonstrated in previous studies?

- A Increased hospital readmission rates
- B: Increased pharmacist workload
- C: Decreased hospital readmission rates
- D: Decreased patient satisfaction

Which of the following is a required component of Transitional Care Management (TCM) in order to obtain reimbursement?

- A A face-to-face visit with a pharmacist
- B A face-to-face visit with a physician or midlevel provider
- C A face-to-face visit with a registered nurse
- D A non-face-to-face visit with a physician or midlevel provider

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING DIAGNOSES AND TREATMENTS OF URINARY TRACT INFECTIONS AT A COMMUNITY TEACHING HOSPITAL EMERGENCY DEPARTMENT

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**Purpose:** Urinary tract infections (UTIs) are a common diagnosis in emergency departments (EDs). Over-diagnosis of UTIs in EDs leads to unnecessary antibiotic use which can increase risk of antibiotic resistance and Clostridium difficile infection. Objectives of this study include evaluating the use of urine studies, such as urinalysis (UA) and urine cultures, and clinical symptoms described by ED providers for UTI diagnosis and treatment. Based on findings, in-services will be provided to ED patient care team to improve quality of UTI management, including limiting asymptomatic bacteriuria treatment, contacting patients with negative cultures for potential antibiotic discontinuation, and establishing an ED UTI management guideline.

**Methods:** This Institutional Review Board approved retrospective study evaluated pediatric and adult patients seen at a community hospital ED from July 1- 31, 2018 who had a urinalysis performed. Patients admitted to the hospital were excluded from this study. The primary outcome assessed the correlation among documented clinical symptoms, abnormal UA, positive urine culture, and UTI diagnosis. Secondary outcomes included number of urine studies ordered, days of unnecessary antibiotic exposure defined by date of negative urine culture result, 14 day readmission, most common antibiotics prescribed, most common organisms cultured, and number of patients treated for asymptomatic bacteriuria.

### Results:

Of 518 patients who had a UA performed, 146 (28.2%) received a UTI diagnosis, of whom 49 (33.0%) had no documented urinary symptoms. / total of 111 (76.0%) patients diagnosed with UTI had a urine culture performed, and 61 (55.0%) of the cultures were negative, which resulted in 331 days of unnecessary antibiotic exposure. The most common prescribed antibiotic was cephalexin (76/146 (52.0%)) followed by nitrofurantoin (26/146 (17.8%)). The most common organism grown was Escherichia coli (32/73 (43.8%)) followed by Streptococcus agalactiae (11/73 (15.0%)).

### Conclusions:

Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review antibiotic treatment guidelines for patients diagnosed with urinary tract infections.

Discuss strategies to reduce unnecessary antibiotic exposure in patients with suspected urinary tract infections.

### Self Assessment Questions:

1. According to the Infectious Diseases Society of America guidelines, which first line empiric antibiotic regimen is recommended for a patient with acute uncomplicated cystitis?

- A Nitrofurantoin monohydrate/macrocrystals 100mg orally twice daily
- B: Ciprofloxacin 250mg orally twice daily for 3 days
- C: Trimethoprim- sulfamethoxazole 160/800mg orally twice daily for 1
- D: Fosfomycin 3g orally once daily for 3 days

Which patient should receive antibiotic treatment for a UTI?

- A 25 year old pregnant female who presents with nausea and has a
- B 33 year old female with history of hypothyroidism who presents with
- C 54 year old male with history of hypertension and diabetes who presents
- D 65 year old female with chronic catheter who presents with foley r

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **FAST TRACK – THE RACE TO ADVANCED PREPARATION OF CHEMOTHERAPY INFUSIONS**

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**Purpose:** Reducing infusion wait times continues to remain an opportunity to improve the patient experience and clinic throughput at UW Health's Carbone Cancer Center and 1 South Park Cancer Clinic. The fast track program, which is the advanced preparation of chemotherapy infusions, was established 6 years ago to encourage patients to have labs completed the day prior so medications could be released, verified and made in advance of their arrival. However, as chemotherapy medications became costlier the program became unsustainable. Patients whose appointments were cancelled, changed and/or had therapy modifications were incurring medication waste. The purpose of this project was to revise and redefine the fast track program to increase the number of fast track products prepared in advance while ensuring that medication waste was eliminated.

**Methods:** An interdisciplinary workgroup was established consisting of pharmacy managers, oncology pharmacists and nursing managers. Clinic and pharmacy workflows were evaluated and standardized across sites to ensure compliance with patient inclusion in the program. A patient call-ahead program was implemented to ensure costlier drugs were not being prepared until the patient was coming to their appointment.

**Preliminary Results:** Prior to revising the program 20 products were fast tracked on average per day, and only 53% of those were prepared prior to the patients' appointment time. Furthermore, \$6500/month in waste was incurred at 1 South Park Cancer Clinic. Post-implementation results will be shared at the Great Lakes Residency Conference.

**Conclusion:** The project is expected to have a positive impact on the number of products that are prepared prior to the patient appointment time while minimizing medication waste. Future steps for this project will examine the impact of these interventions and expand the patient call ahead program to all oncology clinics.

### **Learning Objectives:**

List the proposed benefits of preparing product in advance of the patient appointment

Review outcomes associated with a fast track and call ahead program at an oncology cancer clinic

### **Self Assessment Questions:**

Which of the following is a proposed benefit of preparing product in advance of the patient appointment?

- A Reduce drug waste
- B: Increase the total number of oncology preparations made per day
- C: Improve timely delivery of oncology preparations
- D: A and B

What metrics are associated with implementing a fast track and call ahead program at an oncology cancer clinic?

- A Drug waste
- B Increase in number of products prepared prior to appointment time
- C Number of patient appointments
- D A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **EFFECT OF FECAL MICROBIOTA TRANSPLANTATION IN PATIENTS WITH RECURRENT CLOSTRIDIODES DIFFICILE INFECTION COMPARED TO STANDARD ANTIBIOTIC TREATMENT REGIMENS**

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**Purpose:** Clostridioides difficile is a Gram-positive, spore-forming, toxin-producing anaerobe, and a common nosocomial pathogen. After the first episode of Clostridioides difficile infection (CDI), up to 30% of patients develop at least one recurrent episode. Current guidelines recommend antibiotic treatment for at least two recurrences prior to offering fecal microbiota transplantation (FMT) in the treatment of recurrent CDI (rCDI). FMT has shown a high degree of success in correction of intestinal dysbiosis and is generally well accepted and safe, even in immunocompromised patients. The purpose of this study is to compare clinical outcomes of rCDI treated with standard antibiotic regimens and FMT.

**Methods:** This is a retrospective, observational, single-center study. The electronic medical record system will be utilized to identify patients treated for CDI between September 2015 and June 2018. Demographic and clinical data will be collected to determine baseline characteristics, treatment modality, and number of recurrences at initial presentation and at each encounter thereafter. The two study groups will be patients that received antibiotic treatment for rCDI and those that received FMT for rCDI. Inclusion criteria will include patients age 18 years and older with two or more documented recurrences of CDI. Exclusion criteria will include patients with inflammatory bowel disease or chronic diarrheal disorder. The primary outcome measure will be maintenance of symptom resolution at four weeks. Secondary outcome measures will include adverse events associated with treatment, cost-effectiveness, requirement of further anti-CDI treatment, and all-cause mortality. Information to determine outcomes will be retrieved from progress notes and pertinent lab results in the electronic medical record.

**Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Review the updated guidelines for treatment of Clostridioides difficile infection and the risk for recurrence.

Discuss the current literature regarding fecal microbiota transplantation in the setting of recurrent Clostridioides difficile infection.

### **Self Assessment Questions:**

Which of the following antibiotics has proven efficacy in the treatment of Clostridioides difficile infection?

- A Tigecycline
- B: Rifaximin
- C: Vancomycin
- D: Nitazoxanide

According to the current IDSA guidelines, when is fecal microbiota transplantation recommended for the treatment of Clostridioides difficile infection (CDI)?

- A First episode of CDI
- B First recurrence of CDI
- C For severe CDI only
- D Third recurrence of CDI after appropriate antibiotic treatments have failed

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPLEMENTATION OF OVERNIGHT REMOTE PHARMACY SERVICES AND THE EFFECT ON PATIENT SAFETY AND STAFF SATISFACTION IN A SMALL HOSPITAL SETTING

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**Purpose:** Pharmacists are valued members of the healthcare team with expertise in managing the ever-growing number of available medications and increasing complexity of drug regimens to contribute to the overall health of patients. Multiple studies have shown the positive impact that pharmacists have in reducing the severity and preventing medication errors, increasing patient safety and improving overall patient care delivered in inpatient settings. For these reasons, the American Society of Health-System Pharmacists (ASHP) recommends implementation of 24-hour pharmacy services when possible. This level of pharmacy service is not feasible for all institutions. Smaller hospitals may lack the financial and human resources to provide pharmacist staffing during the overnight hours. Highpoint Health is a 62-bed institution without 24-hour pharmacist coverage. The goal of this study is to implement overnight pharmacist coverage utilizing a contracted remote pharmacy service while measuring patient impact through pharmacist interventions, staff utilization, and medication errors. **Methods:** A comprehensive review of available options to support 24-hour pharmacist coverage was completed. A remote pharmacy service was chosen and implemented at Highpoint Health. Baseline patient impact data points were gathered through a retrospective chart review of medication errors and surveys completed by clinical supervisors. Pharmacists supplied from the contracted service provider assumed the normal duties that Highpoint Health pharmacists provide, including handling medication orders, answering nursing and physician questions and providing physician drug consults from 2300 to 0730 daily. A prospective review of medication orders, pharmacist interventions, medication errors, and staff utilization was completed. **Results and Conclusion:** To be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Outline the benefits of implementing a remote pharmacy service

Describe the roles of overnight remote pharmacy pharmacists

### Self Assessment Questions:

Which of the following defines category C in the NCC MERP index for classifying medication errors?

- A: An error occurred that may have contributed to or resulted in perm
- B: An error occurred but the error did not reach the patient
- C: An error occurred that reached the patient but did not cause patier
- D: An error occurred that may have contributed to or resulted in temp

Which of the following is a benefit to implementing remote pharmacy services?

- A: Hospital staff have 24 hours of access to pharmacists
- B: Medications are brought to the floor as needed
- C: Medications are reviewed by pharmacists 24 hours a day
- D: A and C

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT ON PATIENT CARE ACCESS THROUGH CONVERSION OF PRIMARY CARE PROVIDER APPOINTMENTS TO CLINICAL PHARMACIST APPOINTMENTS

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Clinical pharmacy specialists are advanced practice providers able to provide comprehensive medication management within a scope of practice throughout the VA. Within primary care, clinical pharmacy specialists collaborate with primary care providers to manage chronic disease states. A VA primary care provider with 1,200 patients has sufficient availability to see each Veteran 2.5 times annually on average. Limited access may prevent Veterans from obtaining timely care. The objective of this quality improvement project is to open provider access at Robley Rex VA Medical Center by converting appointments from physicians to pharmacists. This promotes pharmacist utilization to help improve patient care and frees physicians to address more acute needs. Conversion of appointments from physicians to pharmacists occurred at three Robley Rex VA outpatient clinics, with one pharmacist at each clinic assigned to receive appointment conversions from one clinic physician. From October 2018 through March 2019, each clinic underwent project implementation for two consecutive months. Prior to implementation, the pharmacy resident reviewed return-to-clinic orders and physician notes to identify patients that were scheduled for a follow-up visit pertaining to chronic disease state management. A medical support assistant contacted eligible patients and rescheduled their physician appointments as pharmacist appointments if the patients consented. A pharmacy resident recorded details of completed appointments in the data collection tool spreadsheet and analyzed metrics associated with project endpoints. Primary endpoints were provider minutes saved and number of slots opened for provider appointments. Secondary endpoints included pharmacist appointments conducted, appointments converted for each indication, face-to-face vs. telephone appointments, and pharmacist clinical interventions. Indications appropriate for conversion included hypertension, hyperlipidemia, diabetes, smoking cessation, and an "other" category: asthma, chronic obstructive pulmonary disease, benign prostatic hyperplasia, heart failure, gout, thyroid disease, and vitamin D deficiency. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify Identify patient populations who would benefit from appointment conversion from primary care providers to clinical pharmacy specialists  
Discuss Discuss the possible impact of converting primary care provider appointments to clinical pharmacy specialist appointments on patient care access

### Self Assessment Questions:

Converting patient appointments from primary care providers to clinical pharmacy specialists for chronic disease state management is most likely to result in which of the following?

- A: Decreased time for primary care providers to address acute patien
- B: Increased primary care provider revisit interval
- C: Increased patient access to timely care
- D: Decreased likelihood that patients will achieve individualized chror

A patient would most likely benefit from appointment conversion to the clinical pharmacy specialist if they were scheduled to see their primary care provider for which of the following?

- A: Ear ache
- B: Copd
- C: Acute upper respiratory tract infection
- D: Annual wellness visit

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL INPATIENT PHARMACY DASHBOARD AND PHARMACY ACCOUNTABILITY MEASURES: USE OF CLINICAL DATA AND CREATION OF PHARMACY SENSITIVE MEASURES

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### Purpose:

Currently, there are no nationally accepted pharmacy quality measures nor a national database to measure or benchmark pharmacist clinical services. As inpatient pharmacist time is increasingly spent on clinical activities, a set of pharmacy sensitive measures is essential to demonstrate the impact of clinical pharmacy services on patient care outcomes. The primary objective of this project is to demonstrate the value of clinical pharmacy services locally and nationally through the creation of a dashboard and national benchmarking database.

### Methods:

Current pharmacy quality measures were evaluated through a multi-center Vizient survey, literature search, and individual interviews with organizations utilizing established clinical dashboards. A steering committee selected the use of the Donabedian model as the framework for organizing measures and refining dashboard development. Sub-committees in each clinical specialty provided expertise on selection of quality measures to include based on defined criteria. Collaboration with the ASHP Pharmacy Accountability Measures (PAM) workgroup established the potential to include their endorsed quality measures. After the collated outcome measures were selected, the therapeutic sub-committees was tasked to develop process measures while the steering committee evaluated structure measures. An informatics sub-committee was tasked with establishing a collection process for the final resulting measures. Once an internal dashboard is operational, the future partnership with the ASHP-PAM workgroup will result in the establishment of a national database of pharmacy quality measures.

### Preliminary Results:

Of the initial 104 research-based measures and 28 ASHP-PAM endorsed outcome measures, the final composite review resulted in 32 outcome measures. The proposed dashboard contains the 32 outcome measures along with 23 process and 25 structure measures.

### Conclusions:

Pharmacy sensitive measures and clinical outcomes data are able to be refined to a focused set salient to measuring and benchmarking pharmacist clinical services. These metrics will demonstrate the value of clinical pharmacy services locally and nationally.

### Learning Objectives:

Outline a process to identify measures in collaboration with organization (ex. ASHP-PAM)

Explain the advantages of utilizing the Donabedian model for performance improvement

### Self Assessment Questions:

Utilizing an endorsed measure such as those from ASHP-PAM enhances outcome measures for a clinical dashboard in the following ways EXCEPT?

- A Provides a baseline to build upon
- B: Comprehensive of pharmacy services
- C: Creates interoperability among various institutions
- D: Aids in compliance with best practice care guidelines

2.If the Donabedian model is used as an outline for a dashboard what measures would fall into the structure category?

- A Pharmacists FTE dedicated to Antimicrobial Stewardship Program
- B Incidence of hypoglycemic events
- C Number (or proportion) of ischemic heart disease patients who rec
- D Percent of warfarin patients with pharmacy consults

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OUTCOMES IN PATIENTS WITH INJECTION DRUG USE WITH DEEP SEATED INFECTIONS IN A COMMUNITY TEACHING HOSPITAL: A RETROSPECTIVE ANALYSIS

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Purpose: Injection drug users (IDU) are susceptible to a variety of invasive infections such as bacteremia, endocarditis, osteomyelitis, and septic arthritis; these deep-seated infections generally require prolonged courses of intravenous antibiotic therapy. Safety concerns often preclude the use of outpatient parenteral antibiotic therapy with a central line in the IDU population. As a result, other treatment strategies must be utilized; these strategies have been associated with increased healthcare costs and higher rates of treatment failure. This retrospective analysis aims to characterize patient outcomes and healthcare costs associated with IDU with deep-seated infections treated at Munson Medical Center over a five-year period.

Methods: This study will be submitted to the Institutional Review Board for approval. Eligible patients will be identified by cross-referencing patients with an infectious disease consult with patients with one of the prespecified ICD-9 and ICD-10 codes for substance abuse. Data to be collected includes demographic information, infectious diagnosis, organism(s) isolated, antibiotic(s) prescribed, days of therapy, length of stay, discharge location, presence of noncompliant behavior, cost of hospitalization, and cost of antibiotic therapy. The primary outcome will be a composite of 90-day all-cause readmission, 90-day microbiological failure, in-hospital mortality, and 90-day all-cause mortality. Secondary outcomes will include direct cost of inpatient hospital stay, direct cost of antibiotic therapy, length of stay, and percent of patients who receive guideline-preferred therapy. Additionally, regression models will be used to determine factors associated with the primary outcome; factors to be assessed include length of stay, presence of psychiatric comorbidities, type of substance abuse, and viral co-infection. Appropriate statistical tests will be chosen for data analysis.

Results/Conclusions: Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify concerns associated with treatment of deep-seated infections in patients with injection drug use.

Recognize evolving strategies for management of deep-seated infection in patients with injection drug use.

### Self Assessment Questions:

Given concerns associated with treatment of deep-seated infections in patients with injection drug use, which of the following treatment strategies do physicians report using the least?

- A Administering entire course of parenteral antimicrobial therapy on
- B: Completing treatment with parenteral therapy administered in a su
- C: Completing treatment with outpatient parenteral antimicrobial ther
- D: Completing treatment with highly bioavailable oral agents

Which of the following medications is of interest for the treatment of deep-seated infections in patients with injection drug use due to its long half-life?

- A Doripenem
- B Dalbavancin
- C Daptomycin
- D Doxycycline

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMAL ANTIBIOTIC DURATION FOR NECROTIZING FASCIITIS

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**Purpose:** The typical treatment for necrotizing fasciitis (NF) includes prompt surgical consultation and debridement, broad spectrum empiric antibiotic treatment, aggressive fluid repletion, wound care, pain control and hemodynamic support. NF treatment is comprised of antimicrobial therapy and source control through surgical debridement. Despite these interventions, mortality rates for NF remain high. Current Infectious Disease Society of America Guidelines do not specify an exact duration of antimicrobial therapy. In the absence of definitive clinical trials, the guidelines recommend antibiotic treatment until further debridement is no longer necessary, the patient has improved clinically, and has been afebrile for 48-72 hours. Some potential risks to patients from unnecessary antibiotic use include acute kidney injury, clostridium difficile colitis, and antimicrobial resistance. The primary objective of this study is to investigate the optimal duration of antibiotic therapy after source control needed in patients with NF.

**Methods:** This study is a retrospective chart review of all adult patients who were admitted to Loyola University Medical Center between July 2008 and July 2018 for management of NF and received treatment with appropriate antibiotics. Patients were identified using ICD-9-CM and ICD 10 codes and a database of patient admissions maintained by the burn unit. The time eligible for antibiotic discontinuation will be defined as afebrile for at least 72 hours after the final debridement and hemodynamically stable. The primary endpoint for this study will be in-hospital mortality. Baseline characteristics will be analyzed using descriptive statistics. Statistical analysis for the data collected will be a non-inferiority analysis with intention to treat and a pre-specified clinically acceptable difference in the primary outcome of 5%. Results will be analyzed using a calculation of 95% confidence interval for mean or median differences between groups for each endpoint.

Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize components of treatment in the management of necrotizing fasciitis.

Describe the current recommendations for antibiotic therapy length.

### Self Assessment Questions:

1. Per current guideline recommendations for necrotizing fasciitis, antimicrobial therapy should be administered until further debridement is no longer necessary, the patient has improved clinically,

- A: 24 hours
- B: 48-72 hours
- C: 5 days
- D: 7-10 days

Which of the following statements is correct regarding appropriate management of necrotizing fasciitis?

- A: Prompt surgical debridement should occur emergently
- B: There is no need to obtain samples during surgical debridement
- C: Wounds are typically painless and do not require treatment with ar
- D: Broad spectrum empiric antibiotics are not necessary for the treat

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## REFRAMING ACUTE PAIN MANAGEMENT IN AN ACUTE GENERAL SURGERY POPULATION: A LOOK BEFORE AND AFTER OHIO'S GUIDELINE FOR ACUTE PAIN MANAGEMENT AND A MODIFIED ENHANCED RECOVERY INITIATIVE

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The misuse, abuse, and addiction to opioids is a serious national crisis that affects millions across the country. There is increasing evidence that prescribers are partly responsible for the opioid crisis due to overprescribing. Surgeons specifically have been subject to scrutiny as adequate treatment of post-surgical pain is poorly defined. Historically, opioids have been the primary analgesic treatment for patients experiencing acute postoperative pain. Now, combinations of non-narcotic methods of pain control has emerged as an effective and safe alternative and has repeatedly shown in the literature to reduce the need for postoperative narcotics. In addition to increasing multi-modal pain therapy to help reduce opioid prescribing, traditional surgical practices have been re-examined to utilize enhanced recovery after surgery (ERAS) protocols. Many initiatives have been instituted throughout our large, academic medical center to combat opioid abuse, including an ERAS protocol initiative and a Surgeon/Pharmacist Opioid Reduction Initiative. **Methods:** This study is a single-center, retrospective, and observational cohort analysis of acute surgical patients. The primary objective of this study is to compare inpatient opioid prescribing in patients undergoing acute surgical procedures before and after implementation of the Ohio Acute Pain Prescribing Guideline and hospital-wide education movements at the Ohio State University Wexner Medical Center (OSUWMC). Eligible patients are those admitted to the Acute General Surgery Service between January 1st, 2014 through December 31st, 2014; January 1st, 2017 through December 31, 2017. **Results/Conclusions:** One-hundred and eighty-four patients were included in this study. During the pre-opioid initiative group, total oral morphine equivalents (OME) prescribed 24 hours prior to discharge were 91 compared to 73 in the post-opioid initiative group. The average OME prescribed at discharge was 675 in the pre-opioid initiative group vs 486 in the post-opioid initiative group. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the current opioid epidemic and its relationship to overprescribing of opioids by health-care providers.

Recognize inpatient strategies to reduce opioid prescribing during admission and at discharge.

### Self Assessment Questions:

Which of the following may help to combat opioid reduction in an inpatient setting?

- A: Utilizing intravenous opioids as first-line agents for moderate pain
- B: Refraining from prescribing oral opioids upon discharge even if the
- C: Employing the use of multi-modal pain therapy during admission a
- D: None of the above

Which of the following are proposed benefits of a modified enhanced recovery after surgery (ERAS) initiative?

- A: Increase in post-operative pain control with a reduction in opioid pi
- B: Increase use of multi-modal pain therapy
- C: Increase in post-operative patient functionality
- D: All of the above

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF PROPORTION OF DAYS COVERED IN PATIENTS USING 28-DAY ADHERENCE PACKAGING VERSUS STANDARD PACKAGING WITH 90-DAY SUPPLY

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### Purpose:

Medication adherence is important for improving health outcomes and reaching health outcome goals. Many barriers exist for patients that inhibit their ability to adhere to medication regimens. Several approaches are currently used to improve medication adherence. One commonly utilized approach includes dispensing of 90-day supplies in standard packaging. Compliance packaging such as Timely Meds, is a medication adherence service that utilizes 28-day supplies of medications dispensed in personalized blister packaging. Results will be used to compare the impact of two adherence solutions that have both demonstrated efficacy in improving proportions of days covered (PDC) levels. The study will determine if 28-day adherence packaging with the Timely Meds program is non-inferior to the standard of care 90-day packaging.

### Methods:

Refill history data will be obtained and assessed from pharmacy records from SpartanNash retail pharmacies operating in Michigan. Data will be collected from patients enrolled in Timely Meds and patients receiving standard 90-day packaging. Patient inclusion criteria is five or more chronic solid oral medications excluding controlled substances, as needed medications, and hazardous medications such as warfarin and oncology treatments. Groups will be matched for demographics. Study timeframe will include patients in Timely Meds or on 90-day supply prescriptions between July 31, 2018 and January 31, 2019 who have received at least 1 refill within the study period. Following the study timeframe, a retrospective cohort analysis will be conducted assessing patient refill history data and calculating a proportion of days covered (PDC) score for each patient. Aggregate PDC data will be compared between Timely Meds and standard 90-day packaging groups.

### Results/Conclusions:

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

### Learning Objectives:

Outline the importance of involvement of the pharmacy team in improving medication adherence.

Review the comparative effectiveness of Timely Meds versus standard 90-day packaging.

### Self Assessment Questions:

Why should the pharmacy team be directly involved in improving medication adherence?

- A Experts in medication knowledge which could help decrease errors
- B Ability to keep track of medication consumption and disposal through
- C Ability to contact patients due to more time and resources in the pharmacy
- D Utilization of pharmacy staff such as technicians to consult patient

Which of the following is a disadvantage of 90-day packaging?

- A Decreases adherence due to more barriers and confusion from frequent
- B Increases medication confusion due to more telephone calls from
- C Increases confusion and over-supply due to medication changes over
- D Increases overall costs of medications which decreases medication

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A RETROSPECTIVE ANALYSIS OF LONG-TERM LINEZOLID USAGE AND OUTCOMES IN THE TREATMENT OF STAPHYLOCOCCAL INFECTIONS

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### Purpose:

Over the years, the rates of bacterial resistance and use of more broad-spectrum and less desirable antibiotics have become increasingly more common. In a variety of Staphylococcal infections, patients have been requiring long-term treatment with intravenous antibiotics and resistance to mainstay treatment options has been emerging. With the inconvenience of intravenous therapy and the emergence of resistance, there has been a growing need for alternative agents in the treatment of Staphylococcal infections. Since October, 2013, Bronson Healthcare Group has been utilizing linezolid for the treatment of a variety of Staphylococcal infections that require greater than 14 days of therapy, in patients which linezolid is a more appropriate treatment option than vancomycin. The purpose of this study is to determine if linezolid is a safe and effective alternative to vancomycin for long-term treatment of Staphylococcal infections so patients can receive a more convenient, effective treatment option.

### Methods:

Data was collected retrospectively from a single-center electronic medical record database. Patients were included if they were at least 18 years of age and received treatment for a Staphylococcal infection with either linezolid or vancomycin for greater than 14 total days of therapy. Patients were excluded if they were less than 18 years of age or if the subject was pregnant. The primary efficacy outcome of the study was treatment failure. Secondary efficacy outcomes included mortality within 30 or 60 days of therapy and hospital length of stay. The primary safety outcome of the study was any adverse reaction that necessitated change to an alternative antibiotic.

### Results/Conclusions:

Data collection and analysis are currently in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify common and serious adverse reactions that can occur with linezolid therapy.

Describe the advantages and disadvantages of using linezolid versus vancomycin for the treatment of Staphylococcal infections.

### Self Assessment Questions:

Which of the following adverse reactions is most associated with linezolid?

- A Ototoxicity
- B Acute interstitial nephritis
- C Torsades de pointes
- D Thrombocytopenia

Which of the following is an advantage of using linezolid versus vancomycin for the treatment of Staphylococcal infections?

- A Does not require monitoring of visual function
- B Can be given intravenous or oral route
- C Does not require routine lab monitoring
- D Treatment durations are shorter with linezolid for all Staphylococcal

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PREDICTORS OF 3-HOUR SEPSIS BUNDLE NON-COMPLIANCE

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**Purpose:** Sepsis affects millions of patients worldwide each year and results in high mortality rates. Early identification and appropriate management improve patient outcomes. The Centers for Medicare and Medicaid Services adopted the Surviving Sepsis Campaign's 3-hour sepsis bundle, which includes the following: lactate concentration, blood cultures, broad spectrum antibiotics, and 30 mL/kg of crystalloid fluids if initial hypotension or lactate  $\geq$  4 mmol/L. Compliance to the 3-hour sepsis bundle has been associated with decreased in-hospital mortality and increased cost savings. The purpose of this study is to determine rate of 3-hour sepsis bundle compliance and identify predictors of 3-hour sepsis bundle non-compliance in order to identify areas of opportunity to improve sepsis care.

**Methods:** This retrospective cohort study was conducted utilizing the electronic medical record at Loyola University Medical Center to identify patients diagnosed with severe sepsis and/or septic shock from July 1, 2016 to July 1, 2018. The primary outcome was the rate of 3-hour sepsis bundle compliance. Potential indicators of 3-hour sepsis bundle non-compliance that were examined include day, time, and patient unit at onset of severe sepsis or septic shock presentation, boarding in a unit away from the primary care team, contact or isolation precautions, parenteral antibiotic therapy 24 hours prior to presentation, and a clinical pharmacist on the patient's care team. Univariate and multivariable regression analyses were used to determine predictors of 3-hour sepsis bundle non-compliance.

**Results:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the four components of the 3-hour sepsis bundle.

Explain common pitfalls in the management of sepsis.

### Self Assessment Questions:

Which of the following is not a risk factor for developing sepsis?

- A Intensive care unit admission
- B: Advanced age ( $\geq$ 65 years)
- C: Hypertension
- D: Immunosuppression

Which of the following correctly defines sepsis based on the third international consensus definition?

- A A life-threatening organ dysfunction caused by a dysregulated host response
- B A life-threatening infection resulting in persistent hypotension
- C A systemic inflammatory response syndrome
- D A systemic inflammatory response syndrome resulting in persistent hypotension

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFICACY AND TOXICITY OF CONTINUOUS INFUSION AMPHOTERICIN B DEOXYCHOLATE VERSUS LIPOSOMAL AMPHOTERICIN B IN PATIENTS WITH HISTOPLASMOSIS/BLASTOMYCOSIS

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**Background:** Conventional formulation of amphotericin B deoxycholate is associated with infusion-related toxicities and nephrotoxicity, which can be potentially fatal. Liposomal amphotericin B (L-AmB) formulations have been developed to combat this intrinsic toxicity profile but unfortunately incur higher costs. Therefore, continuous infusion of amphotericin B deoxycholate (CI d-AmB) has been proposed as an alternative to mitigate the toxicity profile. To date, no studies have compared CI d-AmB to L-AmB hence, the objective of this study is to evaluate the efficacy and toxicity of CI d-AmB versus L-AmB in patients with histoplasmosis/blastomycosis.

**Methods:** Charts of patients receiving amphotericin B for histoplasmosis/blastomycosis were retrospectively evaluated from April 2005 to May 2018. This study was approved by Indiana University Health Institutional Review Board. Patients of age 18 and older receiving either L-AmB or CI d-AmB for at least 48 hours with proven/probable diagnosis of histoplasmosis/blastomycosis were included. Patients with preexisting ESRD and those without documented serum creatinine pre- and post-amphotericin initiation were excluded. The primary efficacy outcome is the composite of: 90-day all-cause mortality from treatment initiation, or readmission for histoplasmosis/blastomycosis within 90 days from treatment initiation. The primary toxicity outcome deals with the degree of renal impairment per RIFLE criteria within 14 days of amphotericin initiation. Descriptive statistics will describe baseline demographic and clinical data. Normally distributed continuous data will be reported as mean  $\pm$  standard deviation and analyzed via t-test. Non-normal continuous data will be reported as median with a range and analyzed using a Mann-Whitney U test. Nominal data will be reported as N (%) and analyzed via a Chi-square or Fisher's exact test.

**Results and Conclusion:** Data collection is ongoing and results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Define rates of nephrotoxicity among different formulations of amphotericin B

Recognize factors that may increase the risk of nephrotoxicity in patients receiving amphotericin B

### Self Assessment Questions:

What is the nephrotoxicity rate associated with conventional amphotericin B infused over 4 hours?

- A Approximately 80%
- B: Approximately 60%
- C: Approximately 40%
- D: Approximately 20%

Which of the following is associated with an increased risk of nephrotoxicity when co-administered with amphotericin B?

- A Concurrent use of alemtuzumab
- B Concurrent use of calcineurin inhibitors
- C Concurrent use of ceftriaxone
- D Concurrent use of proton pump inhibitors

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECTIVENESS OF PHARMACIST REVIEW OF PAST URINE CULTURE RESULTS PRIOR TO VERIFICATION OF ANTIMICROBIAL AGENT MEDICATION ORDER

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**Purpose:** For patients presenting with urinary tract infections (UTIs), common practice is to order an antibiotic with a spectrum of action to cover common urinary tract pathogens. However with the increasing occurrence of resistant organisms, these front line agents may not provide adequate antimicrobial coverage for certain patients. Studies have demonstrated that past urine cultures can help predict a current UTI's infectious organisms. The purpose of this study is to determine the impact of pharmacist review of past urine culture results prior to verification of antimicrobial agent medication orders to decrease the amount of time that patients are on inappropriate therapy. **Methods:** Starting February 1, 2018, pharmacists at a 220-bed rural community medical center implemented a practice change that included a review of the past twelve months of urine culture results in the electronic medical record prior to verifying an antibiotic order with a urinary-related indication. If a mismatch between past results with the current antibiotic ordered existed, the pharmacist contacted the provider to recommend a change in therapy. A retrospective review of historical patients before the change in practice will be conducted to be used as a historic control. The data will be compared before and after the implementation of the practice change to analyze several metrics including: (1) days until appropriate therapy (defined as number of days the patient was receiving antimicrobial agent that did not match their urine cultures), (2) number of changes in therapy, (3) number of unnecessary empiric antimicrobial changes, and (4) the number of missed opportunities. Appropriateness of antibiotic therapy will be determined using microbiological susceptibilities, patient drug allergies/intolerances, and clinical guideline relevant to the infection. Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss a pharmacist's role in selecting empiric antibiotics for urinary indications.

Select an appropriate empiric antibiotic based on a patient's 12-month urine culture history.

### Self Assessment Questions:

In this study, what was the primary outcome assessed?

- A Length of stay for patients on antibiotics for a UTI
- B: Duration of antibiotic therapy for a UTI
- C: Pharmacist impact on duration of inappropriate antibiotic therapy
- D: Predictability of current urinary pathogen based on 12 month urine

A 70-year-old female arrives to the ED complaining of pain with urination and is admitted for cystitis. Current urine cultures are pending but upon review of the patients' 12-month urine culture history

- A No change required
- B Contact the provider and change empiric antibiotic to cefepime
- C Contact the provider to change empiric antibiotic to gentamicin
- D Contact the provider to change empiric antibiotic to meropenem

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A POST-OPERATIVE PAIN MANAGEMENT OPIOID STEWARDSHIP INITIATIVE IN KIDNEY TRANSPLANT RECIPIENTS

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**Purpose:** Given the current opioid epidemic, it is crucial to implement practices that optimize multimodal pain therapy in an effort to decrease opioid usage. There is minimal data published on acute post-surgical pain management in kidney transplantation. Therefore, the purpose of this project is to determine the effectiveness of a revised post-operative pain management protocol in reducing opioid use post-kidney transplant.

**Methods:** This retrospective chart review divided adult kidney transplant recipients into two cohorts, pre-implementation of the revised protocol (1/1/2017-07/31/2017) and post-implementation of the revised protocol (02/06/2018-08/15/18). Exclusion criteria included multi-organ transplant recipient or less than 30 days of follow up. The primary outcome was the quantity of opioid pills prescribed at discharge. The secondary outcomes included total morphine milligram equivalence (MME) prescribed at discharge, total MME prescribed outpatient during first 30 days post-transplant, number of opioid prescriptions written during first 30 days post-transplant, patient pain-related phone calls, active opioid prescription at 3 months post-transplant, inpatient pain score, 30-day and 90-day readmission, and 90-day graft loss, mortality and biopsy proven rejection.

**Results:** In cohort 1, 93.3% were prescribed an opioid at discharge, whereas only 51.7% in cohort 2 received an opioid at discharge ( $p < 0.001$ ). Those prescribed an opioid received less tablets, 50 tablets vs. 14 tablets ( $p < 0.001$ ) and less MME were prescribed outpatient within 30 days of transplant 315 MME vs. 70 MME ( $p < 0.001$ ) in cohorts 1 and 2, respectively. Rejection rate was higher in cohort 2 compared to cohort 1, 5.6% vs 0% ( $p = 0.005$ ), respectively. There was no significant difference in all other outcomes.

**Conclusions:** Outpatient opioid prescribing for pain management post kidney transplant significantly decreased after implementation of the revised post-surgical pain management protocol.

### Learning Objectives:

Identify the effectiveness, in regards to opioid prescribing at discharge, of a multimodal approach to post-operative acute pain management in kidney transplant recipients

Discuss the outcomes that were and were not significantly changed with the implementation of an opioid stewardship initiative

### Self Assessment Questions:

What is the importance of an opioid stewardship initiative within the kidney transplant recipient population?

- A To withhold opioids from patients until absolutely necessary
- B: To eliminate opioids completely
- C: To increase the risk of chronic opioid utilization post-operatively by
- D: To establish best practice for a unique population with minimal data

Which of the following has been identified in the literature as a transplant risk associated with opioid use?

- A Increased risk of infection
- B Increased risk of death
- C Increased risk of graft failure
- D B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST PRESENCE ON TIME TO PROTHROMBIN COMPLEX CONCENTRATE IN LIFE-THREATENING BLEEDING AND URGENT PROCEDURES

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**Purpose:** Time to receipt of four factor prothrombin complex concentrate (4F-PCC) is critical; however, current guidelines do not provide recommendations on optimal timing from patient presentation to 4F-PCC administration. Interventions targeting faster times to 4F-PCC, including pharmacists at bedside, have not been evaluated. The purpose of this study was to determine if pharmacist presence at bedside is predictive of faster time to 4F-PCC administration. **Methods:** This was a retrospective cohort study between January 2014 to November 2018 of patients who received 4F-PCC for life-threatening bleeding or urgent procedure in the emergency department (ED). Patients with a pharmacist at bedside (PharmD group) were compared to a physician team alone (control). The primary outcome was time to 4F-PCC (minutes) from ED presentation to administration of 4F-PCC. **Results:** Of the 252 patients evaluated, 116 patients (46%) were included (n=50 PharmD group; n=66 control group). Atrial fibrillation was the most common indication for anticoagulation (70% vs 75%, p=0.35) and most patients presented on warfarin (73% vs 82%, p=0.41). Of the patients with a life-threatening bleed (98% vs 90%, p=0.84), intracranial hemorrhage was the most common type of bleed (67% vs 75%, p=0.81). The median time to 4F-PCC administration was significantly shorter in the PharmD group (66.5 minutes vs 206.5 minutes, p<0.001). Pharmacist at bedside was the only factor independently associated with a reduction in time to 4F-PCC ( $\beta$  coefficient -163.5 minutes, 95% CI -249.4 to -77.7 minutes). Although there was no difference in achievement of hemostasis or mortality, patients in the PharmD group had a shorter ICU LOS (2 days vs 5 days, p<0.01) and hospital LOS (5.5 days vs 8 days, p=0.02). **Conclusions:** A clinical pharmacist at the bedside significantly decreased time to 4F-PCC administration in patients with life-threatening bleeding or need for an urgent procedure by over two hours. This was associated with a shorter ICU and hospital LOS.

### Learning Objectives:

Explain the mechanism of action of 4F-PCC for reversal of anticoagulation

Review literature evaluating the impact of faster time to 4F-PCC administration on patient-level outcomes

### Self Assessment Questions:

Which of the following may reduce time to 4F-PCC administration?

- A: Storage of 4F-PCC in the emergency department
- B: Beside reconstitution of 4F-PCC
- C: Pharmacist presence at bedside
- D: All of the above

4F-PCC dose is calculated based off of which factor?

- A: Factor II
- B: Factor VII
- C: Factor IX
- D: Factor X

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF MEDICATION ASSISTED TREATMENT FOR OPIOID USE DISORDER IN MALE AND FEMALE VETERANS

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**Purpose:** Opioid use disorder (OUD) is a condition that causes significant morbidity and mortality, in addition to added healthcare costs and societal burdens. Medication-assisted treatment (MAT) is an option for patients to assist with recovery and abstinence. There is little data that investigates the gender differences with prescription and illicit opioid use, and medication-assisted therapies. The primary objective of this study is to assess the use and outcomes of MAT in men and women who have a history of OUD. Data collected from this study will help guide MAT prescribing habits for treatment of OUD.

**Methods:** This study was a retrospective electronic chart review of patients with OUD who were treated with methadone, buprenorphine, naltrexone, or a combination of agents. A list was generated of patients who received MAT from August 1, 2013 to July 31, 2018. Patients were included if they had a diagnosis of OUD and were treated in the Substance Use Disorder Recovery Program (SUDRP) clinic. Patients were excluded if they use methadone, buprenorphine, or naltrexone for indications other than OUD, or received these medications from an outside provider. A list of females was generated, and an equal number of men was generated through randomization. Men were selected randomly based on age groupings. The primary outcomes of the study were to assess MAT prescribed for OUD, the incidence of relapse, and the method of patient referral to SUDRP. Secondary outcomes included documented opioid use and morphine equivalent dose prior to medication assisted treatment, reported relapse, reported compliance with MAT, comorbid disease states, childbearing potential, highest dose of MAT medication, and medication possession ratio.

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

### Learning Objectives:

Describe current medication-assisted treatment (MAT) options for treatment of opioid use disorder (OUD).

Review the mechanism of action for each medication-assisted therapy.

### Self Assessment Questions:

Which of the following is a full opioid receptor agonist?

- A: Naltrexone
- B: Naloxone
- C: Methadone
- D: Buprenorphine

Which of the following medications is available as a sublingual film?

- A: Naltrexone
- B: Buprenorphine/naloxone
- C: Methadone
- D: Naloxone

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF CONTINUOUS VASOPRESSIN INFUSION IN PATIENTS DIAGNOSED WITH SHOCK

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**Purpose:** Shock is categorized as hypovolemic, cardiogenic, obstructive or distributive. Prompt identification of the origin of the shock state and initiation of appropriate medical management is crucial. Current literature supports the utilization of vasopressin, an antidiuretic hormone analog, as adjunct therapy for patients with septic shock who require escalating doses of norepinephrine. The role of vasopressin as adjunct therapy outside of septic shock, however, is not well demonstrated. The purpose of this study is to assess the outcomes of continuous infusion vasopressin added to norepinephrine in patients diagnosed with all types of shock.

**Methods:** This study, which was approved by the hospital's institutional review board, is multi-center retrospective review of approximately 400 patients initiated on either norepinephrine or norepinephrine plus vasopressin at 5 hospitals within a midwestern health system. Patients were excluded if they were less than 18 years of age, if norepinephrine was discontinued and replaced with an alternative vasopressor, or if transferred from an outlying hospital not within the same health system. Study groups will be matched utilizing Acute Physiologic Assessment and Chronic Health Evaluation (APACHE-II) scores at the time of intensive care unit (ICU) admission. The primary outcome of this study is to compare the ICU mortality of patients diagnosed with shock who received vasopressin in addition to norepinephrine versus norepinephrine alone. A subgroup analysis by shock state will be completed. Secondary outcomes include a comparison of time to shock resolution, ICU length of stay, and average cost of vasopressor therapy. The order of agent discontinuation and time to vasopressin initiation in the vasopressin group will also be assessed. Data will be collected using the electronic medical record.

**Results:** Data collection and analysis are currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the management of distributive shock

Review the current literature surrounding the use of vasopressin in shock

### Self Assessment Questions:

Which shock state has the most literature supporting the adjunct use of vasopressin?

- A: Cardiogenic shock
- B: Distributive shock
- C: Hypovolemic shock
- D: Obstructive shock

What is the vasopressor of choice in distributive shock?

- A: Dobutamine
- B: Phenylephrine
- C: Norepinephrine
- D: Angiotensin II

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACY-DIRECTED MEDICATION MANAGEMENT FOR PATIENTS EXPERIENCING FALLS IN A VETERANS AFFAIRS COMMUNITY LIVING CENTER

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**Purpose:** Since August 2014, nursing staff at the Cincinnati Veterans Affairs Medical Center Community Living Center (CLC) have been required to place an electronic consult to pharmacy after a resident experiences a fall, prompting a review of their medication regimen. The aim of this project is to analyze the number of targeted medication interventions made within 10 days post-fall prior to and following implementation of the consult service, with goals of demonstrating that pharmacy involvement in post-fall evaluations results in a reduction of polypharmacy, adverse drug events, potential drug-drug interactions, and patients' subsequent risk of falling.

**Methods:** The project protocol was approved by the University of Cincinnati Institutional Review Board and VA Research and Development Committee prior to data collection. The VA Computerized Patient Record System and Fall Report records located on the CLC service drive (S:drive) provided necessary patient fall data electronically. Any patient who experienced a fall while admitted to the CLC prior to (fiscal year 2013) and following (fiscal year 2018) initiation of the consult service was included. Patients' fall data was manually queried to include fifty falls from each fiscal year. The principal and co-investigators collaborated to confirm the retrieved patient data met the inclusion criteria. Baseline characteristics of the selected patients, including but not limited to, patients' age, total medications, number of medications associated with specific adverse effects, number of pharmacy recommendations, and the number and type of pharmacist interventions were compared. The primary endpoint encompassed the number of medication interventions made based on pharmacist recommendations within 10 days post-fall to demonstrate the impact of pharmacy involvement in the evaluation of medication regimens for patients experiencing falls.

**Results:** Results will be reported when the full data analysis is complete.

**Conclusions:** Conclusions are pending, as only a subset of patients have been reviewed for data collection.

### Learning Objectives:

Identify commonly prescribed medication classes for elderly Veterans experiencing falls

Recognize appropriate pharmacist interventions for elderly patients post fall

### Self Assessment Questions:

Which of the following medication classes are highly associated with an increased risk for falls, particularly for the elderly population?

- A: Statins
- B: Benzodiazepines
- C: Direct Oral Anticoagulants (DOACs)
- D: Proton Pump Inhibitors (PPIs)

As the clinical pharmacist, what would be the most appropriate recommendation following review of this patient's medication regimen?

- A: Discontinue glipizide
- B: Reduce atorvastatin dose from 40mg to 20mg
- C: Reduce gabapentin dosing frequency from three times daily to twice
- D: Discontinue atenolol

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

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**Learning Objectives:**

**Self Assessment Questions:**

- A
- B:
- C:
- D:

- A
- B
- C
- D

Q1 Answer:            Q2 Answer:

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

**RISK FACTORS FOR VENOUS THROMBOEMBOLIC EVENTS IN PATIENTS FOLLOWING ELECTIVE TOTAL HIP AND TOTAL KNEE ARTHROPLASTY IN THE COMMUNITY HOSPITAL SETTING**

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**Purpose:** Patients who undergo total hip arthroplasty (THA) and total knee arthroplasty (TKA) are at an increased risk of developing venous thromboembolism (VTE). With contemporary prophylactic strategies, the national incidence of VTE in these patients is 1-2%. Clinical guidelines provide a variety of prophylaxis options, all of which have their respective advantages and disadvantages. However, these guidelines do not take into account patient-specific risk factors that may contribute to the development of VTE. This study aims to determine VTE rates in patients undergoing THA/TKA at Norton Healthcare and attempt to identify factors which independently increase the risk of developing VTE.

**Methods:** This was an IRB-approved, retrospective, case-control study of patients who underwent elective THA/TKA from July 1st, 2016 to June 30th, 2018. Adults aged at least 18 years who experienced a VTE event within 30 days following the procedure were identified and assigned to the case group. Each case-subject was then matched 1:1 with a control-subject according to procedure type, surgeon, and proximity in time. Potential risk factors for VTE, including patient specific modifiable and non-modifiable risks, duration of surgical procedure and choice and timing of chemical prophylaxis were collected. These data points were assessed using univariate analyses and multivariate logistic regression to determine if they independently predicted VTE risk.

**Results and Conclusions:** Results and conclusions to be presented at the 2019 Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify patient-specific risk factors that have been associated with increased risk of developing VTE following elective THA/TKA

Select a guideline recommended anti-thrombotic regimen for a patient following elective THA/TKA

**Self Assessment Questions:**

Which risk factor has been associated with increased VTE incidence in patients following elective THA/TKA?

- A BMI > 25kg/m<sup>2</sup>
- B: Enoxaparin as VTE prophylaxis
- C: Early ambulation
- D: No history of tobacco use

2. Which anti-thrombotic regimen is a recommended regimen for VTE prophylaxis in patients post-THA/TKA according to evidence-based guidelines?

- A Clopidogrel 75 mg by mouth daily
- B Dabigatran 75 mg by mouth daily
- C Enoxaparin 1 mg/kg subcutaneously every 12 hours
- D Apixaban 2.5 mg by mouth twice daily

Q1 Answer: A    Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACIST AND PHARMACY INTERN PERCEPTIONS OF ADOLESCENT VACCINATION ADMINISTRATION IN A COMMUNITY PHARMACY SETTING

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### Purpose

There is currently no additional training required to maintain the American Pharmacists Association's (APhA) immunization certification which many pharmacists have completed. However, laws have changed substantially in recent years to expand pharmacist vaccination standing order protocols to include younger patients and a larger variety of immunizations. As providers of immunizations, it is important that pharmacists feel confident recommending and administering vaccinations. The objective of this study is to evaluate community pharmacist and pharmacy intern perceptions of administering adolescent vaccinations per protocol before and after completing an online training module. Secondary objectives will be to model the association between pre and post survey responses and any association between perception and participant demographic information.

### Methods

A 12-item cross-sectional, online survey was developed using the Theory of Self-Perception. The theory states that attitudes are determined by inferring them from one's own behaviors and the circumstances under which they occur. An online training module was developed to provide baseline information on administering adolescent vaccinations in a community pharmacy setting. This study was deemed exempt by the Institutional Review Board. Likert-scale questions address participants' confidence and comfortability administering adolescent vaccinations. Eligible participants include individuals age 18 or older, licensed and practicing in Indiana, have completed APhA's immunization certification program and the online training module. Persons will be excluded if they are not certified to give immunizations. Demographic information will be obtained to characterize the study population. To characterize pharmacist and pharmacy intern perceptions before and after training, descriptive statistics will be conducted. To model the difference in perceptions prior to and after completing the training module, one-time T tests will be conducted. A linear regression model will be used to model any association between perceptions and participant demographic information.

### Preliminary results and conclusion

To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List vaccinations which pharmacists can administer to adolescent patients per protocol in Indiana

Define the Theory of Self-Perception

### Self Assessment Questions:

Which of the following vaccinations is a pharmacist authorized to give an adolescent patient per protocol in Indiana?

- A pneumococcal
- B: polio
- C: human papilloma virus
- D: zoster

Which of the following defines the Theory of Self Perception?

- A Persons determine their attitudes and preferences by interpreting
- B Psychological health behavior change model developed to explain
- C The influence of individual experiences, the actions of others, and
- D A person's health behavior is determined by their intention to perform

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING INTEREST IN MOBILE HEALTH TECHNOLOGY FEATURES AMONG SPECIALTY PHARMACY PATIENTS RECEIVING ORAL ANTICANCER MEDICATIONS.

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### Purpose:

The aim of this study is to evaluate the interest specialty pharmacy patients who receive oral anticancer medications (OAMs) have in the types of features of a hypothetical mobile health (mHealth) app. With the increased use of OAMs, many oncology patients are often self-managing their cancer therapy. Patients with cancer face additional challenges in their care that include understanding complex treatment regimens and treatment-related adverse events. Mobile health apps could potentially be one way to improve the patient experience and help patients better manage their cancer therapy. Numerous healthcare applications are available, but functionality is often limited. In addition, there are concerns about the transparency of the applications and their development in terms of using evidence-based medicine and medical professional involvement. Supporting the unique needs of the cancer patient could present an opportunity for developing a holistic patient-focused mHealth app.

### Methods

Inclusion criteria for survey participation are patients at least 18-years-old who receive at least one OAM from a community-based specialty pharmacy. The questionnaire was designed to assess interest (using a 5-point Likert Scale) of types of features of a hypothetical mHealth app. Basic patient demographic and cancer care information will be collected. Filled prescriptions for eligible patients are identified prior to dispensing and a recruitment flyer is included in the prescription bag. Patients are also screened and recruited telephonically after routine prescription refill calls. The survey is conducted using the online software Qualtrics.

### Preliminary Results

The categorical variables will be listed as percentages and compared using a chi-squared analysis.

### Conclusions/Implication

Identifying the types of features of a mHealth technology app that oncology patients receiving OAMs have the most interest in could potentially lead to the development of tools that assist in improving the patient experience and in helping these patients better self-manage their cancer therapy.

### Learning Objectives:

Discuss the benefits and challenges of utilizing oral anticancer medication

Recognize the limitations of current mHealth apps

### Self Assessment Questions:

Which of the following statements represents a challenge associated with oral anticancer medications (OAMs):

- A Self-administration can lead to poor adherence.
- B: Using OAMs means more frequent visits to the clinic.
- C: Intravenous infusions are usually more convenient than taking OAMs.
- D: Patients usually prefer intravenous infusions opposed to OAMs.

Which of the following statement is true regarding the current mHealth landscape:

- A Medical professionals are usually involved in the creation of mHealth
- B Presently available apps typically lack transparency and are often
- C All mHealth apps must be submitted for FDA-approval
- D There are less than 500 mHealth apps currently available for download

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**EVALUATING THE USE OF GLP-1 AGONISTS AND SGLT2 INHIBITORS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS IN A VETERAN POPULATION AT THE JESSE BROWN VA MEDICAL CENTER (JBVAMC)**

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**Purpose:** Diabetes is a prevalent disease that is estimated to affect approximately 30.3 million adults in the United States. As the disease progresses it becomes more difficult to maintain glycemic control. Newer agents, such as the glucagon-like peptide-1 (GLP-1) agonists and the sodium-glucose cotransporter 2 (SGLT2) inhibitors, improve glucose control as well as may provide additional benefits such as weight loss. Additionally, some agents within these classes have literature showing benefit in cardiovascular protection in patient with established cardiovascular disease. Both classes of agents have been shown to be safe and efficacious in the general population; therefore, their utilization has increased at the Jesse Brown Veteran's Affairs Medical Center (JBVAMC). Current data regarding the benefit of these two medication classes in the veteran population is lacking. This study will determine the efficacy and safety of these agents in a veteran population with multiple risk factors and comorbidities including obesity and cardiovascular disease.

**Methods:** This study is a retrospective, electronic chart review of patient who have been prescribed SGLT2 inhibitors or GLP-1 agonists from January 1st 2014 through July 14th 2018 at JBVAMC. The endpoints that will be evaluated include a change in hemoglobin A1c, weight, and total daily dose of insulin after 3 months and 6 months of therapy in patients who have been prescribed at least 10 weeks of GLP-1/SGLT2 medications. Multiple subgroup analyses will also be performed.

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

**Learning Objectives:**

Review current guideline recommendations for GLP-1s and SGLT2s in the treatment of type two diabetes.

Discuss the safety and efficacy of adding GLP-1s and SGLT2s in a veteran population with multiple risk factors and comorbidities.

**Self Assessment Questions:**

In the 2019 American Diabetes Association guidelines, when considering patients with Type 2 Diabetes and established cardiovascular disease, which of the following agents has the most literature demon

- A: Liraglutide
- B: Repaglinide
- C: Rosiglitazone
- D: Saxagliptin

Which of the following is a potential advantage of SGLT2 inhibitors?

- A: Decreased risk of urinary and genital infections
- B: Demonstrated reductions in heart failure exacerbations
- C: Injectable medication only requiring once weekly administration
- D: Renal and hepatic dose adjustments not necessary

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**IMPACT OF INTERACTIVE TECHNOLOGY AND PHARMACIST INTERVENTION ON PATIENT-REPORTED CHEMOTHERAPY-INDUCED NAUSEA AND VOMITING OUTCOMES ON PATIENTS WITH BREAST CANCER INITIATING DOXORUBICIN AND CYCLOPHOSPH**

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The purpose of this project is to evaluate the feasibility and clinical impact of interactive technology between a pharmacist and patients with breast cancer initiating therapy with doxorubicin plus cyclophosphamide (AC) as a tool to measure patient reported outcomes (PROs) related to chemotherapy-induced nausea and vomiting (CINV). A single-center prospective cohort pilot project analyzing post-implementation of a new pharmacist intervention via interactive patient technology will be conducted from January 2019 to May 2019. Patients with breast cancer initiating AC at the Froedtert Hospital Clinical Cancer Center (FH CCC) will be included. Patients will be excluded if they have previously received AC, cannot read and/or speak English, are less than 18 years of age, or are enrolled in a clinical trial. Primary outcomes include the number and type of pharmacist interventions made through interactive patient technology. Secondary outcomes include number of questionnaire responders and non-responders, number of patients that require pharmacist intervention, differences in nausea and vomiting grade and questionnaire score pre- and post-pharmacist intervention, patient satisfaction and quality of life, time to complete each pharmacist intervention, number of hospital admissions or 24-Hour Cancer Clinic visits due to CINV, number of patients that chose not to use the interactive technology, and the reason patients chose not to enroll. The data will be presented to the FH CCC staff to assess the impact of this program for patients with breast cancer. The goal is to demonstrate feasibility of the CINV monitoring and symptom management program to support utilization of PROs, interactive technology, and pharmacist interventions to include all malignant disease states and associated symptoms at FH CCC.

**Learning Objectives:**

Describe the utility of patient-reported outcomes (PROs) in oncology pharmacy

Discuss how interactive patient technology can serve as a tool to measure PROs

**Self Assessment Questions:**

Which of the following statements is correct?

- A: PROs do not enhance monitoring of patient symptoms
- B: PROs decrease provider awareness
- C: PROs hinder current methods of symptom management
- D: PROs are becoming a more prevalent method for enhancing symp

Which of the following statements is correct?

- A: Interactive patient technology has not yet proven to enhance patie
- B: Interactive patient technology has been associated with decreasec
- C: Interactive patient technology has shown to improve symptom mai
- D: Interactive patient technology is not an effective method for collect

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**ANALYSIS OF ANTIMICROBIAL UTILIZATION IN AN OUTPATIENT INFUSION CENTER AND ASSESSMENT OF PHARMACIST INTERVENTIONS TO OPTIMIZE ANTIMICROBIAL APPROPRIATENESS**

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**Purpose:** To evaluate the use of intravenous antimicrobial therapy in the outpatient infusion center at Columbus Regional Health and to measure pharmacist intervention to promote antimicrobial appropriateness inappropriate antimicrobial therapy.

**Methods:** A retrospective analysis was performed on 91 unique patients with a total of 117 individual antibiotic orders. All patients who received antimicrobial therapy in the outpatient infusion center at Columbus Regional Health from January 2018 through September 2018 were included in this review. No patients or doses were excluded. Based on retrospective data analysis, three major interventions were implemented to promote antimicrobial appropriateness. The first intervention consisted of manipulating the outpatient order form to include a "culture result" line in addition to a "diagnosis" line to prevent confusion when filling out the order form. Second, a pre-checked "pharmacy to optimize antimicrobial therapy" consult was added to the form. Finally, a new indication based dosing protocol was designed to help facilitate antimicrobial dose review and optimization by pharmacists.

**Results:** Overall, only 73% of outpatient antimicrobial orders were dosed appropriately in the initial data set. Antipseudomonal beta-lactam antimicrobials were frequently prescribed utilizing inappropriate regimens. In contrast, antimicrobials with less frequent dosing (i.e. ceftriaxone, daptomycin, ertapenam) were dosed appropriately > 80% of the time. Orders that had a pharmacy dosing consult were dosed appropriately 89% of the time. Physician verified indications were missing on 10% of the orders received in the outpatient infusion center. Osteomyelitis and urinary tract infections/pyelonephritis made up 58% of the orders with known indications. Final data on the results of the three interventions made to improve appropriateness of outpatient antimicrobial infusions is currently unavailable.

**Conclusions:** Conclusions will be made after final data regarding the three interventions listed above becomes available.

**Learning Objectives:**

Explain why antimicrobial appropriateness is critical in outpatient infusion clinics

Identify drug regimens that may make patient compliance difficult in the outpatient setting and that may ultimately lead to inappropriate antimicrobial therapy

**Self Assessment Questions:**

Why is it important that all antimicrobials are dosed appropriately in outpatient infusion clinics?

- A To improve patient adherence
- B: To minimize the development of antimicrobial resistance, to prevent
- C: To increase the hospital's profit from the outpatient infusion center
- D: To improve pharmacist workflow when verifying orders

Which drug regimen likely has the highest risk of patient noncompliance in the outpatient setting and may need to be further discussed with the prescriber?

- A Cefepime 2gm IV Q12H for a skin and soft tissue infection
- B Ertapenam 1gm IV Q24H for pyelonephritis
- C Meropenem 500mg IV Q6H for urinary tract infection
- D Daptomycin 6mg/kg IV Q24H for osteomyelitis

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**IMPACT OF A PHARMACIST-MANAGED DIABETES CLINIC ON AN UNDERSERVED POPULATION WITH UNCONTROLLED TYPE 2 DIABETES**

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**Purpose:** There are currently many studies showing positive outcomes of pharmacist-managed diabetes clinics on patients with type 2 diabetes. However, there is limited research on the impact of this type of clinic in medically underserved patients (i.e. low-income, homeless, Medicaid-eligible), who are at the greatest risk of developing diabetes and diabetes-related complications. The objective of this study is to determine the associated impact of a pharmacist-managed diabetes clinic on hemoglobin A1c, diabetes-related hospitalizations, and diabetes-related emergency department visits compared to primary care physician based care in underserved patients with uncontrolled type 2 diabetes.

**Methods:** A single-center retrospective chart review is conducted at Mercy Hospital and Medical Center (MHMC) in Chicago, Illinois. A medical chart report is used to identify patients enrolled in MHMC's pharmacist-managed diabetes clinic and identify primary physician-managed diabetes patients with a hemoglobin A1c of greater than or equal to 9 percent at the time of study enrollment. Patients are included if they are 18 years or older, have a reported hemoglobin A1c of greater than or equal to 9 percent, have diabetes managed by a primary care physician or a pharmacist-run diabetes clinic, and have at least one follow-up hemoglobin A1c. Patients are excluded from the study if they have type 1 diabetes, diabetes managed by an endocrinologist, or do not have at least one follow-up hemoglobin A1c. The primary outcome will be the change in hemoglobin A1c from baseline at enrollment to first follow-up hemoglobin A1c post-enrollment. Secondary outcomes will include the number of diabetes-related hospitalizations and number of diabetes-related emergency department visits at twelve months or less post-enrollment. **Results/Conclusion:** Final results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Identify medically underserved patient populations

Define the American Diabetes Association hemoglobin A1c goals for nonpregnant adults

**Self Assessment Questions:**

Which of the following patient populations is considered to be medically underserved?

- A Middle-class
- B: African American
- C: Commercially-insured
- D: Medicaid-eligible

The American Diabetes Association defines the goal hemoglobin A1c value for most nonpregnant adults as:

- A < 6.5 %
- B < 7.0 %
- C < 7.5 %
- D < 8.0 %

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## TIME TO APPROPRIATE ANTIMICROBIAL SELECTION THROUGH PHARMACIST INTERVENTION FROM RAPID DIAGNOSTIC BLOOD TEST RESULTS: A RETROSPECTIVE PROCESS INITIATION PILOT STUDY

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**Purpose:** Antimicrobial stewardship (AMS) practices have become a central component for clinical success in acute care facilities in recent years. The motive for this change in practice is due, in large part, to world-wide trends of increasing bacterial resistance against our most powerful and useful antibiotics. In order to combat this deadly phenomenon, acute care facilities must apply novel AMS strategies for improving outcomes in patients with bacterial bloodstream infections (BSI). One effective and evidence-based approach is to utilize pharmacists for reporting rapid diagnostic blood tests (RDBT) to clinicians, while also giving recommendations for targeted antimicrobial treatment, or in cases of possible contamination, de-escalation of treatment. The objective of this study is to assess the time to appropriate antimicrobial therapy after implementation of a 24-hour pharmacist-driven RDBT reporting process. **Methods:** This single-center pre/post retrospective pilot study compared the average time to targeted antimicrobial therapy or discontinuation of therapy before and after the implementation of a pharmacist-driven reporting process. The RDBT reporting process was started on December 7th, 2018. Patients with positive RDBT results dating back to December 1st, 2017 will be stratified for inclusion into the final analysis. Patients with positive RDBTs for gram-positive and gram-negative bacteria and with documented pharmacist-to-clinician notification (for the post-implementation group) will be included in the study. Patients are excluded if their length of stay is less than 1 day, comfort care is initiated, they receive treatment for mixed BSIs, or if they are treated for a concomitant infection not related to the BSI. The primary comparison outcomes are the average times to appropriate antibiotic selection or discontinuation. The secondary comparison outcomes are the average median lengths of hospital stay, mortality rates during the hospital stay, and provider-approved pharmacist recommendations. **Results/Conclusions:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the utility for incorporating pharmacists into antimicrobial stewardship practices

Duplicate a standardized process aimed at reducing the time to targeted antimicrobial therapy

### Self Assessment Questions:

What is the most concerning long-term result of inappropriate antimicrobial therapy?

- A Increased healthcare costs to institutions and patients
- B: The development of bacterial resistance to broad-spectrum antimicrobials
- C: Treatment failure with an empiric antimicrobial regimen
- D: There are no concerns with continued use of broad-spectrum antimicrobials

What resources may a pharmacist use for making antimicrobial therapy recommendations?

- A Institution-specific antibiograms and standardization protocols
- B Drug monographs and clinical decision support tools
- C Other pharmacists or similarly trained clinicians
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST-RUN CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) CLINIC ON PATIENT OUTCOMES WITHIN THE VETERANS AFFAIRS ILLIANA HEALTHCARE SYSTEM (VAIHCS)

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**Purpose:** At VAIHCS, Clinical Pharmacy Specialists help increase access to care through outpatient pharmacist-run clinics. A COPD clinic was initiated one year prior to this study. The aim of this clinic is to further expand Veteran access to care and improve patient outcomes. The purpose of this study is to evaluate the impact of this pharmacist-run COPD clinic on patient outcomes.

**Methods:** Patients enrolled in the COPD clinic were selected for this analysis. Criteria for clinic enrollment includes: diagnosis of COPD, FEV1/FVC < 0.70, and willingness to attend one in-person visit. Patients were excluded from clinic enrollment if they were COPD treatment naïve  $\alpha$ -1 antitrypsin deficient, or unwilling/unable to attend one in-person visit. Primary endpoints include mean difference in Medication Complexity Regimen Index (MCRI) scores and COPD Assessment Test (CAT) scores. Secondary endpoints include change in number of cigarettes per day, smoking status, immunization status, COPD exacerbation rates, and adherence. It is hypothesized that participation in this clinic will decrease CAT and MCRI scores while improving adherence and clinical outcomes.

**Results:** Interim analysis was conducted for one participant following two appointments. Mean reductions in CAT score and MCRIS were 17.0 and 8.5, respectively. Vaccination status improved by 33% upon follow-up. Medication adherence and smoking status were unchanged, with participant categorized as "non-compliant" and "former-smoker" at both visits. No difference in exacerbation rates between visits was seen.

**Conclusions:** Interim analysis of data above shows the clinic's favorable impact on CAT score, MCRIS, and vaccination status so far; however, additional data is needed to understand full impact of clinic. Results are limited by the small sample size and short duration of data collection, but do pose a promising benefit in expanding effective access to care for COPD management through pharmacist-run COPD clinics.

### Learning Objectives:

Describe components of the COPD Assessment Test

Review impact of pharmacist-run clinics on patient outcomes in past and present research

### Self Assessment Questions:

Which of the following is a key factor in the COPD assessment test?

- A Shortness of breath
- B: Rescue inhaler usage
- C: Impact on activities of daily living
- D: Missed work days

What was the mean difference in CAT scores for COPD clinic participants?

- A No change
- B 10
- C 5
- D Answer - TBD

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPROVING ANTIMICROBIAL USE AT HOSPITAL DISCHARGE THROUGH A COLLABORATIVE PHARMACIST-LED TRANSITION-OF-CARE INTERVENTION

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Excessive antibiotic use is a primary driver of antimicrobial resistance and contributing to the decline in effectiveness of antimicrobial treatment. Unnecessary and prolonged antibiotic use also increases patient harm and resource utilization. Antibiotics prescribed at the time of hospital discharge represent an important opportunity to intervene and optimize therapy. The purpose of this study is to implement and evaluate a novel antibiotic stewardship transition of care (TOC) intervention for patients discharged from general medical units on oral antibiotics. This is an IRB-approved multi-hospital, quasi-experimental study examining antibiotic appropriateness at hospital discharge and patient outcomes before and after the implementation of an antibiotic stewardship TOC practice. The pharmacist collaborates with the physician to optimize the oral antibiotic regimen and prepares the discharge medication order in the electronic medical record. The physician signs the orders at discharge. Interventions include education provided to pharmacy, medicine and nursing departments. The study focuses on 4 common types of infection, which include skin and soft tissue infections, pneumonia (community acquired, hospital acquired, and respiratory viral infections), intra-abdominal, and urinary tract infections. All recommendations for antibiotic selection, dose and duration are derived from established guidelines and clinical evidence to provide optimal patient care. The primary endpoint is the frequency of optimal antibiotic therapy prescribed at discharge.

### Learning Objectives:

Explain To explain opportunities for pharmacists to improve discharge antibiotic prescribing during transitions of care.  
Arrange To arrange appropriate antibiotic therapy by optimizing antibiotic selection, dose and duration of therapy.

### Self Assessment Questions:

Which intervention is an opportunity to improve discharge antibiotic prescribing?

- A Optimizing antibiotic selection
- B: Optimizing antibiotic dose
- C: Optimizing antibiotic duration of therapy
- D: All the above

TN is a 35 yo M being treated for community acquired pneumonia that has currently completed 2 days of therapy with ceftriaxone and azithromycin. Patient to be discharged on moxifloxacin, how many days

- A 0 Days
- B 3 Days
- C 5 Days
- D 7 Days

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFICACY AND SAFETY OF TBO-FILGRASTIM AFTER HEMATOPOIETIC CELL TRANSPLANT

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Granulocyte-stimulating factors (G-CSF) are routinely used to accelerate engraftment in patients undergoing hematopoietic cell transplant (HCT). Currently, little to no data exist to support the use of biosimilar tbo-filgrastim in allogeneic HCT. Tbo-filgrastim also lacks FDA approval for use in this patient population. The objective of this study is to determine the efficacy and safety of tbo-filgrastim compared to its originator product, filgrastim, when used to facilitate engraftment after HCT.

This project will retrospectively examine the clinical outcomes (time to engraftment, incidence of engraftment syndrome, rates of culture-positive infection, rates of febrile neutropenia) and the financial impact (direct cost, length of hospitalization) associated with use of tbo-filgrastim compared to filgrastim. The primary hypothesis of this study is that tbo-filgrastim is non-inferior to filgrastim regarding time to engraftment when used to facilitate engraftment after HSCT.

This study will include patients 2 years of age or older who received HCT at Michigan Medicine between 01/01/2008 to 08/31/2018.

The following data will be collected from the electronic medical record: age, sex, date of admission, date of discharge, diagnosis, disease status, conditioning regimen, type of graft received, previous chemotherapy, molecular testing, number of doses of growth factor received, culture-positive infection, febrile neutropenia, time to engraftment, and whether engraftment syndrome occurred.

### Learning Objectives:

Describe HCT, its complications, and relevant patient populations  
Recognize the need for biosimilar G-CSF data in adult and pediatric HCT patients

### Self Assessment Questions:

What is the purpose of conditioning regimens prior to hematopoietic cell transplant?

- A Eradicate malignancy
- B: Create space for transplanted cells to engraft
- C: Increase cell division
- D: A and B only

What is the purpose of using granulocyte-colony stimulating factor after hematopoietic cell transplant?

- A Reduce duration of neutropenia
- B Reduce duration of thrombocytopenia
- C Reduce duration of pancytopenia
- D Reduce duration of anemia

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**INCIDENCE OF CYTOMEGALOVIRUS INFECTION IN KIDNEY TRANSPLANT PATIENTS: A COMPARISON OF CLINICAL AND DEMOGRAPHIC VARIABLES**

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**Purpose:** Cytomegalovirus (CMV) is an opportunistic infection in solid-organ transplant recipients. It can lead to tissue-invasive disease, rejection, and mortality. There are many risk factors for CMV including donor/recipient serostatus, immunosuppression level, and inappropriate antiviral dosing based on renal function. The purpose of this study is to quantify incidence of CMV infection in kidney transplant (KT) recipients at University Hospitals Cleveland Medical Center and identify variables that increase patients' risk for developing CMV.

**Methods:** This was a single-center retrospective cohort study including adult patients undergoing KT from 8/1/14-11/2/17. Patients were excluded if they received multi-organ transplant. The primary outcome was incidence of CMV infection. Secondary outcomes included biopsy-proven acute rejection (BPAR), graft survival, and patient survival 12 months post-transplant.

**Results:** 267 patients were included in this study, of which 34 (12.7%) developed CMV infection. Of these 34 patients, 1 was low risk, 18 were intermediate, and 15 were high risk for CMV. A subgroup analysis was performed on 34 patients with and 34 patients without CMV. There was no significant difference in incidence of BPAR (14.7% vs 11.7%, $p=1$ ) or graft survival (100% vs 91%, $p=0.23$ ) between these groups. No mortality was seen in either subgroup. A higher incidence of CMV infection was seen in patients continued on steroids post-transplant rather than early steroid withdrawal (57.5% vs 39.3%, $p=0.22$ ). No difference was seen between intermediate risk patients receiving reduced-dose valganciclovir and high risk patients receiving full-dose in incidence of CMV viremia (51.6% vs 71.4%, $p=0.17$ ). A higher incidence of CMV syndrome and tissue-invasive disease was seen in the high risk group (57.1% vs 21.2%, $p=0.01$  and 40% vs 2.9%, $p=0.01$ ).

**Conclusion:** Based on these results, it is recommended to continue reduced-dose valganciclovir in intermediate CMV risk patients. Additionally, identification of high-risk CMV patients to incorporate into the early steroid withdrawal eligible group will be considered.

**Learning Objectives:**

Define risk factors for CMV infection in kidney transplant patients  
Identify strategies to reduce CMV infection after transplantation and optimize patient outcomes

**Self Assessment Questions:**

Which factor may decrease a kidney transplant patient's risk for CMV infection?

- A: CMV Donor +/- Recipient – status
- B: Anti-thymocyte globulin induction
- C: Steroid withdrawal by day five post-transplantation
- D: High levels of immunosuppression for kidney rejection

What strategy may reduce CMV infection after kidney transplantation?

- A: Target higher tacrolimus levels
- B: Pharmacist-driven valganciclovir dose optimization program
- C: Decrease valganciclovir prophylaxis to less than 3 months in all patients
- D: Dose valganciclovir based on hepatic function and serum levels

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

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**Learning Objectives:**

**Self Assessment Questions:**

- A
- B:
- C:
- D:

- A
- B
- C
- D

Q1 Answer:              Q2 Answer:

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## **SYRINGE LABELING IN ANESTHESIOLOGY: SURVEYED ENDORSEMENT AND RANDOMIZED CONTROL ASSESSMENT OF AN AUTOMATED SYRINGE LABELING SYSTEM**

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**Purpose:** This study aims to assess the potential safety improvements with medication labeling in anesthesiology with automated syringe labeling and the endorsement of an automated syringe labeling system by anesthesiology providers. Medication safety technology has had difficulty permeating the operating room (OR). Other inpatient care areas employ robust, integrated systems to prevent medication errors, such as bar code medication administration and computerized physician order entry. In one prospective observational study, the most common cause of medication errors observed in the OR was errors in syringe labeling. A separate expert literature review reported a ranked list of workflow implementations that could improve medication safety in the perioperative environment. Of the top ten recommendations, three involved syringe labeling practices. The first recommendation involved proper labeling of medication syringes including drug name, date, and concentration. **Methods:** Improvements to medication safety with automated syringe labeling will be determined by measuring differences in medication labeling compliance and anesthesiology provider throughput in physical simulations of surgical cases with anesthesiology residents. Residents will be randomized to manual medication label preparation (current practice) or will receive automatically printed labels for use. Data collection items include but are not limited to labeling compliance, medication selection time, and selection error. These simulation observations will take place between February and April 2019. During November and December of 2018, an automated syringe labeling system was trialed in OR suites during actual surgical cases. Anesthesiology providers were asked to use the device to label their medications. Endorsement of the device will be assessed through a survey to the anesthesiology providers that used it. The survey includes twelve Likert Scale questions. The anesthesiology providers will be invited to complete the survey in February 2019. **Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lake Pharmacy Residency Conference.

### **Learning Objectives:**

Define the medication labeling recommendations for anesthesiology set by ASA, TJC, ISMP, and ASTM  
Identify the advantages and disadvantages of an automated syringe labeling system for use by anesthesiology

### **Self Assessment Questions:**

For particular medications given during surgical cases that require color-coding on the label, how are those color patterns determined?

- A: Determined through standards set by The Joint Commission (TJC)
- B: Determined through standards set by The American Society of Anesthesiologists (ASA)
- C: Determined through standards set by each health care institution
- D: Determined through standards set by The American Society for the Practice of Anesthesiology (ASPA)

Select the correct combination of one predicted advantage and one predicted disadvantage to employing an automated syringe labeling system in operating suites for use by anesthesiology providers.

- A: Increased throughput for medication administration but additional time for labeling
- B: Improved compliance with medication labeling recommendations
- C: Reduction in medication selection error AKA "syringe swap" but longer labeling time
- D: Increased throughput for medication administration but additional time for labeling

Q1 Answer: B      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## **IMPACT OF INITIAL VASOPRESSOR DOSE ON MEAN ARTERIAL PRESSURE GOAL ATTAINMENT IN SEPTIC SHOCK**

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**Purpose:** Sepsis is a common cause of severe disease and is associated with high mortality rates. The crucial concept for treating septic patients is that time matters. The Surviving Sepsis Campaign (SSC) guideline recommends effective fluid resuscitation to be initiated in the first hour. If the patient does not respond, the guideline recommends initiating vasopressors. There are no specific doses included but it is noted that vasopressor dosing should be titrated to an end point reflecting perfusion. To avoid adverse effects, vasopressors are initiated at a lower dose and titrated every 5-15 minutes.

Although adverse effects should be concerning, it is important to mention that delaying time to target MAP may increase risk of mortality. Maheshwari et al. (2018), evaluated the association of MAPs below various thresholds in septic adult patients located in the ICU  $\geq 24$  hours. It was determined that for every 2 hours MAP  $< 65$ , increased the odds of in-hospital mortality by 3.6% ( $p < 0.001$ ).

The aim of this trial is to assess the relationship between initial doses of vasopressors in septic shock patients with the time required to achieve goal MAP and to further evaluate the effect this has on patient outcomes.

**Methods:** The primary outcome of this study is to evaluate the association between the initial dose of vasopressors and time to achieve target MAP goal. This is currently an ongoing retrospective cohort study. Patients were identified through discern analytics at University of Illinois Hospital & Health Sciences System using ICD codes for sepsis, SIRS, severe sepsis and septic shock. This patient list was cross-referenced with a list of all patients who received vasopressors. Secondary outcomes include: ICU and hospital LOS, length of mechanical ventilation, length of renal replacement therapy, 28-day mortality, number of vasopressors required and total duration of vasopressors.

**Results:** Data is currently being collected.

### **Learning Objectives:**

Review the current Surviving Sepsis Campaign Guidelines and their recommendations for treatment of septic shock patients  
Discuss the importance of timing of initial treatment in septic shock patients

### **Self Assessment Questions:**

Which of the following is not included in the SSC 1-hour bundle?

- A: Administration of broad-spectrum antibiotics
- B: Rapid administration of colloids
- C: Apply vasopressors if patient is hypotension during or after fluid resuscitation
- D: Lactate level

What do the SCC guidelines recommend for vasopressor initiation?

- A: Start all patients on norepinephrine 0.01 mcg/kg/min
- B: Titrate all patients to MAP of 60 mm Hg
- C: Dopamine is second choice agent
- D: Dosing should be titrated to an end point reflecting perfusion

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF BASILIXIMAB AND ALEMTUZUMAB FOR LUNG TRANSPLANT INDUCTION

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Purpose: Compare alemtuzumab and basiliximab used for lung transplant in terms of rejection, CLAD, and mortality

Methods: A retrospective review of lung transplants performed between 2010 and 2016. Patients were excluded if younger than 18 years, had a previous lung transplant, received a multi-organ transplant, or died within 30 days of transplantation. Continuous and categorical variables were compared using T-test and Chi-squared, respectively

Results: 328 patients were reviewed; IPF (147) and COPD (114) were the most common indications for transplant. 304 were Caucasians and 179 were male. Median age was 61 in the alemtuzumab group and 56 in the basiliximab group. 241 patients received alemtuzumab and 87 received basiliximab. Recipients of basiliximab were significantly more likely to experience biopsy proven ACR (A2) rejection and BOS-III than those treated with alemtuzumab (46% v. 12%;  $p < 0.001$ ). However, time to onset of CLAD (911.5 + 600 v. 1336 + 831 days;  $p < 0.001$ ) and time to death (1214 + 822 v. 818 + 596 days;  $p = 0.011$ ) were greater in the basiliximab group

Conclusions: More lung transplant recipients who received basiliximab experienced ACR compared with alemtuzumab, although there was a longer time to onset of CLAD and mortality

### Learning Objectives:

Describe role of induction therapy in lung transplantation

Discuss complications of lung transplantation

### Self Assessment Questions:

Which of the following induction agents is non-depleting?

- A Rabbit anti-thymocyte globulin (Thymo)
- B: Alemtuzumab (Campath)
- C: Basiliximab (Simulect)
- D: Equine anti-thymocyte globulin (Atgam)

Immunosuppression is administered to prevent which complication of lung transplantation?

- A Infection
- B Rejection
- C Tremors
- D Nephrotoxicity

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF BREAKTHROUGH NAUSEA AND VOMITING IN MODERATE RISK OXALIPLATIN-BASED AND IRINOTECAN-BASED CHEMOTHERAPY REGIMENS: A RETROSPECTIVE CHART REVIEW

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Purpose: The National Comprehensive Cancer Network (NCCN) Antiemesis Guidelines define standard antiemetic regimens based on the relative risk of vomiting for individual chemotherapy agents. The 2017 NCCN guideline update classifies all platinum chemotherapy agents, except oxaliplatin, as highly emetogenic. However, it is hypothesized that oxaliplatin regimens also have a high emetic risk. This study will investigate if oxaliplatin-based chemotherapy is associated with more breakthrough nausea and vomiting following a standard moderate risk antiemetic regimen than similar irinotecan-based chemotherapy. Secondary objectives include the determination of patient factors that increase the risk of nausea and vomiting with oxaliplatin chemotherapy.

Methods: This is a retrospective, observational, cohort study conducted at two centers within a single health system. This study involves chart review of patients at least 18 years old that received fluorouracil and oxaliplatin-based chemotherapy (FOLFOX) or fluorouracil and irinotecan based chemotherapy (FOLFIRI) with a standard moderate risk antiemetic regimen consisting of two pre-medications from July 1, 2016 to July 1, 2018. The primary endpoint includes failure of a standard moderate risk antiemetic regimen. Failure is defined as admittance or readmittance to Baptist Health Louisville for nausea and vomiting secondary to chemotherapy, unexpected doctor's office or infusion center visits, unanticipated contact for antiemetic refills, increase in previous dose of an antiemetic medication, or initiation of new antiemetic medications. Known patient specific risk factors for chemotherapy-induced nausea and vomiting have also been collected. Statistics will be performed as appropriate, using a chi-square analysis for nominal data and a student's t test to analyze continuous variables. A regression analysis will be performed for identification of patient specific risk factors.

Results/Conclusions: Data collection is complete with 129 patients included. Preliminary results show 50% of FOLFOX patients experienced failure versus 33% of FOLFIRI patients. However, analysis is ongoing and full results and conclusions are expected Spring 2019.

### Learning Objectives:

Define the classifications of chemotherapy induced nausea and vomiting (CINV) and the relative emetogenic risk for individual chemotherapy agents.

Review the current National Comprehensive Cancer Network (NCCN) supportive care guidelines for CINV.

### Self Assessment Questions:

Which of the following chemotherapy agents is considered highly emetogenic?

- A Irinotecan
- B: Cisplatin
- C: Oxaliplatin
- D: 5-Fluorouracil

JD is a 55 year old male with a new diagnosis of stage IV colon cancer who presents to your outpatient oncology infusion center for his first cycle of FOLFOX. Per the current NCCN guidelines, how many

- A 0
- B 1
- C 2
- D 3

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF HEART FAILURE TRANSITIONS OF CARE PROGRAM: A PROSPECTIVE STUDY OF HEART FAILURE EDUCATION AND PATIENT SATISFACTION

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**Background:** Heart failure (HF) is the fourth leading cause of death in patients with cardiovascular (CV) disease and affects an estimated 6.5 million adults in the United States.<sup>1</sup> Approximately one million patients are hospitalized each year for heart failure.<sup>3</sup> Studies have shown heart failure accounts for \$1.75 billion in healthcare expenditure and was the leading cause of 30-day readmissions for Medicare patients in 2011.<sup>4</sup> Numerous studies have been conducted looking at reduction of readmission rates among heart failure patients after pharmacist led education; however, due to the small sample size no difference in readmission rates was detected.<sup>7,8,9</sup> A few studies did show a favorable effect at reducing readmission rates through pharmacy education.<sup>10,11</sup>

**Methods:** This single center pilot study was conducted from September 2017-December 2018. Patients that met inclusion had to be diagnosed with heart failure and be counseled by a fourth year pharmacy student or pharmacist. Patients were identified by the heart failure educator. The heart failure educator is a nurse designated to teach patients with an active diagnosis of heart failure. The teaching can be broken down into three parts: disease state, diet and medication education. Pharmacy students will take over the medication portion but the heart failure educator will continue to provide diet and disease state information. Patients were provided with verbal education and a written medication information handout. The primary outcome was 30-day heart failure readmission rate, which was defined as documented clinical diagnosis of heart failure decompensation made by a physician at the time of admission. The secondary endpoints included patient satisfaction scores by phone survey.

**Results/Conclusions:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the process of performing a heart failure medication education  
Discuss the benefits of pharmacy led heart failure medication education

### Self Assessment Questions:

Which of the following was utilized during heart failure medication education?

- A Patient Education Medication Handout
- B: ACC/AHA/HFSA Guideline for Management of Heart Failure
- C: Medline website information
- D: No education materials were provided

What was the outcome of heart failure medication education provided by fourth year pharmacy students?

- A No significant difference in readmission rates or patient satisfaction
- B Reduction in readmission rates among those educated by pharmacy
- C Increase in readmission rates among those educated by pharmacy
- D No difference in readmission rates but improved overall patient satisfaction

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFICACY OF ESTABLISHED DIRECT ORAL ANTICOAGULANTS IN OBESE PATIENTS

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**Purpose:** Direct oral anticoagulants (DOACs), including apixaban, dabigatran, edoxaban, and rivaroxaban, are approved for the prevention of cerebrovascular accidents (CVAs) in atrial fibrillation and the treatment of venous thromboembolism (VTE) in place of traditional warfarin therapy. The International Society on Thrombosis and Hemostasis (ISTH) recommends avoiding these agents in patients with obesity due to the lack of clinical data regarding safety and efficacy in this population. Trials comparing DOACs to warfarin did not specifically exclude patients with high body weight, but details were too limited and variable between studies to draw any conclusions. The purpose of this study is to determine the effectiveness of DOACs in preventing CVAs and VTE in obese patients with atrial fibrillation or a history of VTE.

**Methods:** Approval by the Institutional Review Board was obtained prior to study implementation. A retrospective chart review included patients admitted from September 1, 2017 to November 1, 2018 who were at least 18 years old with a body mass index greater than 40 kg/m<sup>2</sup> and/or weight greater than 120 kg, on a DOAC as an outpatient, and with a history of atrial fibrillation or VTE. Patients were excluded if they were on hemodialysis; had severe hepatic impairment; were on anticoagulation for orthopedic VTE prophylaxis or an off-label use; or were prisoners, unable to consent, or pregnant. Study endpoints included patients with an acute diagnosis of VTE or CVA and major or minor bleeding events to assess safety. The results will be used to understand if DOAC therapy is appropriate to continue in this patient population and to generate further research if it is found to be inappropriate.

**Results:** Data collection and analysis is ongoing. Final results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recall dosing in obesity recommendations from ISTH for apixaban, dabigatran, edoxaban, and rivaroxaban.  
Recognize challenges healthcare providers face when managing obese patients on DOACs.

### Self Assessment Questions:

According to the International Society of Hemostasis and Thrombosis (ISTH), what is the current recommendation for direct oral anticoagulant (DOAC) use in patients with a BMI >40 kg/m<sup>2</sup> or weight >120

- A Administer without dose adjustments
- B: Dose adjust based on anti-factor Xa levels
- C: Increase DOAC doses upon initiations
- D: Avoid the use of these agents

What is a potential advantage of direct oral anticoagulants when compared to warfarin?

- A Availability of reversal agents for all agents
- B Can be administered without regard to meals
- C Decreased risk of drug-drug interactions
- D Parenteral formulations available if needed

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF HOME ANTIEMETIC REGIMEN COMPLIANCE

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### Purpose:

The National Comprehensive Cancer Network (NCCN) defines chemotherapy-induced nausea and vomiting (CINV) as nausea and vomiting induced by anticancer agents. The NCCN developed guidelines for the prevention of CINV according to the emetogenic potential of the patient's chemotherapy regimen. Antiemetic therapy faces the same issues with compliance as chronic medications. A retrospective study discovered that only 49% of patients were compliant with oral antiemetics. The purpose of this study is to evaluate current compliance of home scheduled antiemetic regimens and barriers faced, among patients receiving moderate and high emetogenic chemotherapy at Bing Cancer Center (BCC).

### Methods:

This was approved as a prospective, quality improvement, patient-survey based project. Patients were identified through the electronic medical record if they were on moderate or high emetogenic chemotherapy regimen from September to November 2018 at BCC. Patients were issued a compliance survey at their infusion visit assessing the prior chemotherapy session. Patients potentially completed the survey multiple times if they had numerous infusion visits during the study time frame. The BCC pharmacists documented on the surveys emetogenic potential, home scheduled antiemetic regimen, and cycle number. The patient documented the following information: age, cancer type, insurance type, and answered three survey questions assessing compliance, barriers to compliance, and the presence of nausea or vomiting.

### Results/Conclusion:

Preliminary data was collected and analyzed utilizing survey results from the month of September. A total of 45 surveys were completed, consisting of 10 high and 35 moderate emetogenic chemotherapy regimens. Only eight patients reported they did not take their scheduled antiemetic medications at home, resulting in an 82.2% compliance rate. The most common reported barrier at 46% was the patient did not have nausea and vomiting, so they did not take their scheduled antiemetic. Full data analysis results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List risk factors that contribute to assignment of antiemetic regimens  
Discuss compliance rates of home antiemetic regimens including barrier

### Self Assessment Questions:

According to NCCN guidelines, which of the following reasons has the biggest impact on selection of antiemetic regimen choice?

- A Patient medication list
- B: Emetogenic potential of chemotherapy regimen
- C: Patient has previous motion sickness issues
- D: Previous compliance issues

Patients may face many barriers that can result in poor compliance, which of the following reasons represent a common barrier for scheduled antiemetics?

- A Misunderstanding instructions
- B Medication was unaffordable
- C Patient decides not to take due to lack of nausea/vomiting
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ECONOMIC AND CLINICAL OUTCOMES OF INTRAVENOUS OPIOID STEWARDSHIP

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### Purpose

Manufacturing limitations and injectable opioid shortages have severely curtailed the availabilities of intravenous opioids to health systems nationally. To conserve the limited supply of intravenous opioids, a stewardship policy was implemented at our institution in March 2018. There is currently limited data regarding the impact of intravenous opioid stewardship initiatives. The purpose of this study is to evaluate the economic and clinical impacts of the intravenous opioid stewardship policy.

### Methods

This is a quasi-experimental study of opioid naïve patients admitted to the non-intensive care floors, tolerating an enteral diet and receiving opioids. Excluded patients include those with a palliative, hospice, or pain consults as well as those receiving patient-controlled analgesia. The pre-intervention group is randomly selected from June 2017 to September 2017 before policy implementation. The washout period is between October 2017 to May 2018. The comparator group is randomly selected from June 2018 to September 2018. Data collection involves patient demographics, total money spent on intravenous and oral opioid/non-opioid analgesics, pain score, length of stay, Morphine Milligram Equivalent of opioids, and discharge status on new opioids. The primary endpoint evaluates the cost difference. The secondary endpoints include the clinical efficacy and rates of adverse events. Mann Whitney U test, Chi Square, Fisher's Exact test, and multivariate analysis will be used to analyze relevant endpoints. Results and conclusions to be presented at the conference.

### Learning Objectives:

Describe the contributing factors for national injectable opioid shortage.  
Describe the implementation process of establishing an opioid stewardship program.

### Self Assessment Questions:

Which one of the following contributed to the national injectable opioid shortage?

- A Lack of compliance with the current good manufacturing practice t
- B: Lowered national quota for opioid production by the Drug Enforcer
- C: All of the above
- D: None of the above

Which of the following criteria must be met for pharmacists to perform an automatic intravenous to oral opioids therapeutic interchange?

- A Patient tolerating at least one dose of medication through enteral r
- B Patient with gastric obstruction or ileus
- C Patient with malabsorption syndrome including short bowel syndro
- D Patient with Grade 3 or 4 mucositis

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACY STUDENTS' ABILITY TO IDENTIFY AN UNPROMPTED DRUG-DRUG INTERACTION

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**Purpose:** Drug-drug interactions (DDIs) are estimated to account for 3 to 5% of preventable adverse drug reactions in the hospital setting.

Although pharmacy systems help to identify DDIs through incorporation of clinical decision support systems (CDSSs), health professionals may still fail to appropriately manage harmful DDIs. Many reasons may account for this failure. These reasons include "alert fatigue," suboptimal performance of clinical decision support software, and approval of new medications. Previous studies have evaluated the benefit of a DDI lecture or course and pharmacy students' ability to use drug information resources when prompted. The purpose of this study is to evaluate students' ability and confidence to utilize drug information resources to identify and manage drug-drug interactions using drug information (DI) resources when unprompted.

**Methods:** A cross-sectional study will be conducted on pharmacy students in their first- through third-year of didactic study. Participating students will be presented with a paper copy of three patient case vignettes meant to simulate the outpatient pharmacy setting. Students will be presented with a "new prescription" and asked to evaluate the prescription and determine whether or not to fill it. Each patient profile and "new prescription" will correspond to one of three situations: contraindicated DDI, DDI requiring an intervention, and a control prescription without a DDI. Students will be given the option to use one drug information resource at their discretion. Performance scores will be calculated for each assessment item across the three interactions. Confidence and perception will be evaluated using a survey based on prior related studies. To incentivize participation, bonus points will be awarded to participating students.

**Preliminary Results/Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify Identify common reasons pharmacists may not appropriately identify and manage DDIs.

Describe Describe the current level of pharmacy student readiness to identify and manage DDIs.

### Self Assessment Questions:

1. Which of the following is a common reason resulting in the failure to identify a drug-drug interaction in a pharmacy setting?

- A Excessive number of alerts resulting in "alert fatigue"
- B Under detection of drug interactions due to suboptimal CDSS
- C Expanding number of FDA-approved medications
- D All of the above are true

Which of the following statement is true regarding this DDI research study?

- A Assessed students' ability to identify and manage DDIs using DI re
- B Drug interactions were chosen that students have previously enco
- C This study identified students retention of DDIs following a DDI ele
- D Assessed students' ability to recall specific drug interactions

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF EPIC INTERVENTION ON ALTEPLASE USE AND CORRELATION WITH CLABSI OCCURRENCE

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Central venous access devices (CVADs) are fundamental clinical tools in healthcare facilities to administer lifesaving interventions in a timely manner. Dangerous treatment delays can occur when loss of central access occurs from line occlusion. Alteplase 2mg/2mL (Cathflo) has been shown to restore line patency, which is vital for continuing treatment in patients with limited central venous access, but can be unnecessary in patients who no longer require the line. Current ordering procedures at the Cleveland Clinic Health System (CCHS) do not require prescribers to identify or evaluate lines when prescribing alteplase for line occlusion. By requiring individual orders for each lumen along with the prescriber providing discrete information of the line type and site; it is thought that the prescriber will evaluate the possibility of line removal or replacement versus clearing with alteplase. This outcome can reduce overutilization of alteplase, and also reduce CVAD-associated days. In this study we will assess the impact of implementing new required physician ordering parameters for alteplase for line occlusion in intensive care units at Cleveland Clinic.

This is a single-center pre/post interventional cohort study of adult CCHS patients admitted to an ICU with a CVAD from September 18th, 2018 to February 18th, 2019. Patients are excluded if they receive alteplase 2mg/2mL intrapleurally. The primary objective is to compare the rates of alteplase utilization before and after implementation of additional physician ordering parameters. Secondary objectives include evaluating the average amount of alteplase administered to a line, line characteristics, duration of CVAD usage post alteplase dose, and rates of central line associated bacterial infections (CLABSI) before and after implementation. Pertinent data collected includes age, gender, type of CVAD, duration of line, line insertion site, number of administrations, dose administered, time administered, and infection control reported CLABSI events.

**Results and Conclusions:** Data analysis currently underway.

### Learning Objectives:

Review current best practices in prevention of central line associated bacterial infections and risk factors associated with their occurrence.

Recognize the impact of overutilization of alteplase for line occlusion.

### Self Assessment Questions:

The primary cause of line occlusion is due to:

- A Drug Induced Precipitate
- B Mechanical Obstruction
- C Thrombotic Blockage
- D Malposition

How routinely should a peripheral inserted catheter be replaced to prevent a CLABSI?

- A Every 7 days
- B Every 30 days
- C Every 48 days
- D They should not be routinely replaced to prevent CLABSI

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF AN ANTIMICROBIAL STEWARDSHIP RISK-ASSESSMENT TOOL TO PREDICT THE OCCURRENCE OF DRUG-RESISTANT PATHOGENS AND ASSOCIATED OUTCOMES IN PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

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**Purpose:** Antimicrobial stewardship programs (ASPs) serve as vital resources to prevent increased rates of multidrug resistant organisms by optimizing antimicrobial agent selection based on patient-specific risk factors. Community acquired pneumonia (CAP) is a targeted disease state for ASPs across healthcare settings, as treatment for this disease state often features inappropriate anti-infective selection, excessive duration of therapy, and suboptimal dosing strategies. These inappropriate prescribing practices may be driven by a lack of consistent educational resources for providers. In order to address this knowledge gap and improve antimicrobial prescribing patterns at Northwestern Memorial Hospital (NMH) a CAP-specific treatment algorithm using risk classification for drug resistant pathogens (DRPs) was established. This algorithm included recent gastric acid suppression, tube feeding, non-ambulatory status, hospitalization for two or more days during the last 90 days, antibiotic use within the previous 90 days, and immunosuppression, as these factors were identified as being more associated with DRPs in patients with CAP. This study aims to validate the appropriateness of risk stratification for DRPs using the aforementioned algorithm in CAP patients from whom isolates of *Pseudomonas aeruginosa* (PSA) were obtained. Performance of the risk assessment tool evaluated outcomes of patients determined to be high-risk compared to those low-risk patients without DRPs to assess the correlation between individual risk factors and occurrence rates of resistant pathogens.

**Methods:** This retrospective, single-center, cohort chart review including hospitalized patients with CAP in non-ICU settings at Northwestern Memorial Hospital from January 1, 2014 to May 29, 2018 will evaluate the accuracy of risk assessment tools for DRP PSA based on patient-specific risk factors compared to CAP patients without PSA. Data collected included patient demographics and risk factors, culture data, and antimicrobial therapy selection including agent, dosage, and duration.

**Results/Conclusion:** To be presented at the Great Lakes Pharmacy

### Learning Objectives:

Describe patient specific risk factors that can predict an increased risk for drug resistant pathogens.

Recognize antimicrobial stewardship strategies to reduce the risk of inappropriate antibiotic selection based on identifiable risk factors.

### Self Assessment Questions:

Which of the following are risk factors that increase a patient's risk for drug resistant pathogens (DRPs)?

- A Non-ambulatory status
- B: Use of gastric acid suppression
- C: Antibiotic use within the previous 90 days
- D: All of the above

Which of the following prescribing practices decreases the risk for development of multidrug resistant organisms?

- A Extended course empiric antimicrobial therapy
- B Lower doses of antimicrobial agents to reduce antibiotic exposure
- C Culture-directed antimicrobial therapy using guideline-recommend
- D Combination therapy using agents with similar spectrums to ensur

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## MODELING MEROPENEM BOLUS TO PROLONGED INFUSION

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**Purpose:** Investigate novel meropenem dosing strategy to attempt to meet various pharmacodynamic targets, including time above MIC (T>MIC) associated with clinical efficacy and trough concentrations associated with suppression of bacterial resistance.

**Methods:** Monte Carlo simulations were performed using Crystal Ball to model meropenem doses in three patient populations: <120 kg patients, ≥120 kg ICU patients and ≥120 kg non-ICU patients. Bolus doses included 250 mg, 500 mg and 1000 mg infused over 5, 15 and 30 minutes immediately followed by a prolonged infusion of 500 mg, 1000 mg and 1500 mg infused over what remained of a three hour time window. The primary endpoint was probability of target attainment (PTA) of 40% T>MIC. Secondary endpoints included PTA 54% T>MIC, 100% T>MIC, trough concentration 1.7 x MIC and trough concentration 6.2 x MIC. First dose and steady state outcomes were investigated.

**Preliminary Results:** All first BPI doses studied achieved >97% PTA for 40% T>MIC at MICs ≤8 mcg/mL and >90% PTA for 100% T>MIC at MICs ≤1 mcg/mL in non-ICU patients regardless of weight. In ≥120 kg ICU patients, all doses achieved >91% PTA for 40% T>MIC for MICs ≤4 mcg/mL and >90% PTA for 100% T>MIC at MICs ≤0.5 mcg/mL. In ≥120 kg non-ICU patients, a 500 mg bolus/1500 mg infusion had >90% PTA for trough concentration 6.2 x MIC at MIC ≤1 mcg/mL with most infusion times. This dose also correlated with the greatest PTA for trough 6.2 x MIC for MIC ≤0.5 mcg/mL in ≥120 kg ICU patients and the highest PTA for 1.7 x MIC targets in all groups. Steady state data are pending.

**Conclusions:** Utilizing a bolus and prolonged infusion combination approach to meropenem dosing likely achieves pharmacodynamics associated with clinical efficacy and may achieve targets associated with suppression of antimicrobial resistance at lower MICs.

### Learning Objectives:

Review previous research in dose optimization of meropenem

Describe results of Monte Carlo simulations investigating meropenem bolus prolonged infusion dosing

### Self Assessment Questions:

What time above MIC (T>MIC) has been established to be adequate for clinical efficacy against Gram negative organisms for meropenem?

- A 40% t>mic
- B: 54% t>mic
- C: 60% t>mic
- D: 100% t>mic

Which meropenem trough concentration has been shown to suppress antimicrobial resistance when utilizing meropenem monotherapy?

- A 0.5 mcg/mL
- B 10 mcg/mL
- C 1.7 x MIC
- D 6.2 x MIC

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF INSULIN ADMINISTRATION AND HYPOGLYCEMIC EVENTS IN HOSPITALIZED PATIENTS WITH TYPE 2 DIABETES

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**Purpose:** The American Diabetes Association recommends close monitoring of blood glucose during hospitalization due to associated morbidity and mortality following hypoglycemia. Risk factors for hypoglycemia should be carefully assessed before insulin initiation. Higher weight-based insulin doses have been associated with greater odds of hypoglycemia during hospitalization. Additional insight on risk factors for hypoglycemia during hospitalization are needed as most of the current literature focuses on outpatient risk factors. The primary aim of this study is to compare total daily insulin doses in hospitalized patients with type 2 diabetes experiencing a hypoglycemic event to those who did not experience a hypoglycemic event. Secondary aims are to evaluate risk factors for hypoglycemia in hospitalized patients with type 2 diabetes and to describe risk factors for multiple hypoglycemic events during a single admission.

**Methods:** This single-center, retrospective case control study will include patients 18 years of age or older with a diagnosis of type 2 diabetes admitted to the University of Cincinnati Medical Center who have been receiving a subcutaneous insulin regimen for 24 hours or more since the time of hospital admission. Patients in the case group experiencing hypoglycemia defined as a blood glucose of less than or equal to 70 mg/dL will be randomly matched to a control patient who was admitted during the same month as the case patient. Patients admitted to the hospital for diabetic ketoacidosis or hyperglycemic crisis, patients using an insulin pump, patients with cystic fibrosis, and pregnant women will be excluded. Total daily insulin doses will be compared using a student t test or Wilcoxon Rank sum test as appropriate. A multivariate logistic regression analysis will be performed to determine characteristics predictive of an initial hypoglycemic event as well as multiple hypoglycemic events during the same admission.

**Results/Conclusion:** Data collection and analysis are currently on-going.

### Learning Objectives:

Discuss negative outcomes associated with hypoglycemia

Describe risk factors for hypoglycemia in patients with type 2 diabetes

### Self Assessment Questions:

Which of the following adverse events is most likely to be attributable to hypoglycemia?

- A Traumatic Brain Injury
- B: Seizure
- C: Acute myocardial infarction
- D: Neuropathy

Which of following choices is a risk factor for hypoglycemia in patients with type 2 diabetes?

- A Age less than 35 years old
- B CrCl > 100 mL/min
- C Use of ACE inhibitors
- D Use of insulin

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPROVING PREP SERVICES IN A MAJOR URBAN HOSPITAL

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**Purpose:** Clinical trials have demonstrated the safety and efficacy of preexposure prophylaxis (PrEP) therapy in decreasing the spread of HIV by 92%. However, the incidence of HIV in certain populations, such as men who have sex with men (MSM) and select minority groups, has remained stagnant or even increased. Approximately 10% of individuals expected to benefit from PrEP therapy have been initiated on treatment. Successful implementation of PrEP services requires a collaborative and proactive approach among healthcare providers with proper infrastructure and processes to facilitate the program. The purpose of this study was to improve management and access to PrEP therapy through implementation of a PrEP referral process and advancement of a pharmacy practice model in primary care.

**Methods:** This was a single-center, IRB-approved, quasi-experiment for patients before and after implementation of a PrEP assessment template and expansion of PrEP services. Patients were included if they presented to the emergency department (ED) between October 2018 – March 2019 and met the Center for Disease Control (CDC) guideline criteria for PrEP therapy. The intervention group was compared to a similar cohort of patients from April 2018 – September 2018. Exclusion criteria: HIV positive, <18 years old, contraindication to PrEP therapy, or PrEP therapy, patients admitted to the hospital from the ED, and pregnancy. The two-part intervention provided ED screeners a set of criteria to assist in identifying high-risk patients for PrEP referral and established delegated authority for ambulatory care pharmacists to order PrEP medications and associated labs that are indicated per CDC guidelines. Endpoints included structure, process, and outcome measures. Additional opportunities for improvement included number of referrals, HIV tests performed, number of patients who attended the referral appointment, and prescriptions written for PrEP therapy. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe opportunities for quality improvement in the treatment of high-risk patients for HIV presenting to the Emergency Department

Identify appropriate patients for PrEP referral

### Self Assessment Questions:

What is only medication approved for preexposure prophylaxis (PrEP) against HIV?

- A tenofovir disoproxil fumarate/emtricitabine
- B: dolutegravir/rilpivirine
- C: abacavir/lamivudine
- D: lamivudine/zidovudine

According to the CDC, how often should an individual who is on PrEP therapy be tested for HIV?

- A every month
- B every 2 months
- C every 3 months
- D every 4 months

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## REAPPRAISAL OF ANTIMICROBIAL STEWARDSHIP IN THE EMERGENCY DEPARTMENT THROUGH EVALUATION OF CULTURE FOLLOW-UP

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### Purpose

To evaluate the impact of Henry Ford Hospital's emergency department culture follow up programs on appropriateness of therapy, patient outcomes and process measures.

### Background

Overuse of antibiotics and inappropriate prescribing practices lead to poor patient outcomes. In acute care hospitals in the United States, 20-50% of the antibiotics prescribed are unnecessary or inappropriate. Emergency departments represent an important target for antimicrobial stewardship practices due to the use of empiric antibiotics and the need for culture and susceptibility report follow up. This study aimed to evaluate the impact of an emergency department culture follow up program on appropriateness of therapy, patient outcomes and process measures.

### Methods

This retrospective quasi-experimental study evaluated patients at least 18 years of age presenting to the emergency department who had a positive urine or blood culture and who were discharged home with a prescription for antibiotics at three distinct points in time: January 1, 2011 to February 6, 2012, January 1, 2014 to December 31, 2014, and January 1, 2018 to September 30, 2018. The primary endpoint evaluated in this population was a composite endpoint of readmission within 30 days and emergency department revisits within 96 hours. Secondary endpoints included appropriateness of therapy and time to appropriate therapy. Additional data collected included age, gender, race, pregnancy status, insurance status, and presence of catheter and/or other indwelling urinary device. Nominal will be evaluated using the Chi squared test and continuous data will be evaluated using ANOVA. Multivariate logistic regression analyses will be used to control for confounders in subgroups of interest such as public and privately insured patients.

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize barriers to culture follow up in emergency departments  
Identify risk factors for receiving inappropriate antibiotic prescriptions in the emergency department

### Self Assessment Questions:

Which of the following are barriers to culture follow up in the emergency department?

- A Culture and sensitivity results are often available before the patient
- B: Culture and sensitivity result guided therapy is used for patients with
- C: 15.7% of patients leave the emergency department with a prescription
- D: More than half of antibiotics prescribed in the emergency department

Which of the following are risk factors for receiving inappropriate antibiotic prescriptions in the emergency department?

- A Child
- B Night-time admission
- C qSOFA score
- D female

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A PHARMACIST MEDICATION RECONCILIATION ON ACCOUNTABLE CARE ORGANIZATION (ACO) PATIENTS DISCHARGING TO AN EXTENDED CARE FACILITY (ECF)

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**Purpose:** Medication discrepancies and lack of communication during transitions of care have a major impact on hospital readmissions and patient safety. Medication errors account for approximately 1.5 million adverse events annually, with an estimated 40% of these errors occurring due to insufficient medication review during the transition of care process. The primary objective of this study is to ensure patients discharging to extended care facilities are receiving the most appropriate therapy based upon their primary diagnosis and prior to admission (PTA list).

**Methods:** This is a prospective, quality improvement study that includes accountable care organization (ACO) patients discharging to one of two extended care facilities between October 2018 and March 2019. The study was broken into two phases. Phase 1 will evaluate the current discharge medication reconciliation process within Franciscan Health – Indianapolis. Phase 2 continues the process conducted in phase 1, but adds two additional components. The first component is a standardized, easy-to-read patient medication list that will be sent to the respective extended care facility. The second component involves the primary investigator reviewing the patient's extended care facility medication list within 24 hours, developing a closed-loop process. Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review possible causes for medication errors that occur when a patient is discharging from the hospital to an extended care facility  
Explain the NCC MERP Index and how this tool is utilized to categorize medication errors

### Self Assessment Questions:

Which of the following is a source of medication errors for elderly patients transitioning to extended care facilities?

- A Lack of communication
- B: Manual entry of medication lists into EMR systems
- C: Complicated medication regimens
- D: All of the above

A patient was admitted to the hospital for community-acquired pneumonia. Warfarin 5 mg by mouth every other day was listed on the patient's prior to admission medication list. On admission, warfarin was

- A Category A - No error occurred
- B Category D - Error occurred that reached the patient and required
- C Category E - Error occurred that contributed to, or resulted in, harm
- D Category H - Error occurred that required an intervention necessary to prevent harm

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMIZING USE OF THE ELECTRONIC MEDICAL RECORD TO IMPROVE TRANSITIONS OF CARE FOR ONCOLOGY SERVICES

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**Purpose:** In order for pharmacists to fulfill their critical role in providing comprehensive patient care, complete access to clinical information is fundamental. Oncology treatment regimens tend to be complex, individualized, and high risk, which warrants a greater need for transparency across all clinical care settings. Because transitions of care are known for being vulnerable to a lack of standardization, the electronic medical record (EMR) should be optimized to achieve standardization of pharmacist care that supports oncology services across the health system. At Norton Healthcare, there is a lack of standardization in the pharmacy department between the inpatient and ambulatory care settings. The purpose of this project is to optimize the use of the EMR to improve transitions of care for patients receiving oncology-based services.

**Methods:** This process improvement project utilizes a define, measure, analyze, and improve methodology to drive improvements in transitions of care for patients receiving oncology services. The define stage outlines the perceived problems with current patient assessment and pharmacist documentation within inpatient pharmacies and ambulatory care clinics. Measure includes an evaluation of current problems as they exist within the workflow in both settings. The main focus for analyze includes using a gap analysis to compare actual workflow to ideal workflow to identify opportunities for standardization. Lastly, the improve step designs and incorporates proposed standardized strategies into both the inpatient pharmacies and ambulatory care clinics.

### Learning Objectives:

Identify Identify EMR standardized strategies that would benefit oncology pharmacy services.

Describe Describe the benefits in optimizing clinical pharmacists EMR documentation for transitions of care.

### Self Assessment Questions:

Which of the following standardization strategies may benefit transitions of care for oncologic services?

- A Standardized pharmacist documentation
- B: Comprehensive patient assessment that is consistent across practices
- C: EMR indicators of recent patient admission to the hospital
- D: All of the above

Which of the following is NOT a benefit of optimizing clinical pharmacist documentation in an electronic medical record?

- A Continuity of patient care
- B Optimized pharmacist workflow
- C Comprehensive patient assessment
- D Increased incidence of medication errors

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPACT OF ORDER SET CHANGES ON PHYSICIAN PRESCRIBING PRACTICES AND CLINICAL OUTCOMES IN THE INTENSIVE CARE UNIT

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### Purpose:

A standard order set is a pre-defined template that assists health care providers in making clinical decisions when entering orders for medications, laboratory tests, imaging, diet modifications, and monitoring parameters. Implementation of disease specific order sets has been shown to improve compliance with standards of care for the management of a variety of different disease states. However, evidence of the impact admission order sets can have on the care of hospitalized patients is limited. The purpose of this study is to compare the prescribing habits of providers before and after changes made to the Inpatient Adult Critical Care Admission Order Set (IP CC Admit Order Set) at Bronson Methodist Hospital.

### Methods:

Data will be collected retrospectively from a report generated using the electronic medical record. Patients were included if they were 18 years or older, were admitted to the Medical Intensive Care Unit (MICU) and if the IP CC Admit Order Set was utilized. Patients were excluded if they were admitted to the MICU for a second time during their hospital stay and if they were pregnant or a prisoner. Patients admitted prior to order set changes being made (May 19, 2018 to August 19, 2018) were compared to patients admitted after changes were implemented (August 20, 2018 to December 20, 2018). Changes to the order set include: addition of scheduled acetaminophen, addition of a histamine 2 receptor antagonist (H2RA) and listing lactated ringers as the first choice intravenous fluid, rather than normal saline. The primary outcome of this study is the change in the number of orders for scheduled acetaminophen, an H2RA, and lactated ringers after implementation of the revised IP CC Admit Order Set.

### Summary/Conclusions:

Data collection and analysis is currently in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the benefits of incorporating standard order sets into everyday practice.

Review literature available on the use of standard order sets.

### Self Assessment Questions:

Which of the following is an advantage of standard order set implementation?

- A Increased interactions between pharmacists and physicians
- B: Reduced need for providers to use clinical judgement
- C: Simplification of order verification for pharmacists
- D: Decreased omission and variations in care

Disease specific order sets have been shown to

- A Improve compliance with standards of care
- B Complicate physician workflow
- C Increase the number of inappropriate lab tests
- D Have no effect on patient outcomes

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## FENTANYL-DRIVEN ANALGOSEDATION VERSUS MIDAZOLAM-DRIVEN MULTIMODAL SEDATION IN MECHANICALLY VENTILATED ICU PATIENTS

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**Purpose:** In 2018, the Society of Critical Care Medicine upheld the 2013 guidelines on the management of pain, agitation, and delirium in mechanically ventilated patients. These guidelines support the use of analgo-sedation as first line therapy over benzodiazepine infusions for sedation. Analgo-sedation is defined as either analgesia-first sedation (e.g. starting an opioid analgesic prior to a sedative to reach the targeted RASS score) or analgesia-based sedation (e.g. using an opioid analgesic instead of a sedative to reach the targeted RASS score). Review of the literature did not reveal any studies directly comparing patient outcomes between these two approaches to analgo-sedation. This study compares the risks and benefits of analgesia-based sedation using fentanyl infusion alone, to analgesia-first sedation using fentanyl infusion in conjunction with midazolam to achieve institutional targeted light sedation (RASS score -1 to +1) in mechanically ventilated critically ill patients. **Methods:** This is a retrospective cohort study evaluating patients admitted to adult critical care units from August 1, 2013 to July 31, 2018. Patients  $\geq 18$  years of age, and mechanically ventilated for  $\geq 24$  hours were included. Patients were excluded if they were being treated for a primary diagnosis of alcohol withdrawal, traumatic brain injury, and status epilepticus. Patients receiving paralytic agents or undergoing targeted temperature management were excluded as well. Patients were divided into two different analgo-sedation groups: fentanyl infusion alone after initial stabilization (analgesia-based) and multimodal sedation including a fentanyl infusion in conjunction with midazolam infusion (analgesia-first) for a minimum of 12 hours. The primary endpoint of this study is length of mechanical ventilation. Secondary endpoints include average daily RASS score, total fentanyl dose, additional sedatives and dose, length of stay in the critical care unit and hospital, adverse events, and mortality. **Results/Conclusion:** Results and conclusion to be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review recommendations for treatment of agitation/sedation from the updated 2018 Society of Critical Care Medicine pain, agitation/sedation, delirium, immobility, and sleep disruption (PADIS) guidelines.

Discuss the risks and benefits of using analgo-sedation with a fentanyl infusion as first line therapy for treating agitation/sedation in mechanically ventilated ICU patients prior to traditional multimodal sedation approaches.

### Self Assessment Questions:

Based on the PADIS guidelines, which regimen is defined as analgesia-based sedation for the indication of sedation in mechanically ventilated ICU patients?

- A: Fentanyl infusion + propofol infusion
- B: Fentanyl infusion + propofol infusion + midazolam infusion
- C: Fentanyl infusion alone
- D: Midazolam infusion alone

Which of the following is correct regarding the use of a benzodiazepine infusion for sedation in mechanically ventilated ICU patients?

- A: Increased length of mechanical ventilation
- B: Decreased mortality
- C: Decreased risk for delirium
- D: Decreased length of stay in a critical care unit

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DESIGN AND IMPLEMENTATION OF A HOSPITAL GUIDELINE FOR THE MANAGEMENT OF CALCIUM CHANNEL BLOCKER AND BETA BLOCKER TOXICITY

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Beta blocker and calcium channel blocker toxicity is associated with a large number of fatalities and significant morbidity. American Poison Control centers report that the substance category with the third fastest rate of increased exposures is cardiovascular drugs. Recommendations for inpatient care have not been systematically developed and this poses as a concern for inpatient healthcare providers. The treatment of a patient who has presented with an overdose of a beta blocker and/or calcium channel blocker is critically complex, challenging to establish, at best vague when it comes to evidence-based treatments, and time-sensitive in nature. The relatively infrequent number of cases make it very difficult to establish any evidence-based treatment protocols. Calcium channel and beta blocker toxicity management, while rare, it is quite challenging for the health care team. The goal of this study is to review all cases of patients who experienced calcium channel or beta blocker toxicity at Munson Medical center between 1/1/14 and 1/1/19, to determine which treatments had the best outcomes, then to develop a hospital guideline based on a combination of the current literature and empiric observation. Providing a stepwise approach to therapy will add clarity to the current literature which currently lacks consensus. Time is of the essence in these patients, and a protocol could help to reduce risk of poor clinic outcomes. The purpose of this study is to design and implement an evidenced-based hospital guideline at Munson Medical Center with the expectation that it will contribute to the future of the management of calcium channel blocker and beta blocker toxicity.

### Learning Objectives:

Describe the clinical picture of a patient presenting with calcium channel blocker or beta blocker overdose

Discuss the literature evaluating the efficacy of treatment modalities for calcium channel blocker and beta blocker overdoses and understand their proposed mechanisms

### Self Assessment Questions:

Which of the following is true regarding high-dose insulin therapy (HDIT)

- A: It is a refractory treatment option for calcium channel blocker overdose
- B: A high-dose insulin infusion will promote vasoconstriction
- C: One titration parameter of a high-dose insulin infusion is blood pressure
- D: One titration parameter of a high-dose insulin infusion is blood glucose

Which of the following is proposed mechanism of action for lipid emulsion therapy?

- A: Decreased utilization of free fatty acids in cardiac myocytes for energy
- B: Enhanced uptake and utilization of glucose in stressed cardiac myocytes
- C: Enhanced metabolism of toxic metabolites through CYP3A4
- D: "Lipid Sink" Theory

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ANDEXANET ALFA VERSUS 4F-PCC FOR THE REVERSAL OF ORAL FACTOR XA INHIBITORS IN THE SETTING OF AN INTRACRANIAL HEMORRHAGE

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**BACKGROUND:** Direct oral anticoagulants (DOACs) have become a primary intervention for the medical treatment, prevention, and reduction of recurrent venous thromboembolism (VTE) and stroke prevention in patients with non-valvular atrial fibrillation. Their use has become increasingly prevalent over the years, with rivaroxaban and apixaban constituting 89% of the DOAC market.<sup>1</sup> Amongst all DOAC-related major bleeding events, intracranial hemorrhages (ICH) account for about 11%, and are associated with a 4-fold increased risk of mortality.<sup>2,3</sup> Given the risk of hematoma expansion and further neurological deterioration with an ICH, rapid reversal of the anticoagulant is essential. Until recently, most DOACs lacked a specific reversal agent in the setting of an emergent bleed, and management featured administration of blood products and prothrombin complex concentrates (PCCs); however, specific DOAC reversal agents have recently emerged.<sup>1,2</sup> Most recently, coagulation factor Xa (recombinant) (Andexxa®) received accelerated approval by the FDA for the reversal of anticoagulation by rivaroxaban or apixaban in the setting of life-threatening or uncontrolled bleeding.<sup>4</sup>

**METHODS:** This study will be a single-center, retrospective, cohort study, designed to evaluate hematoma expansion following andexanet alfa or 4F-PCC administration for the reversal of either rivaroxaban- or apixaban-associated ICH. Patients with a diagnosis other than extracranial hemorrhage or on a DOAC other than apixaban or rivaroxaban will be excluded. Study endpoints include interval increase in size of hematoma, average baseline hematoma volume, need for rescue therapy (e.g. repeat dosing of reversal agent), blood products administration (pre/post) and amount of units administered, need for hematoma evacuation, change in GCS score, ICU length of stay, administration of other reversal agents (i.e. DDAVP), thromboembolic events 30 days post-andexanet alfa administration, disposition (home, SNF, or SAR), and average time from order entry to administration.

**RESULTS/CONCLUSIONS:** To be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Discuss the utilization of prothrombin complex concentrates (PCCs) and andexanet alfa for the reversal of Factor Xa inhibitors in intracranial hemorrhages

Review the administration and effects of PCC's and andexanet alfa on hematoma expansion in the setting of oral Factor Xa inhibitor associated -ICH

### Self Assessment Questions:

1. Which of the following does andexanet alfa have FDA approved labeling for reversing in the setting of a life-threatening bleed?

- A: Edoxaban
- B: Apixaban
- C: Rivaroxaban
- D: B & c

Which of the following is a difference between FEIBA and Kcentra?

- A: FEIBA contains 3 Factors and Kcentra contains 4 Factors
- B: FEIBA contains 4 Factors and Kcentra contains 3 Factors
- C: FEIBA contains activated Factor VII and Kcentra contains inactivated Factor VII
- D: FEIBA contains inactivated Factor VII and Kcentra contains activated Factor VII

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## REDUCING CLINICAL VARIATION IN ANTITHROMBOTIC MEDICATION USE

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The purpose of this project is to evaluate UnityPoint Health's efficacy and safety outcomes related to combination antithrombotic regimens and design an intervention to bring use of these agents more in line with evidence-based clinical practice guidelines. The Tableau visualization tool using the Electronic Data Warehouse (EDW) will be queried to evaluate adult patients over 18 years of age with coronary artery disease (CAD) and an indication for anticoagulation, including atrial fibrillation, prosthetic heart valves, peripheral vascular disease, and venous thromboembolism. Medication therapies and indications for anticoagulation have been added to the CAD application and queried from the Lumedx Apollo Advance database to determine the association between aspirin use alone, double antithrombotic therapy, triple antithrombotic therapy, and adverse outcomes, including major bleeding events, at UnityPoint Health hospitals. Results will include the incidence of ischemic events, including stroke, venous thromboembolic disease, and stent thrombosis in addition to outcome metrics such as length of stay, 30-day readmission rate, mortality, and average direct variable costs, in these patients. As a result of these findings, Epic post-PCI order sets will be modified to improve these metrics and rates of complications, based on evidence-based clinical practice guidelines.

### Learning Objectives:

Select the appropriate triple antithrombotic regimen when given a brief patient case.

Identify one difference between the two sets of antithrombotic therapy recommendations discussed in the presentation.

### Self Assessment Questions:

LH is a 74 year old female with a HAS-BLED score of 2 who presents for urgent percutaneous coronary intervention (PCI) related to acute coronary syndrome. According to the 2018 Chest "Antithrombotic T

- A: No triple therapy
- B: One month of triple therapy
- C: One to three months of triple therapy
- D: Six months of triple therapy

Which of the following is a difference between the 2018 Chest "Antithrombotic Therapy for Atrial Fibrillation" guidelines and the 2018 AHA Consensus Statement on antithrombotic therapy in patients with

- A: The Chest guidelines prefer clopidogrel as the P2Y12 inhibitor while the AHA recommends prasugrel
- B: Both the Chest guidelines and the AHA recommend reducing the duration of triple therapy
- C: The AHA recommends up to six months of triple therapy while the Chest guidelines recommend up to three months
- D: In atrial fibrillation with stable coronary artery disease the Chest guidelines recommend triple therapy while the AHA recommends dual therapy

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT AND IMPLEMENTATION OF A PROTOCOL TO ADMINISTER HIGH-DOSE METHOTREXATE IN THE OUTPATIENT SETTING

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### Statement of Purpose:

The purpose of this implementation project is to create a protocol to allow for safe administration and monitoring of high dose methotrexate (HD-MTX) in the outpatient setting at Froedtert & the Medical College of Wisconsin. Previous studies on outpatient administration of HD-MTX have mainly focused on pediatric patients, but have shown that an outpatient protocol is feasible with close monitoring and patient education. Additional data is needed to assess this practice in adults prescribed HD-MTX.

### Methods:

This is a prospective implementation protocol. Enrollment of patients began in November of 2018 and will conclude in April of 2019. Patients with osteosarcoma and breast cancer with leptomeningeal involvement receiving HD-MTX will be included at the discretion of their physician. Patients will be excluded if they are <18 years old, are enrolled in a clinical trial or plan to receive doses <500 mg/m<sup>2</sup>. The primary outcome: are percent of cycles completed in the outpatient setting and the difference in cost, measured by charge to the patient for inpatient versus outpatient administration. Secondary outcomes include incidence and severity of toxicities, number of cycles completed in the outpatient setting and number of inpatient hospital stays avoided.

### Summary and Conclusions

This implementation protocol is currently recruiting patients who fit all parameters and who have shown appropriate methotrexate clearance in the inpatient setting. There is currently a treatment plan available for patients with osteosarcoma patients in the electronic health record and another treatment plan is being created for patients with breast cancer with leptomeningeal involvement. Enrollment for the study is open, however, no patients have been enrolled to date.

### Learning Objectives:

List the criteria that are necessary for outpatient high-dose methotrexate in the specified patient populations.

Reproduce the criteria that are necessary for outpatient high-dose methotrexate in the specified patient populations.

### Self Assessment Questions:

Which of the following may prompt inpatient administration while a patient is receiving high-dose methotrexate?

- A Serum creatinine of 1.17 mg/dL (baseline of 0.8 mg/dL)
- B: 24 hour methotrexate level post infusion of 26 micromol
- C: Bilirubin of 2.1 mg/dL
- D: ALT of 240 u/L (baseline 19 u/L)

Which of the following may preclude a patient from receiving outpatient high-dose methotrexate?

- A Patient receiving methotrexate dose of 12 g/m<sup>2</sup> who fits all other c
- B Patient receiving methotrexate dose of 8 g/m<sup>2</sup> who fits all other cri
- C Patient who had delayed clearance during first dose while inpatient
- D Patient who had elevated liver enzymes of 5x ULN after first dose

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PHARMACY MEDICATION SAFETY RESOURCES IN PEDIATRIC HOSPITALS

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Adverse drug events (ADEs) occur in various stages of the medication use process and may lead to patient harm. As health-systems continue to expand pharmacy and clinical services, the ability to evaluate potential medication safety risks and mitigate errors remains a high priority. Workload and productivity monitoring tools exist for the assessment of operational and clinical pharmacy services. However, such tools have not been created to justify medication safety pharmacy services. The purpose of this study is to determine methods used to assess, allocate, and justify medication safety resources in pediatric hospitals. We hypothesized that challenges exist in adding additional resources for unique positions such as medication safety resources.

A 31 question survey was designed and distributed utilizing the Research Electronic Data Capture (REDCap) tool. Productivity assessment literature was used to guide survey development. The survey was disseminated to 47 pediatric hospitals affiliated with the Children's Hospital Association (CHA) Medication Safety Leaders Collaborative and Pharmacy Director's Forum. The survey was distributed in October 2018 and the respondents had three weeks to submit responses. Three reminders were sent to respondents before the deadline. Data analysis includes the use of descriptive statistics. Categorical variables were summarized by frequencies and percentages to distinguish the differences between pediatric health-systems.

Preliminary results of the study demonstrate variability of medication safety resources within pediatric hospitals. This information can enable pharmacy leaders to benchmark practices and full-time equivalent assessment in order to justify additional resources. It can also serve as the foundation to create a standardized scoring tool to assist with resource allocation for medication safety resources.

Assessing medication safety resources at various pediatric hospitals highlights several potential barriers and opportunities. Pharmacy has a role in conducting proactive and reactive review of safety concerns throughout the medication use process.

### Learning Objectives:

Discuss the various ways pediatric hospitals justify medication safety resources

Identify similarities and differences between pediatric hospitals and common barriers for resource justification

### Self Assessment Questions:

Which of the following statements is correct?

- A Pediatric hospitals lack variability with medication safety resources
- B: Medication safety risk assessment and mitigation are low priority
- C: Workload and productivity monitoring tools are undefined for medication safety
- D: Resource assessment is unwarranted for medication safety pharmacy

2. Based on the survey results, what is the most common challenge in justifying additional medication safety resources?

- A Budgetary constraint
- B Lack of leadership support
- C Shortage of medication safety trained pharmacists
- D Satisfaction with current medication safety resources

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECTS OF EHR CONVERSION ON DRUG-DRUG INTERACTION (DDI) ALERTS AND ACCEPTANCE RATES BY PROVIDERS IN AN ACADEMIC MEDICAL CENTER

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Clinical decision support (CDS) is a tool designed to help prevent adverse drug events (ADEs) in healthcare settings, but the amount of alerts healthcare providers receive raises concerns about their clinical usefulness and impact on patient care and safety. In the setting of converting from one electronic health record (EHR) to another, staff at Northwestern Memorial Hospital (NMH) have observed an increase in the overall number of drug-drug interaction (DDI) alerts since switching from Cerner to Epic. ADEs comprise the largest single category of adverse events experienced by hospitalized patients, accounting for about 19 percent of all injuries. This project is a retrospective study comparing inpatient drug-drug interaction alerts at the point of ordering by providers. Data will be collected from August through October of 2017 in the Cerner legacy EHR and August through October of 2018 in Epic EHR. Key data points include date and time of drug interaction alert to the provider, both drugs that triggered the drug interaction alert, severity class of interaction alert, acceptance of the alert by the provider, and reason for override of the alert. The goal of this project is to determine if there is a difference between the acceptance rates for DDI alerts by providers after the transition from Cerner to Epic at NMH. By assessing the number and severity of alerts received in Cerner and Epic, we can attempt to understand why alerts may be accepted or overridden by providers, what alerts were commonly overridden, and the impact of clinical decision support on patient outcomes. Results and conclusion are in progress and will be presented at the 2019 Great Lakes Pharmac Resident Conference.

### Learning Objectives:

Discuss clinical decision support systems (CDS) and alert fatigue as well as their role in patient care and safety

Review current literature comparing the effects on drug-drug interaction (DDI) alerts and acceptance rates after transitioning from a legacy electronic health record (EHR) to a commercial EHR

### Self Assessment Questions:

What percentage of adverse events experienced by hospitalized patients are related to adverse drug events?

- A: 35%
- B: 22%
- C: 19%
- D: 50%

Which of the following tools is NOT an example of clinical decision support (CDS) available to providers to assist in clinical decision-making

- A: Medication order sets
- B: Drug dosing calculations
- C: Drug formulary guidelines
- D: Automated drug substitutions

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ANTI-IMPULSE THERAPY IN THE TREATMENT OF TYPE B AORTIC DISSECTION

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Stanford Type B aortic dissections (TBAD) originate distal to the left subclavian artery, and can be differentiated into complicated and uncomplicated, based on symptomatology. Complicated dissections exhibit symptoms of malperfusion, rupture, hypotension/shock, or neurologic sequelae that warrant emergent surgical intervention. Additionally, hypertension refractory to three IV agents or uncontrolled pain indicates the need for urgent surgical intervention. Uncomplicated TBAD is largely managed through optimal medical therapy (OMT) with anti-impulse therapy aimed to lower the momentum of blood across the site of the tear by slowing the heart rate (HR) to a goal of less than 60 beats per minute (bpm) and maintaining blood pressure (SBP) between 100–120 mmHg. The purpose of these strict blood pressure parameter is to prevent rupture or propagation of the dissection. However, these aggressive endpoints come at the potential cost of end organ hypoperfusion, and the associated sequelae. The primary objective of this study is to assess the safety and efficacy of anti-impulse therapy in acute, uncomplicated TBAD.

This was a single-center, retrospective, cohort comparison study of adult patients with acute, uncomplicated TBAD from January 2013 through June 2018. Patients with type A aortic dissection, complicated TBAD, traumatic aortic dissection, intramural hematoma, penetrating atherosclerotic ulcer, end-stage renal disease, hepatic dysfunction, and pregnancy were excluded. Patients will be assigned to either goal HR <60 bpm achieved or not achieved. Study arms will be compared for the need of emergent operation and end-organ dysfunction. Secondary outcomes include incidence of achievement of both goal HR and SBP, presence of clinically relevant or severe hypotension, number of anti-impulse medications required, time to oral conversion of medications, and length of ICU stay.

Data collection and analysis is ongoing. Preliminary results and conclusions will be presented at the 2019 Great Lakes Residency Conference.

### Learning Objectives:

Explain the role anti-impulse therapy plays in the management of acute, uncomplicated type B aortic dissection

Recognize potential adverse events related to anti-impulse therapy

### Self Assessment Questions:

Which of the following best describes the mechanism of anti-impulse therapy in acute, uncomplicated TBAD?

- A: Lowers systolic blood pressure, decreasing workload of the heart
- B: Reduces stress along the tear, decreasing risk of propagation and
- C: Decreases systolic blood pressure, reducing the risk of stroke/MI
- D: Minimized heart rate, decreasing the pulsatile flow across the tear

Which of the following are potential adverse events related to anti-impulse therapy?

- A: End-organ dysfunction
- B: Stroke/MI
- C: Mesenteric ischemia
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A SURGICAL ANTIBIOTIC PROPHYLAXIS PROTOCOL

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### Purpose:

Surgical site infections (SSI) represent 31% of all hospital-acquired infections, according to a prevalence study in 2012. Even with enhanced infection prevention practices, SSI have a 3% mortality rate of all hospital-acquired infections. Despite being within acceptable national limits, Palos Hospital saw a notable and sustained increase in SSI since the third quarter of 2017. A common procedural thread was not identified, and causative organisms varied. Given no identifiable trend, prophylactic antibiotics were evaluated. Internal review identified that the surgical prophylaxis guidelines and antibiotic utilization were not congruent with published guidelines, and that the recommended re-dosing times were provided as ranges versus a single time, resulting in ambiguity. The institution protocol was revised to incorporate recommendations from the American Society of Health-System Pharmacists and American Association of Nursing Anesthetics to provide a single recommended re-dose time based on drug half-life. The primary objective of this study is to evaluate the impact of the revised surgical antibiotic prophylaxis guideline on SSI rates.

### Methods:

This is a retrospective, single-center, quality improvement study using the electronic medical record. The SSI rate pre-guideline revision will serve as baseline. Data points will be evaluated using a standardized checklist and include: patient's allergies, weight, renal function, infection risk factors, history of infections, prophylactic antibiotic agent used, prophylactic antibiotic dose, antibiotic administration time, and re-dose time(s).

### Results:

Preliminary data suggest that the current SSI rate is lower than the rate pre-guideline revision. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the impact of surgical site infections on mortality rate.  
Discuss the recommended antibiotic infusion time prior to surgical incision time.

### Self Assessment Questions:

Which of the following adverse sequelae has been associated with the development of surgical site infections?

- A Acute kidney injury
- B: Ototoxicity
- C: Increased mortality
- D: Antibiotic resistance

A patient is scheduled for a total knee arthroplasty and is to receive vancomycin preoperatively. How early can vancomycin be initiated prior to incision time?

- A Up to 120 minutes
- B Up to 30 minutes
- C Up to 60 minutes
- D Up to 10 minutes

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## CONSOLIDATING AND DESIGNING A SYSTEM-WIDE FORMULARY FOR A MEDIUM SIZED HEALTH SYSTEM

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**Purpose:** The Aspirus health system includes 8 acute care centers ranging from critical access hospitals to a regional referral center. Among them, there are currently two electronic health records and 7 medication formularies with poor search functionality. A system-wide P&T committee was recently created to unify optimal medication management. The primary objective of this project is to create a system-wide formulary that is easily accessible online.

**Methods:** The different formularies were combined into one master formulary. Initially, only active ingredients and formulations were considered; individual strengths and concentrations will be examined at a later date. Furthermore, IV mixtures and maintenance fluids were excluded. Medications were then analyzed for commonalities in formulary status between sites. Medications found at the majority of facilities will be proposed to the system-wide P&T committee as the foundation for the system-wide formulary. A system functional team will then evaluate the remainder of the medications and suggest which medications should be added to the master formulary. Once the system-wide formulary is created, NDCs for the same medication will then be brought before pharmacy leadership for consolidation. Additionally, the master formulary will be exported into an online database so that any individual can search if a medication is part of the formulary. This project's success will be evaluated by employee surveys regarding the online formulary, number of views generated, and cost savings generated through medication consolidations.

**Results/Conclusion:** To be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the necessary steps to create a system P&T formulary  
Review barriers to implementation of a system P&T formulary

### Self Assessment Questions:

Which of the following is true per the Joint Commission?

- A Formularies require as many concentrations for a drug as possible
- B: Formularies require medication strength and dosage form
- C: Formularies require medicating pricing information
- D: Formularies require sample medications to be listed

Which of the following is a barrier to implementation of a system formulary?

- A Clinical informatics time and workload
- B Having hospitals in different states
- C Medication costs
- D Pharmacy technician staffing

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A PHARMACIST-LED INTERVENTION ON POSTSPLENECTOMY VACCINATION ADHERENCE AMONG TRAUMA PATIENTS.

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**Purpose:** Patients who undergo splenectomy are at increased risk of infection caused by encapsulated bacteria. Overwhelming postsplenectomy sepsis occurs in 5% of asplenic patients with a 50-70% mortality rate. The Advisory Committee on Immunization Practices (ACIP) recommends a series of vaccinations for asplenic patients, the first of which are generally completed prior to hospital discharge in the setting of trauma. Results from a previous observational study indicate that trauma patients at our institution receive booster vaccinations at a suboptimal rate. Because of these findings, the University of Louisville (ULH) developed and implemented an inpatient pharmacist-led postsplenectomy counseling service in October 2017. The objective of this quality improvement project was to evaluate the impact of this service on patient understanding and patient reported revaccination follow-up rate in the trauma population.

**Methods:** The ULH trauma registry was utilized to identify patients who underwent splenectomy due to trauma between October 2017 and December 2018. The data collected in the original observational study, representing pre-service implementation, was compared to the data collected in the current project, representing post-service implementation. Patients were contacted via telephone at least eight weeks after initial vaccination. A scripted introduction and questionnaire were utilized for every patient interaction. The primary outcome was patient reported follow-up vaccination rate per ACIP recommendations. Secondary outcomes included patient awareness of infection risk, patient reported hospitalizations since initial traumatic event, patient access to rapid antibiotics, and percentage of patients who received counseling by a pharmacist at ULH.

**Results and Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss Advisory Committee on Immunization Practices recommendations for vaccinations in asplenic patients.

Review the impact of a pharmacist-led counseling service on postsplenectomy patient adherence to follow-up vaccines.

### Self Assessment Questions:

Which of the following postsplenectomy vaccines only require a single dose?

- A Meningococcal ACWY
- B: Haemophilus influenzae type B
- C: Meningococcal serogroup B
- D: Pneumococcal

The role of a pharmacist in vaccinating patients who undergo splenectomy may include:

- A Educating patients and family members on importance of vaccination
- B Reminding patients and health care team members when vaccines
- C Administering vaccines
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## HEMODYNAMIC COMPARISON OF IV PUSH DILTIAZEM VS METOPROLOL FOR ATRIAL FIBRILLATION RATE CONTROL

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**Purpose:** Intravenous (IV) diltiazem and metoprolol are commonly used for the acute treatment of atrial fibrillation (AF) with rapid ventricular rate (RVR). Available evidence indicates similar efficacy between the agents for rate control leading to selection based upon provider preferences, patient comorbid conditions, and home rate control medications. There have been no studies conducted to evaluate whether there is a difference in hypotension incidence between agents. Degree of hemodynamic changes caused by IV diltiazem or metoprolol may impact medication selection in patients presenting to the emergency department with AF with RVR.

**Methods:** This is a retrospective study evaluating adult patients who received IV diltiazem or metoprolol for treatment of AF with RVR in the emergency department from July 1st 2008 to July 1st 2018. Known pregnancy, incarceration, rate or rhythm modifying interventions prior to study intervention, extreme dose of study intervention (metoprolol < 2.5 mg or > 5 mg, diltiazem < 10 mg or > 25 mg), myocardial infarction during admission, systolic blood pressure (SBP) < 90 mmHg immediately before study intervention, and presentation with acute heart failure exacerbation are exclusion criteria. The primary endpoint is mean reduction in SBP from baseline to nadir during the study period. Study period is defined as first IV push dose of metoprolol or diltiazem to 30 minutes after last IV push dose of intervention or first maintenance dose whichever comes first. Secondary outcomes include the following: a composite of SBP < 90 mmHg or 10% decrease in SBP, new vasopressor requirement, or fluid bolus during study period, rate control within study period, and nadir SBP within 6 hours of initial intervention. Chi-square and t-test will be utilized to analyze nominal and continuous data respectively.

**Results & Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize contraindications and precautions to use of metoprolol and diltiazem for atrial fibrillation with rapid ventricular rate.

Select a guideline-based medication and dose for treatment of atrial fibrillation with rapid ventricular rate given a patient scenario.

### Self Assessment Questions:

Diltiazem is contraindicated for treatment of atrial fibrillation with rapid ventricular rate in which of the following situations?

- A History of heart failure
- B: History of Wolf-Parkinson's White syndrome
- C: Home beta blocker usage
- D: Presentation with SBP 100 mmHg

An 80kg patient presents to the emergency department with atrial fibrillation, a ventricular rate of 150 BPM, and a stable blood pressure of 124/82 mmHg. Which of the following is the most appropriate

- A Cardioversion
- B Digoxin 500 mcg IVPB
- C Diltiazem 10mg IV push
- D Metoprolol 5mg IV push

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL OUTCOMES ASSOCIATED WITH THE USE OF PHENOBARBITAL IN PATIENTS WITH ALCOHOL WITHDRAWAL SYNDROME

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**Purpose:** In patients with alcohol withdrawal syndrome, there is limited data to support the addition of phenobarbital to symptom-triggered benzodiazepine therapy, or standard of care. Furthermore, there is limited data to guide the dosing of phenobarbital for this indication. Within Community Health Network, phenobarbital is used in a nonstandardized fashion for the treatment of alcohol withdrawal syndrome. It is unknown whether the addition of phenobarbital leads to improved clinical outcomes. The primary objective of this study is to compare time to resolution of symptoms between patients that received standard of care in comparison to standard of care plus phenobarbital.

**Methods:** This study was a retrospective, observational chart review of patients who had a "General Adult Alcohol Withdrawal Focused" order set placed and received doses of lorazepam with or without phenobarbital. The primary endpoint, time to symptom resolution, was evaluated by comparing time to CIWA-Ar scores less than or equal to ten between the two groups. To compare differences in clinical outcome between the two groups, endpoints such as hospital length of stay, intensive care unit length of stay, incidence of mechanical ventilation, and increase in level of care were collected. Data was compared between patients who received standard of care with or without phenobarbital. In an attempt to minimize confounding, study participants were matched using Charlson Comorbidity Index (CCI).

**Results:** Data collection for this study is on-going. Results will be presented at the Great Lakes Pharmacy Resident Conference

**Conclusion:** The conclusion of this study will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Describe the role of benzodiazepine and phenobarbital therapy in the treatment of alcohol withdrawal syndrome, respectively.

Identify the impact of phenobarbital on various clinical outcomes in patients with alcohol withdrawal syndrome

### Self Assessment Questions:

Which of the following are therapies that may be used in the treatment of alcohol withdrawal syndrome?

- A: Scheduled benzodiazepines
- B: Symptom-triggered benzodiazepines
- C: Phenobarbital
- D: All of the above

Which of the following is a reported clinical outcome associated with phenobarbital use in alcohol withdrawal syndrome?

- A: Higher cumulative doses of benzodiazepines
- B: Decreased ICU length of stay
- C: Increased rates of mechanical ventilation
- D: Increased incidence of respiratory depression

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT OF HUMAN IMMUNODEFICIENCY VIRUS (HIV) MEDICATION ASSOCIATED ERRORS ON HOSPITAL ADMISSION

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**Purpose:** First introduced in the mid-1990s, antiretroviral therapy (ART) revolutionized the management of human immunodeficiency virus (HIV). Initial first-line ART regimens included multiple tablets requiring frequent dosing throughout the day. Studies have shown an association with increased medication errors and these complex medication regimens in hospitalized patients with HIV. The 2018 ART guidelines, however, now recommend several single tablet once daily regimens as first-line treatment options. The purpose of this study is to determine if HIV-medication-related errors on inpatient admission have decreased since the widespread use of less complex first-line regimens for treatment naïve patients.

**Methods:** A retrospective chart review was conducted on HIV seropositive patients from September 2014 through August 2018. The study assessed baseline demographics such as sex, race, renal function, and liver function as well as HIV specific factors including home ART regimen, medication reconciliation, and time to correction of medication errors. Patients were included in the study if they met the following criteria: age greater than 18 years old, diagnosis of HIV, prescribed ART as an outpatient, and ART continued on admission. Medication errors were defined as wrong drug, omission error, wrong timing, wrong dose, or a known drug interaction. Known drug interaction: were predefined as antacids, multivitamins, H2-receptor antagonist, proton pump inhibitors, warfarin, antiepileptics, and HMG CoA-reductase inhibitors. The primary outcome was the number of medication errors in hospitalized patients with HIV. Secondary outcomes assessed pharmacist impact on overall achieved outcomes and time from admission to correction of medication errors. The study utilized descriptive statistics for data analysis, requiring 232 patients to meet power, with an effect size of 0.25.

**Results/Conclusions:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify medication related factors contributing to ART medication errors in hospitalized patients with HIV

Discuss the potential drug-drug interactions associated with common ART therapy

### Self Assessment Questions:

Which of the following is NOT cited as an example of medication related factors contributing to ART medication errors on hospitalized patients with HIV?

- A: Wrong drug
- B: Omission error
- C: Wrong frequency
- D: Wrong brand

Which of the following is a potential drug-drug interaction commonly associated with ART therapy

- A: Warfarin
- B: Cetirizine
- C: Montelukast
- D: Albuterol

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**EVALUATION OF PATIENT OUTCOMES FOLLOWING THE EXPANSION OF AMBULATORY CARE CLINICAL PHARMACY SERVICES ON RURAL HEALTH VETERANS WITHIN THE HERSHEL "WOODY" WILLIAMS VETERANS AFFAIRS MEDICAL CENTER IN HU**

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**Purpose:** The role of ambulatory care pharmacists in the outpatient clinical setting is expanding. In the VA health system, opportunities exist for pharmacists to see patients in clinics for a number of chronic disease states. The HWWVAMC utilizes clinical pharmacists to evaluate patients for chronic disease state management. Through the VA Office of Rural Health (ORH), the HWWVAMC has recently added three rural health clinical pharmacists. Each utilize face to face visits, phone calls, and telehealth technology. With an aging veteran population, ease of access to quality healthcare is becoming a prominent issue. The purpose of this study is to analyze the impact of pharmacist interventions on veterans seen in rural ambulatory care clinics.

**Methods:** A retrospective chart review to evaluate the impact of ambulatory care clinical pharmacy services in chronic disease state management. **Results & Conclusions:** Results and conclusions are currently pending and will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Outline Outline the American Diabetes Association guidelines of pharmacologic approaches to glycemic treatment

Discuss Discuss the impact of a pharmacist led rural outreach ambulatory care clinic on achieving blood pressure and HgbA1C goals

**Self Assessment Questions:**

What are potential reasons veterans may choose to follow with clinical pharmacy as opposed to their primary care physicians?

- A Lack of accessibility to primary care
- B: Chronic disabilities
- C: Transportation issues
- D: All of the above

What does the S represent in SMART goals?

- A Specific
- B Separate
- C Sustainable
- D Short-Term

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**EXTENDED INFUSIONS OF PIPERACILLIN/TAZOBACTAM VERSUS CEFEPIME FOR EMPIRIC TREATMENT OF NEUTROPENIC FEVER**

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**Purpose:** Neutropenic fever is considered a medical emergency. Since neutropenic patients may be unable to mount an inflammatory response a fever may be the only indication of a severe underlying infection. According to the IDSA and NCCN guidelines for high risk patients that require hospitalization, monotherapy with an anti-pseudomonal beta-lactam agent should be initiated as empiric treatment for neutropenic fever. Additional antimicrobial agents may be indicated based on other complications or resistance patterns. The NCCN guidelines state extended infusions of beta-lactams can be used instead of traditional infusions when optimization of pharmacodynamics is thought to be important. Currently, there is a lack of literature that directly compares extended infusions of piperacillin/tazobactam versus cefepime for neutropenic fever. The objective of this study is to compare the efficacy of extended infusions of piperacillin/tazobactam versus cefepime for the empiric treatment of neutropenic fever at a community hospital.

**Methods:** This retrospective, single-center cohort study includes patients 18 years and older with an absolute neutrophil count (ANC) less than 500 cells/mm<sup>3</sup> or ANC expected to decrease to less than 500 cells/mm<sup>3</sup> during the next 48 hours, single oral temperature measurement of greater than or equal to 38.3°C or a temperature of greater than or equal to 38° sustained over 1 hour period, and administration of extended infusions of piperacillin/tazobactam or cefepime as initial antibiotic therapy for at least 48 hours between January 1, 2015 and September 1 2018. The primary outcome is time to defervescence in hours between piperacillin/tazobactam and cefepime. Secondary outcomes include in-hospital mortality, hospital length of stay, time to defervescence and no acetaminophen use within 8 hours, defervescence by 72 hours, and clinical failure. **Results/Conclusions:** Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify a patient with neutropenic fever

Discuss empiric treatment regimens for neutropenic fever that will optimize pharmacodynamic parameters

**Self Assessment Questions:**

Which of the following meets the IDSA/NCCN criteria for neutropenic fever?

- A Temperature 37.7°C, ANC 50 cells/mm<sup>3</sup>
- B: Temperature 38.5°C, ANC 100 cells/mm<sup>3</sup>
- C: Temperature 39.2°C, ANC 3000 cells/mm<sup>3</sup>
- D: Temperature 37.4°C, ANC 5000 cells/mm<sup>3</sup>

What is an appropriate empiric antibiotic for neutropenic fever?

- A Cefazolin
- B Ceftriaxone
- C Ampicillin/sulbactam
- D Piperacillin/tazobactam

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF THE IMPACT OF THE CLARIFICATION OF PENICILLIN ALLERGIES ON CARBAPENEM UTILIZATION IN A COMMUNITY HOSPITAL

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Penicillin allergies are one of the most frequently documented drug allergies, being reported by 10-20% of hospitalized patients. Carbapenem antibiotics are sometimes prescribed to avoid a possible allergic reaction in this patient population, potentially increasing carbapenem resistance. However, reports demonstrate that over 98% percent of people reporting penicillin allergies can receive antibiotics in the class. To this end, the Baptist Health Lexington antimicrobial stewardship committee has begun clarifying the nature of reported penicillin allergies in patients receiving carbapenems who are candidates for de-escalation. This study aims to assess whether clarification of penicillin allergies alters days of carbapenem therapy. This retrospective study was submitted to and approved by the local Institutional Review Board. Patients will be included in the study if they are admitted to Baptist Health Lexington with a diagnosis of either skin and soft tissue infection, intra-abdominal infection, urinary tract infection, or pneumonia and are prescribed a carbapenem with a reported penicillin allergy between August 1, 2017 and March 1, 2019. Two different six month groups will be compared, one before and one after the implementation of a pharmacy-driven allergy clarification service performed by the antimicrobial stewardship team. Data recorded will include the following parameters: age, sex, penicillin allergy description, days of carbapenem therapy, length of ICU stay, length of hospital stay, admission date, and discharge date. Exclusions will include the following: patients with a documented ESBL infection, pregnant patients, incarcerated patients, and patients with a diagnosis of sepsis. The primary outcome is defined as the days of carbapenem therapy in patients whose allergies were clarified when compared to those whose allergies were not clarified. Secondary outcomes include the length of stay and length of ICU stay. Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Discuss the nature of reported penicillin allergies and their impact on antimicrobial stewardship efforts.

Identify ways which pharmacists can improve antimicrobial stewardship through penicillin allergy clarification

### Self Assessment Questions:

Approximately what percent of patients who report a penicillin allergy will have an allergic reaction if administered ceftriaxone?

- A: 7%
- B: 5%
- C: < 1%
- D: 10%

Which best describes the method used by our stewardship program when clarifying penicillin allergies?

- A: Review the patient's administered medication history within our EMR
- B: Review the patient's medication history within our EMR, ask the patient
- C: Talk to the patient/family, update their chart
- D: Talk to the patient/family, review EMR medication history, page the pharmacist

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMIZING OPIOID PRESCRIBING AT HOSPITAL DISCHARGE IN OPIOID NAÏVE SURGICAL PATIENTS

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Over the past 20 years, the potency of opioid prescriptions significantly increased. The Center for Disease Control reports opioid prescriptions per person in 2015 have three times the potency (measured as morphine milligram equivalents or MME) of their 1999 prescription counterpart. Inappropriate opioid prescribing at the time of discharge (i.e. prescriptions written for an excessive quantity or MME per day) leads to an increased risk of adverse events, diversion, overdose events, particularly in opioid naïve patients. In 2016, the CDC released chronic opioid prescribing guidelines with recommendations that patient experiencing acute pain that could transition to chronic pain should receive less than 50 MME per day for initial opioid prescriptions. The purpose of this project is to reduce excessive opioid discharge prescribing and explore possible pharmacy interventions to drive improvement.

The primary objective of this study was to analyze discharge opioid prescribing practices at Froedtert Hospital and compare this to the 2016 CDC guideline. This objective was achieved by analyzing opioid prescriptions written from January 1-March 31, 2018 for patients admitted to a surgical department at Froedtert Hospital. Patients were separated into opioid-naïve and opioid-exposed categories based on the presence of an opioid on their prior to admission medication history. Prescriptions were converted to MME and the maximum allowable amount per the directions was used to calculate maximum MME/day to allow for comparison between prescriptions. This data analysis revealed similar prescribing patterns across all surgical departments. Duration of therapy and MME/day were similar regardless of the opioid-naïve or opioid-exposed status of the patient. Following this data analysis, the existing acute pain opioid prescribing policy was updated to reflect the CDC guideline recommendations. Future interventions will focus on customizing regimens based on surgical procedure performed and previous exposure to opioid therapy.

### Learning Objectives:

Review 1. Review opioid discharge prescribing patterns among surgical departments at Froedtert Hospital in opioid naïve and opioid exposed patients

Identify 2. Identify areas for pharmacy intervention to tailor opioid discharge prescription to patient's analgesic requirements while inpatient

### Self Assessment Questions:

1. What are CDC guideline recommendations regarding initial morphine milligram equivalents per day (MME/day) for opioid naïve patients?

- A: ≤ 15 MME/day
- B: ≤ 50 MME/day
- C: ≤ 90 MME/day
- D: ≤ 120 MME/day

2. What are the maximum daily morphine milligram equivalents of this prescription: Oxycodone 5mg, take 1-2 tablets every 4-6 hours

- A: 20 mme
- B: 50 mme
- C: 90 mme
- D: 140 mme

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF MEDICATION ADMINISTRATION AND LAB DRAW TIMING ON DELIRIUM & MORTALITY IN THE SURGICAL INTENSIVE CARE UNIT – A PILOT STUDY

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A sleep bundle is a strategy to optimize patient care by limiting care interactions overnight so patients can experience a prolonged restful state. To date, there have been few studies evaluating sleep related to secondary outcomes in ICU patients. A pilot study assessing a change in medication administration times and lab draw times is in process in the Surgical ICU (SICU) at Froedtert & the Medical College of Wisconsin. Implementation of this pilot and assessment of compliance will help assess feasibility of implementing a comprehensive sleep bundle and assessing its impact on delirium and mortality in intensive care unit patients.

This study is a single-center, prospective, observational study with both retrospective and prospective data analysis. Phase one is a pilot feasibility study assessing optimization of medication administration and lab draw times, followed implementation of a comprehensive sleep bundle during phase. During the pilot study, the primary outcome is the change in percentage of medications administered during the hours of 2200-0400 to determine the impact of nursing and pharmacist education. Secondary endpoints include the number of missed doses and refused medications between the hours of 2200 – 0400, confusion assessment method in the ICU (CAM-ICU) delirium score during intervention period, number of drug or lab levels drawn between the hours of 2200 – 0400, total time patients spent in delirium, 28-day all-cause mortality, days on mechanical ventilator, average CAM-ICU score in a 24 hour period, total medication administrations overnight including scheduled and as needed medications, as well as bag changes for continuous infusion.

Thus far the pharmacy team has gained support from the physician team and results are forthcoming showing a trend towards decreasing in medication administration times and lab drawn times. Conclusions will be drawn once results are collected and analyzed.

### Learning Objectives:

Explain Explain different strategies to optimize sleep in ICU patients and identify which intervention is part of the pilot study.

Recognize Recognize which time frame will be utilized for this study to determine how sleep disruptions contribute to ICU delirium and mortality

### Self Assessment Questions:

Which of the following interventions are being investigated as part of the pilot study?

- A Optimizing care interventions of nursing staff overnight, including t
- B: Adjusting medication administration times and lab draw times to fa
- C: Reducing noise and light distractions overnight, including but not li
- D: There is no pilot study – the entire sleep bundle is being implemen

Care interventions during the study will be optimized to of outside of which time frame?

- A 0000 - 0600
- B 2200 - 0600
- C 2200 - 0400
- D 2000 - 0400

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF VASOPRESSOR REQUIREMENTS IN MECHANICALLY VENTILATED PATIENTS SEDATED WITH DEXMETETOMIDINE VERSUS PROPOFOL

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Both dexmedetomidine and propofol have been known to cause hypotension. With the differing mechanisms of action between dexmedetomidine and propofol involving either GABA or adrenergic effects, it is unclear if either agent should be preferred with regard to hemodynamic alterations and outcomes. Currently no direct comparison studies analyzing dexmedetomidine versus propofol regarding vasopressor requirements have been completed. The purpose of this study is to analyze the difference in vasopressor requirements using norepinephrine equivalents at 24, 48 and 72 hours in mechanically ventilated patients that receive dexmedetomidine or propofol.

This is a retrospective, single-center study conducted at a 433-bed community hospital in Lexington, KY. Patients were identified via a computer search of who received dexmedetomidine or propofol with vasopressors while mechanically ventilated. Data was collected by review of electronic health records including patient demographics and clinical criteria. The Norepinephrine Equivalent conversion scale was developed based on the cardiovascular Sequential Organ Failure Assessment score and previous medical literature. Norepinephrine equivalents is defined as the sum of all vasopressors doses with each vasopressor dose converted to the clinically equivalent norepinephrine dose. The primary endpoint of this study is the total amount of vasopressors in norepinephrine equivalents required at 24, 48, and 72 hours. Secondary outcomes include number of vasopressors used, mean arterial pressure, heart rate and lowest blood pressure at 24, 48, and 72 hours, need for mineralocorticoids – fludrocortisone or hydrocortisone, hospital mortality, 30-day readmission, as well as ICU and total hospital length of stay. Appropriate statistical tests were used with p-values < 0.05 considered statistically significant.

### Learning Objectives:

Discuss conflicting data related to dexmedetomidine and propofol with respect to hemodynamic outcomes and vasopressor requirements  
Identify Norepinephrine Equivalent doses of each vasopressor agent

### Self Assessment Questions:

Which of the following is correct?

- A Dexmedetomidine causes more hypotension than propofol in mecl
- B: Propofol causes more hypotension than dexmedetomidine in mecl
- C: Dexmedetomidine and Propofol cause the same amount of hypote
- D: There is mixed data regarding which sedative agent causes more

Patient SJ is mechanically ventilated, sedated with propofol, and is requiring vasopressors. The vasopressors currently running are norepinephrine 0.15 mcg/kg/min and vasopressin 0.04 Units/min. What

- A 0.2 mcg/kg/min
- B 0.25 mcg/kg/min
- C 0.2 mcg/kg/min
- D 0.15 mcg/kg/min

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST DRIVEN MEDICATION RECONCILIATION IN PSYCHIATRIC EMERGENCY SERVICES ON PATIENT OUTCOME

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**Introduction:** Psychotropics pose a particular challenge to medication safety and effective transitions of care. Medication errors can arise from unintentional discrepancies on patient medication lists due to inadequate communication between fragmented health systems. However, pharmacists possess the necessary skill set to perform an accurate and complete medication reconciliation. The objective of this study is to evaluate the impact of a pharmacist driven medication reconciliation process in Psychiatric Emergency Services (PES) on patient outcomes. **Methods:** This study has been exempt from Institutional Review Board (IRB) approval as a quality assurance/quality improvement project. A retrospective observational period consistent with usual care will be compared to two different prospective interventional periods. The first prospective period will consist of medication reconciliation completion by a pharmacist in PES prior to admission to an inpatient psychiatric unit as is feasible with daily workflow restrictions. The second prospective period will consist of medication reconciliation completion by a pharmacist on a patients admitted Monday through Friday to an inpatient psychiatric unit, within 24 hours of admission. The following data will be collected: patient age, attending provider, date/time of presentation to PES, date/time of admission to psychiatric unit, total length of stay, number of medications pre-intervention, number of medications post-intervention, number of discrepancies on initial medication reconciliation, number of discrepancies on after visit summary (AVS), and classification of potential errors. The primary outcomes will be length of stay, with secondary outcomes including number of discrepancies on admission, and number of discrepancies on AVS at discharge.

**Results:** pending

**Conclusions:** pending

### Learning Objectives:

Discuss the current literature regarding the impact of pharmacist lead medication reconciliation on patient outcomes.

Describe the impact of pharmacist driven medication reconciliation in psychiatric emergency services in this study.

### Self Assessment Questions:

What was the primary outcome of this study?

- A: Number of medication errors
- B: Length of stay
- C: Number of discrepancies on admission
- D: Number of discrepancies on discharge

Which of the following is a barrier to accurate medication reconciliation?

- A: Ineffective communication between health care settings
- B: Simple medication regimens
- C: Patient expertise of their medication regimens
- D: Complete medical records

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPACT OF A PHARMACIST MANAGED MRSA PCR DIRECTED ANTIBIOTIC DE-ESCALATION PROTOCOL

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**Purpose:** Patients are frequently treated with empiric vancomycin or linezolid for pneumonia if the patient has risk factors for pneumonia due to methicillin-resistant *Staphylococcus aureus* (MRSA). Due to the difficulty of obtaining high quality respiratory cultures and the time these take to result, patients can receive prolonged, unnecessary MRSA targeted therapy. The aim of this study is to evaluate if pharmacist management of vancomycin and linezolid de-escalation via MRSA PCR screening reduces the duration and cost of empiric therapy and laboratory testing for patients with pneumonia.

**Methods:** This retrospective pre-post cohort study assesses the impact of a pharmacist managed antibiotic de-escalation protocol on duration and cost of empiric therapy for pneumonia. A protocol was developed and implemented in November 2018, which allows the hospital's Antibiotic Advisory Team (AAT) pharmacists to order MRSA PCR nasal screens for patients with pneumonia receiving either vancomycin or linezolid. This protocol also instructs AAT pharmacists to monitor for negative MRSA screening results and recommend discontinuation of MRSA coverage if appropriate. Two cohorts include patients treated with vancomycin or linezolid for pneumonia before and after protocol implementation from December 2017 through February 2018 and December 2018 through February 2019. Patient demographics, lab values, and antibiotic usage data will be collected via retrospective chart review. The primary outcome is duration of vancomycin and linezolid therapy, presented as days of therapy per 1000 patient days. Secondary outcomes include cost of treatment, quantity of MRSA PCR swabs ordered, and quantity of vancomycin levels ordered.

**Results/Conclusion:** Data collection and analysis is still ongoing. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference in April 2019.

### Learning Objectives:

Review current body of literature for validity of using nasal MRSA PCR screens as a tool for antibiotic de-escalation in pneumonia

Identify the potential benefits associated with earlier pharmacist intervention for patients receiving MRSA targeted therapy for pneumonia

### Self Assessment Questions:

Which of the following is true regarding the predictive value of nasal MRSA PCR screenings?

- A: They have a high positive predictive value and can guide continuation
- B: They have a high negative predictive value and can guide de-escalation
- C: They have a high negative predictive value and can guide de-escalation
- D: They have a high positive predictive value and can guide initiation

Which of the following is a potential benefit of early MRSA targeted antibiotic de-escalation?

- A: Increased duration of antibiotic therapy
- B: Reduced duration of hospital admission
- C: Increased potential for adverse effects
- D: Reduced cost of antibiotic therapy

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EFFICACY OF EARLY LOCAL ANESTHETICS FOR HIP FRACTURES

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**Purpose:** Multimodal pain control is frequently used to achieve adequate analgesia perioperatively in patients who receive surgical repair of hip fractures, including: spinal anesthesia, general anesthesia, and local anesthesia. The use of anesthetic nerve blocks after surgery has shown benefit in reducing pain from movement within 30 minutes after block placement, as well as time to mobilization. The most common preoperative pain technique employed is general anesthesia using opioids, generally administered in the emergency department and continued through surgery. Opioids come with many adverse effects, especially in elderly patients. The purpose of the study is to evaluate the impact of early analgesia via nerve block in patients that are hospitalized due to hip fractures on duration of hospital stay.

**Methods used:** This study is a retrospective cohort design comparing patients with hip fractures who received injectable local anesthesia in the emergency department to patients that did not receive injectable local anesthetics in the emergency department. The primary outcome is length of hospital stay in days between the patients that received a hip block in the ED and patients that received a hip block during or immediately after surgery. Secondary outcomes include duration of hospital stay, 30-day readmission, discharge destination, 30-day mortality, inpatient opioid usage, opioid amounts prescribed at discharge.

**Results/Conclusions:** will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain how local anesthetics can be utilized as part of a multimodal pain regimen.

Review the mechanism through which local anesthetics prevent pain.

### Self Assessment Questions:

Local anesthetics may be used for which of the following forms of anesthesia?

- A: General
- B: Regional
- C: Neuraxial
- D: Both B and C

Local anesthetics exhibit their action via:

- A: Noncompetitive NMDA receptor antagonism
- B: Inhibition of initiation and conduction of nerve impulses
- C: Pure agonism of mu receptors
- D: Reversible inhibition of cyclooxygenase-1 and 2

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT OF A PRODUCTIVITY MODEL TO ASSESS PRIOR AUTHORIZATION COORDINATOR NEEDS FOR AMBULATORY CARE CLINICS AT AN ACADEMIC MEDICAL CENTER

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**PURPOSE:** Measure workload through development of a productivity tool. Assess current prior authorization coordinator (PAC) staffing model at existing clinics, and predict full-time equivalents (FTE) needs at new clinics.

**BACKGROUND:** Prior authorizations (PA) are utilized by third-party payers to evaluate appropriateness of therapy and control costs incurred by an insurance group. PAs are effective for third-party payers, but may contribute to downstream inefficiencies within the health care system, including outpatient clinics. Historically PAs have been handled by clinic personnel, such as physicians, nurses, or ancillary staff. With PA volume increasing 20% per year, the additional workload can contribute to clinician burnout. PACs can alleviate clinic staff from PAs by facilitating communications between the third-party payer, the patient, and the clinic.

**METHODS:** A productivity model was developed using prescribing data from The Ohio State University Wexner Medical Center (OSUWMC) outpatient clinics and documented activities of PACs in the electronic medical record (EMR). Clinic prescriptions were sorted into four categories: specialty oncology, specialty non-oncology, opioids, and non-specialty. There were ten core functions that PACs could document activities under: PA, appeals, Medicare B verification, copay card assistance, required to use another pharmacy, medication assistance program referral, cost exceeds, benefits investigation, free voucher, and miscellaneous. PACs documented activities in the EMR, specifying what category of drug the activity pertained to, and how much time was spent completing the activity. Prescribing and activity documentation data were extracted from the EMR and stored in Microsoft Access®. Data was analyzed and the model built within Microsoft Excel®.

**RESULTS:** Data collection and tool development is ongoing. Results will be presented at the Great Lakes Resident Conference.

**CONCLUSION:** We expect this tool to assess and optimize resource needs and improve the overall efficiency of our PA process.

### Learning Objectives:

Describe the current state of prior authorizations.

Explain how a productivity model is built and why it is important.

### Self Assessment Questions:

What is the basic construct of a productivity equation?

- A: Output divided by input
- B: Input divided by output
- C: Output multiplied by input
- D: Input minus output

What is a benefit of using a PAC to handle PAs and other adjudication needs?

- A: Offset the work burden from clinicians
- B: Cost effective use of resources
- C: More efficient access to care for patients
- D: All the above

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**EVALUATION OF AN OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY (OPAT) SERVICE ON READMISSION AND EMERGENCY DEPARTMENT VISITS IN PATIENTS WITH STAPHYLOCOCCUS AUREUS BACTEREMIA**

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Outpatient parenteral antibiotic therapy (OPAT) is a safe and cost-effective option for patients requiring a prolonged course of parenteral antibiotics. Despite the benefits of an OPAT program, adverse drug events and central access complications may lead to emergency department (ED) visits and hospital readmissions within 30 days of hospital discharge. Limited data exists regarding the characteristics predictive of ED visits, and/or unplanned readmission, along with the impact an OPAT program has on high risk patients. The objective of this study was to identify risk factors for 30-day unplanned OPAT-associated readmissions and ED visits, and the impact of an OPAT team on patients with *S. aureus* (SAB).

A retrospective study at The Ohio State University Wexner Medical Center (OSUWMC) was completed comparing the rate of 30-day unplanned OPAT-associated readmissions and/or ED visits in patients with SAB with and without OPAT team oversight. Secondary outcomes included two-week infectious diseases (ID) provider follow-up, OPAT duration of therapy adherence, and 30-day post-discharge all-cause mortality. All inpatients with one positive blood culture for *S. aureus* discharged on IV anti-*S. aureus* antibiotics from November 1, 2016 to August 31, 2017 (pre-intervention) and January 1, 2018 to November 31, 2018 (post-intervention) were evaluated for inclusion. Exclusion criteria included prisoners, pregnant patients, patients <18 years old (YO) or >80 YO, patients with non-curative OPAT, patients with planned readmissions, patients discharged to a long-term acute care hospital, and patients without ID consults. Data collected included demographics, disease characteristics, treatment characteristics, and outcomes. Statistical analysis will be completed using logistic regression modeling to assess the relationship between exposure and primary outcomes. Subgroup analysis will be performed to assess the effect on patients identified as high risk for ED visit and/or readmission.

Data collection and evaluation are ongoing. Preliminary results and conclusions will be presented.

**Learning Objectives:**

Identify patient risk factors for unexpected acute care hospital needs with OPAT in patients with SAB.

Recognize the impact of a multidisciplinary OPAT team on treatment-related outcomes in SAB patients and identified high risk patients.

**Self Assessment Questions:**

Which of the following is a risk factor associated with clinical failure on OPAT?

- A Receipt of previous OPAT
- B: Discharge to home with a home health agency
- C: Inpatient ID consult
- D: Female gender

Within the literature, what outcome has been consistently demonstrated with multidisciplinary OPAT team involvement?

- A Reduction in 30-day hospital readmissions
- B Improvement in process of care metrics (e.g. decreased antimicro)
- C Reduction in home health care needs
- D Increased duration of antimicrobial therapy

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**INTRAPLEURAL TPA AND DORNASE ALFA FOR THE TREATMENT OF PLEURAL EFFUSIONS AND EMPYEMA.**

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Purpose: The use of intrapleural alteplase (tPA) and dornase alfa (DNase) combination therapy has been increasing within Community Health Network (CHNw) in recent years. However, there have been no studies to date within CHNw that have compared the outcomes of the use of this intrapleural combination therapy with the use of intrapleural tPA alone. Physicians within CHNw have inquired about administration times, and whether or not the medications need to be administered separately or if they may be given together. The primary objective of this study was to compare the rates of treatment success (defined as radiological resolution noted on imaging without the need for surgical intervention within that admission) in patients who received only intrapleural tPA compared to those who received intrapleural tPA-DNase combination therapy.

Methods: A retrospective chart review was completed using the Epic electronic medical record (EMR). The study was completed utilizing the electronic medical charts of patients admitted to Community Hospital East (CHE), Community Hospital North (CHN), and Community Hospital South (CHS) between August 1, 2012 and July 31, 2018 that had an order for either intrapleural tPA or for the combination of intrapleural tPA and DNase. Patients were excluded if they did not receive a dose of either regimen during admission, if they were less than 18 or greater than 89 years old, if they were incarcerated, or if they were pregnant. Secondary outcomes included incidence of documented adverse events and the comparison of outcomes within the combination therapy group to identify any efficacy differences among different administration schedules, as applicable (e.g. concurrent administration vs. separated/timed out administration).

Conclusion: Final results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Explain the proposed mechanism of action of intrapleural tPA and DNase and the rationale for their use.

Indicate when intrapleural therapy may not be effective for resolution of pleural effusions.

**Self Assessment Questions:**

Which of the following statements is correct?

- A The mechanism of action of intrapleural tPA and DNase therapy is
- B: Use of intrapleural therapies rarely causes an increase in chest pa
- C: Intrapleural tPA and DNase may be given simultaneously though t
- D: There is little data to support the use of intrapleural tPA and DNas

Of the following organisms, which are the most common culprits for empyema?

- A Atypical organisms (Legionella, Mycoplasma)
- B Streptococcus spp and Staphylococcus spp
- C Gut anaerobes (i.e. Bacteroides spp)
- D Aerobic GNRs (e.g. E. coli, Pseudomonas spp)

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PHARMACY RESIDENT-LED TRANSITIONS OF CARE PILOT PROGRAM FOR PATIENTS WITH HEART FAILURE

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**Purpose:** Literature reveals that 60 percent of medication errors occur during periods of patient transition between levels of care. The Center for Medicare and Medicaid Services (CMS) issues up to 3% on all admissions in hospitals with 30-day readmission rates that exceed the national average for specified diagnoses on certain conditions, including heart failure. To prevent medication discrepancies and increase communication between providers following hospital discharge, the pharmacy residents at University of Louisville Hospital (ULH) implemented a transitions of care (TOC) service in November 2017 for patients with heart failure. The objective of this study is to evaluate the impact of the pharmacy resident-led TOC service within ULH.

**Methods:** This study was approved by the University of Louisville Institutional Review Board. The TOC service includes medication reconciliation and patient education on heart failure and related medications at discharge, as well as at follow-up within 72 hours of discharge via telephone, and within seven to 14 days in clinic. Patients were included if they were at least 18 years old, admitted to a ULH medicine team with a primary or secondary diagnosis of heart failure and willing to enroll in the transitions of care service. Patients were excluded if they were being discharged to a location other than home or could not be contacted following discharge. Data was collected via retrospective chart review from November 2017 to October 2018. The primary outcome is hospital readmission at ULH within 30 days of discharge. Secondary outcomes include an emergency department visit at ULH within 30 days of discharge, patient show-rate for telephonic and clinic follow-ups, and medication discrepancies. This data will be compared to eligible patients that were not included in the pilot project.

**Results and Conclusions:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List the six conditions/procedures that the Centers for Medicare and Medicaid (CMS) included in the Hospital Readmissions Reduction Program (HRRP)

Describe the pharmacy resident-led transitions of care pilot project at the University of Louisville Hospital

### Self Assessment Questions:

Which is a condition/procedure included in the CMS HRRP?

- A Asthma
- B: Diabetes
- C: Pneumonia
- D: Stroke

How many days after discharge is appropriate to schedule a follow-up clinic visit per the University of Louisville resident-led pharmacy pilot project?

- A 5 days
- B 10 days
- C 15 days
- D 20 days

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPREHENSIVE PRIMARY HEADACHE INTERVENTION SERVICES AT AN OUTPATIENT PHARMACY

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**Statement of Purpose:** Primary headaches are a common and poorly managed medical problem. Most current pharmacist-patient interactions for headache management are brief and concern over-the-counter product recommendations. Studies have suggested that community pharmacists could do more to proactively help primary headache sufferers manage their headaches. This project aims to determine the impact of providing more comprehensive community pharmacy-based headache management services for primary headaches on patient outcomes. Secondary outcomes include assessing patient satisfaction with the service as well as knowledge gained from service participation.

**Statement of Methods Used:** This project aims to recruit primary headache patients for a headache management consultation session with a community pharmacist where strategies and treatments for headache management can be discussed. If necessary, referrals to a primary care provider or neurologist can be made. A pre-survey assessing each patient's headache knowledge and management as well as the validated 6-question Headache Impact Test (HIT-6) are administered prior to the consultation. After the consultation, a post-survey assesses knowledge gained and satisfaction with the service. Four weeks later, the HIT-6 survey is re-administered along with an additional post-survey to assess changes in each patient's headache management strategy, headache impact, retained knowledge, and satisfaction with the follow-up service.

**Summary of Results:** Research in progress. We hypothesize that patients' HIT-6 scores will decrease from baseline, indicating a reduction in headache's negative impact on their quality of life. Additionally, we hypothesize that survey results will show improvement in patients' understanding of and management of primary headaches, along with satisfaction with this service.

**Conclusions Reached:** This project's results may demonstrate that a comprehensive community pharmacy-based service such as this can improve patients' management of primary headaches. Such results would support an expanded role for community pharmacists in the management of primary headaches.

### Learning Objectives:

Discuss the prevalence of headaches and their negative personal and societal impacts

Describe a potential headache management service in an outpatient pharmacy setting

### Self Assessment Questions:

In 2016, the World Health Organization estimated that what percentage of adults worldwide had experienced a headache within the past year?

- A 15-20%
- B: 25-35%
- C: 40-50%
- D: 50-75%

Select the correct statement about the headache management service described in the presentation:

- A Patients were eligible for the service if they experienced any form of headache
- B Patients were ineligible to participate if they were minors, pregnant, or breastfeeding
- C Possible patient education topics included common types of headache and when to seek medical attention
- D Tools used to assess service results included pre- and post-consultation surveys

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACIST LED OPIOID ANALGESIC REDUCTION SERVICE.

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**Purpose:** The United States is in the midst of an opioid epidemic calling upon health care providers to reassess how they navigate the difficult task of treating chronic pain. Although there is no established ceiling dose of opioid medications, guidelines suggest doses above 90 morphine milligram equivalents (MME) should be avoided as the risks often outweigh potential benefits. Current research indicates that strategic dose reductions in opioid analgesics do not significantly impact pain scores or worsen patient outcomes. The purpose of this project is to safely reduce potential patient harm to opioid analgesics utilizing Monroe Clinic pharmacotherapists. The primary objective is to taper opioid dose to less than 90 MME in patients on high dose opioids without significantly increasing pain.

**Methods:** Prospective patients at Monroe Clinic beginning September 2018 will be identified using reports tracking quarterly MME data. Adult patients above 200 MME, or otherwise deemed candidates for the service by their physician, with chronic, non-cancer pain, and an absence of opioid use disorder will be included. Patients under the age of eighteen or those with a cancer diagnosis will be excluded. Following an appointment with their prescribing physician, patients willing to participate are referred to meet with a pharmacotherapist within the Monroe Clinic Adult Medicine department. Patients will complete opioid reduction appointments to have their medications slowly tapered. If the patient agrees, follow up appointments are made to reduce the medications as tolerated at regular intervals after the initial visit. Total MME reduction, pain scores, opioid-related hospitalizations, and DIRE scores will also be tracked.

**Results:** The project is ongoing. Full information will be shared at the conference.

**Conclusions:** The project is ongoing. Full information will be shared at the conference.

### Learning Objectives:

Identify the risks associated with chronic use of high dose opioid analgesics.

Describe tools or strategies pharmacists can utilize to improve the success of an opioid reduction service.

### Self Assessment Questions:

Which of the following is a potential complication of high dose opioid analgesics?

- A: Essential hypertension
- B: Hyperkalemia
- C: Respiratory depression
- D: Transient ischemic attack

What is a patient-specific characteristic to take into account when conducting pain management visits?

- A: Lipid panel
- B: PADUA score
- C: PEG score
- D: TSH level

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## VANCOMYCIN - THERE HAS TO BE A BETTER WAY

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**Introduction:** Current standard of care recommends monitoring vancomycin with trough levels as a more practical method. At Henry Ford Health System (HFHS) our current practice includes 10-15 mcg/mL for skin and soft tissue infections and 15-20 mcg/mL for more serious infections. Troughs of 15-20 mcg/mL are correlated with a higher risk of developing nephrotoxicity. Recent literature published by Finch NA, et al in 2017 demonstrated trough goals of 15-20 mcg/mL are unnecessary to achieve target area under the curve (AUC/MIC) goals of 400-600 mg\*h/L and are associated with increased rates of nephrotoxicity compared to AUC/MIC target goals.

With anticipated national guidelines changing to the new standard of care of AUC/MIC as monitoring targets for vancomycin in place of the current practice of trough monitoring, this study will compare target trough goals of 10-15 mcg/mL to AUC/MIC monitoring to determine the amount of discordance.

**Methods:** Approximately one-hundred patients will be collected and their charts will be reviewed for the percentage of time patients that are dosed on vancomycin at trough goals of 10-15 mcg/mL are within the proposed AUC/MIC dosing nomogram goal of 400-600 mg\*h/L. For AUC/MIC monitoring this study will use a nomogram based on mg/kg vancomycin dosing and trough levels to determine the correct AUC/MIC range. This nomogram was created by Paul Lewis and published in 2018.

**Results:** Data collection and analysis are ongoing

**Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Discuss the benefits and safety of vancomycin trough monitoring compared to AUC/MIC monitoring

Describe the AUC/MIC monitoring goals for most infections

### Self Assessment Questions:

Which adverse event is likely decreased with new AUC/MIC monitoring goals for vancomycin?

- A: Ototoxicity
- B: Nephrotoxicity
- C: Red Man Syndrome
- D: Myalgias

WL is a 60 year old male that presents to the hospital with a skin/soft tissue infection that failed outpatient oral therapy. The medical team would like to start vancomycin on this patient. Per the n

- A: AUC/MIC goal of 200-400 mg\*h/L
- B: AUC/MIC goal of 300-600 mg\*h/L
- C: AUC/MIC goal of 500-700 mg\*h/L
- D: AUC/MIC goal of 400-600 mg\*h/L

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION AND IMPACT OF A PHARMACIST-DRIVEN IMMUNIZATION COLLABORATIVE PRACTICE AGREEMENT AND GUIDELINE FOR POST-BONE MARROW TRANSPLANTATION RECIPIENTS

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**Purpose:** After a hematopoietic stem cell transplant, patients lose immunity to previously administered vaccinations and are at an increased risk for life-threatening infections. Multiple organizations including the National Comprehensive Cancer Network (NCCN) recommend post-transplant vaccination. The purpose of this study is to determine the impact of a NCCN recommended immunization guideline managed by pharmacists utilizing a collaborative practice agreement (CPA) to improve the number of patients who receive vaccinations appropriately after a bone marrow transplant (BMT).

**Methods:** A retrospective chart review was conducted over 12 months (September 2017 to September 2018) to identify patients 18 years of age or older who received an autologous or allogeneic stem cell transplant and immunizations post-BMT. Patients were excluded if they experienced a BMT failure or graft-versus-host-disease (GVHD). The following data points were collected: age, sex, race, diagnosis, date and type of transplant, and immunization records containing the type of vaccine, date administered, and antibody titers. The primary outcome was to assess patient's adherence to the vaccine schedule prior to and after implementation of a pharmacist-driven CPA. The CPA was developed to allow oncology pharmacists to prescribe and manage post-BMT vaccination regimens and was approved in January 2019. A voluntary survey using a 5-point Likert scale was sent to oncology physicians and pharmacists to obtain baseline data regarding knowledge of post-BMT vaccination regimens, time spent managing regimens, and satisfaction, comfort, and confidence with the current procedure. Secondary outcomes included the number of deviations from the vaccination schedule (missing or inappropriately timed vaccines), satisfaction with the process, and pharmacist knowledge of post-BMT vaccination regimens. The study group will include post-BMT patients receiving immunizations after the CPA and guideline were approved. **Results/Conclusions:** Data collection and analysis are ongoing. The final results will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the benefits of pharmacist management of vaccination schedules for patients post-BMT utilizing a CPA

Identify the NCCN recommended immunizations for patients to receive post-BMT

### Self Assessment Questions:

Which of the following are benefits of having pharmacists prescribe and manage patient's vaccines post-BMT utilizing a CPA?

- A Safe and efficacious administration of vaccines
- B: Increased access and timeliness to vaccines to prevent infectious
- C: Less administrative burden on oncology physicians
- D: All of the above

Which of the following vaccines are recommended for patients to receive as soon as 6 months post-BMT?

- A Hepatitis B, inactivated polio, haemophilus influenza type b, and d
- B Inactivated influenza
- C Pneumococcal conjugate 13
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE CLINICAL IMPACT OF IMPLEMENTING THE ON-DEMAND MOLECULAR TESTING FOR SEXUALLY TRANSMITTED INFECTIONS IN THE EMERGENCY DEPARTMENT

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**Purpose:** Sexually transmitted infections (STIs) are often asymptomatic and remain amongst the most underdiagnosed infections. The clinical diagnosis of STIs requires laboratory tests in the majority of patients. Traditional laboratory test has a long turnaround time, which often result in inappropriate empiric antibiotic selection. In an effort to expedite the diagnosis and treatment of STIs, Bronson Healthcare Group recently implemented on-demand molecular testing - for the rapid detection of three common STI-related organisms: Chlamydia trachomatis (CT), Neisseria gonorrhoeae (NG), and Trichomonas vaginalis (TV). The primary outcome of this study is appropriate antibiotic use pre- vs post implementation of on-demand molecular testing.

**Method:** This study is a retrospective cohort design comparing patients who received antibiotics for Chlamydia trachomatis, Neisseria gonorrhoeae, or Trichomonas vaginalis before and after implementation of on-demand molecular testing for CT, NG and TV at Bronson Methodist Hospital and Bronson Battle Creek Hospital. The appropriateness of antibiotics is determined based on Antimicrobial Guidebook 2018-2019 from Bronson Healthcare Group.

**Results and conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify appropriate therapy for Chlamydia trachomatis, Neisseria gonorrhoeae, and Trichomonas vaginalis.

Discuss the clinical impact of on-demand molecular testing on appropriate antibiotic selection in Emergency Department.

### Self Assessment Questions:

According to CDC 2015 Sexually Transmitted Diseases Treatment Guideline, which antibiotic is most appropriate for a 22-year-old otherwise healthy female presenting with Neisseria gonorrhoeae?

- A Ceftriaxone 250mg IM in a single dose and azithromycin 1g orally
- B: Metronidazole 500mg orally twice a day for 14 days
- C: Azithromycin 1 g orally in a single dose
- D: Benzathine penicillin G 2.4 million units IM in a single dose

Which of the following statements is true regarding on-demand molecular testing?

- A On-demand molecular testing cannot be run with other tests such
- B On-demand molecular testing has faster turnaround time
- C On-demand molecular testing increases total amount of time patient
- D On-demand molecular testing increases cost to the patient

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL OUTCOMES OF NON-MEDICAL SWITCHING PATIENTS TO PREFERRED SHORT-ACTING/RAPID-ACTING INSULIN PRODUCTS AMONG A COMMERCIALY INSURED POPULATION

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**Purpose:** Given the interchangeability between insulin products within the same class, many healthcare organizations prefer certain brand insulin products on their formularies. Preferring one brand over another can cause significant impact to a healthcare organization, providers, but most importantly patients, and this impact is typically assessed prior to implementation. However, published literature is minimal regarding the effect on clinical outcomes such as patients' hemoglobin A1c. The primary objective of our research is to assess the impact on hemoglobin A1c when commercially insured patients are converted to preferred brand insulin products.

**Methods:** This research is a retrospective, observational, pre-post study utilizing pharmacy and medical claims data from 2.9 million commercial insured Blue Cross Blue Shield of Michigan patients. Additionally, laboratory results data and body measurements will be pulled from the Michigan Health Information Network Shared Services. Among patients that filled a non-formulary short-acting/rapid-acting insulin product, the following inclusion criteria must be met: first (index) fill of a preferred insulin product during June 1, 2018 through August 5, 2018; length of preferred insulin therapy is at least six months post-switch; and availability of A1c values within six months pre-switch and at least three months post-switch. Patients that disenroll from the plan will be excluded from analysis.

Primary outcomes assessed will include change in A1c, proportion of patients with controlled A1c, and concomitant diabetes therapy. Secondary outcomes include weight and BMI, as available through study data sources. Pre-post results will be compared using chi-square for categorical and t-test for continuous variables.

**Results/Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss diabetes-related burden for patients and for healthcare organizations

Describe impact on clinical outcomes when commercially insured patients are converted to preferred brand insulin products

### Self Assessment Questions:

Which of the following statements is correct?

- A: 20% of healthcare spending is for patients with diabetes
- B: Health care costs for Americans with diabetes are 4 times greater
- C: 10 million Americans have diabetes
- D: Diagnosed diabetes costs America \$2 billion per year

Which of the following statements is correct about preferred insulins?

- A: A small number of healthcare organizations pursue opportunities to
- B: Limited studies have assessed the impact on A1c when switching
- C: Insulin products within the same class are not considered to be dir
- D: Preferring one brand of insulin has minimal impact to a healthcare

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## TUCKING THEM IN: STREAMLINING THE PHARMACIST ADMISSION PROCESS

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**Purpose:** To sustainably improve the efficiency, completeness, and effectiveness of the pharmacist admission process through redesign of the admission workflow and electronic health record.

**Methods:** A workgroup was assembled consisting of inpatient pharmacy staff and administrators with experience in a variety of settings. With input from the workgroup, a complete inventory of admission-related tasks was identified, and the most problematic components were prioritized for revision. A new set of tools in the electronic health record were developed to better match actual workflow, improve transparency of clinical thinking, improve usability, and improve communication. To measure changes in performance, a standardized patient case was used to determine the minimum number of discrete actions needed to complete the admission documentation. In parallel, data was retrieved for all inpatient admissions in April 2018 to analyze when each admission task is performed compared to key time points. Finally, the time to complete admission documentation was directly observed for three patient cases using the current tools. Similar analyses will be performed after the new tools are implemented.

**Results:** 1,803 admissions were analyzed. The median time to completion of all documentation was 15.8 hours and was complete within 24 hours in 73% of cases. In a standard case, 235 clicks or keystrokes, 22 single-word text entries, and 18 other text entries were required to complete the documentation. At least six items are routinely documented two or more times during an admission. The medication history status is routinely communicated in four to six locations.

**Conclusion:** Although the current admission process is completed promptly, there is a significant amount of inefficient and redundant data entry. New tools are being implemented which will improve efficiency, reduce redundant data entry, promote better communication, and make the admission documentation more meaningful.

### Learning Objectives:

Discuss how to choose the best electronic tools for a specific task in the electronic health record

Outline three approaches to measuring the efficiency of decentral pharmacists' electronic documentation

### Self Assessment Questions:

What is important to consider when designing new electronic tools?

- A: Always use the newest functionality to keep the EHR modern
- B: Always cater to the highest-paid user
- C: Always consider how the new tool will interact with other data and
- D: Always make custom tools when possible to perfectly match your i

What is the best way to measure the efficiency of decentral pharmacists admission workflows?

- A: Data-driven chart review of all patient admissions
- B: Direct observation of standardized patient cases
- C: Counting minimum clicks, keystrokes, and free text fields required
- D: The best measure depends on the specific tools and workflow

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF DOXORUBICIN AND OLARATUMAB TREATMENT SCHEDULES IN PATIENTS WITH SOFT TISSUE SARCOMA

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The FDA approved dosing schedule is doxorubicin and olaratumab on day 1 and olaratumab on day 8 of every 21-day cycle for the treatment of soft tissue sarcoma. In clinical practice, many patients are too myelosuppressed to receive the day 8 dose of olaratumab resulting in that dose being missed. At Michigan Medicine, we have given olaratumab on day 15. This project will compare the percentage of on-time next cycle administration following day 1, 8 vs day 1, 15 or day 1 only administration of doxorubicin and olaratumab. This project will also compare toxicities and efficacy of these dosing schedules.

The primary outcome of this study will be the percentage of the percentage of on-time next cycle administration following day 1, 8 vs day 1, 15 or day 1 only administration of doxorubicin and olaratumab. Secondary endpoints will include toxicity analysis, overall survival and progression free survival.

This study has been submitted to the Institutional Review Board for approval. This study will be a retrospective study which will assess the percentage of on-time next cycle administration following day 1, 8 vs day 1, 15 or day 1 only administration of doxorubicin and olaratumab. All patients who received doxorubicin and olaratumab at Michigan Medicine will be included in the analysis. Data to be collected will include demographic information, WBC, neutrophil count, albumin, start date of doxorubicin and olaratumab, previous doxorubicin exposure, dose of chemotherapy, delays in treatment cycles, anemia and toxicities (ex. fatigue, mucositis, nausea, vomiting, diarrhea, etc), performance status, dose changes/ reasons for dose changes, progression free survival, overall survival.

Results and Conclusions: Will be presented at GLPRC.

### Learning Objectives:

Review first line treatment options for patients with metastatic soft tissue sarcoma

Describe the mechanism of action of olaratumab

### Self Assessment Questions:

Which of the following is first-line treatment for patients with metastatic soft tissue sarcoma?

- A: Doxorubicin and ifosfamide
- B: Capecitabine and oxaliplatin
- C: Fluorouracil, leucovorin, irinotecan
- D: Gemcitabine and paclitaxel

What is the primary mechanism of action of olaratumab?

- A: Monoclonal antibody that binds to and inhibits platelet-derived growth factor
- B: Monoclonal antibody directed against CD20 antigen on surface of B cells
- C: Monoclonal antibody that binds to and inhibits epidermal growth factor receptor
- D: Monoclonal antibody which blocks the alpha-chain of the interleukin-2 receptor

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ESTABLISHMENT OF BEST DOCUMENTATION PRACTICE IN AN ACUTE CARE SETTING

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### Purpose

Clinical Pharmacy Specialists (CPS) serve as highly-trained medication management experts and consultants collaborating with providers to ensure safe, appropriate, and cost-effective use of medications. Documentation is vital for continuity of care, and for demonstrating the value of CPS as a member of the health care team. Acute care encounters were less than 20% of total workload encounters in 2018, yet VA Clinical Pharmacy Practice Office (CPPO) has not established best practices for acute care documentation and workload capture. This project will establish acute care CPS clinics and standardized note templates to increase acute care encounters.

### Methods

Prior to initiation of the project, the protocol was submitted to the University of Cincinnati Institutional Review Board and the VA Research and Development Committee for approval. Two acute care clinics were created for the CPS using defined stop codes and specific pharmacy clinic encounter types, to help define encounters. Standardized note templates were created using patient data objects and a national VA program named Pharmacists Achieve Results with Medications Documentation (PhARMD tool) to help with documentation of patient assessment and recommendations. Outcomes data will be collected using a computer generated report from CPPO. The primary outcome will examine the total number of encounters performed by acute care CPSs for three months pre- and post-efficiency improvements. Secondary outcomes will examine the type of workload and pharmacy interventions that were documented during the defined time periods. This data will be used to help improve efficiency and workload capture throughout other areas of clinical pharmacy services in the acute care setting at the Cincinnati Veterans Affairs Medical Center.

### Results/Conclusions

Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the role of pharmacists in an acute care setting

Recognize the VHA required elements for workload capture of acute care pharmacist

### Self Assessment Questions:

Which of the following statements is correct regarding the role of acute care pharmacists?

- A: Perform chart reviews only
- B: Participate in direct patient care rounds
- C: Provide physical assessment of patients
- D: Provide medication dispensing

2. Which of the following is one of the 3 required elements needed for pharmacy encounters to be considered for workload capture according to VHA CPPO?

- A: Medication dispensing
- B: Medication reconciliation
- C: Face to face interaction with patient
- D: Documentation in CPRS

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OUTCOMES OF FACTOR EIGHT INHIBITOR BYPASSING ACTIVITY (FEIBA) IN PATIENTS USING FACTOR-XA INHIBITORS AND EXPERIENCING ACUTE MAJOR BLEEDING

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**Purpose:** The use of factor-Xa inhibitors has increased in VTE treatment and prevention as well as prevention of stroke since these agents have been shown to be safe and effective. These agents also carry the risk of major bleeding events. Currently these bleeds are being managed using nonspecific agents such as factor eight inhibitor bypassing activity (FEIBA). The purpose of this study is to determine if FEIBA is effective in reversing factor-Xa inhibitor activity in patients experiencing an acute major bleed. This is because the approval of the new factor-Xa inhibitor specific reversal agent, andexanet alfa, has hospitals determining if the benefit of the medication will outweigh the cost to carry it on formulary. Outcomes of this study will be compared to the outcomes from the andexanet alfa study which looked at use of andexanet alfa in patients taking factor-Xa inhibitors and experiencing an acute major bleed.

**Methods:** This is a retrospective chart review looking at patient data from Munson Medical Center. The electronic medical record will identify and include patients who received FEIBA during their hospital stay, who are at least 18 years of age, had received a factor-Xa inhibitor within 18 hours of presentation and were experiencing an acute major bleed. Baseline data to be collected includes age, gender, BMI, renal function, hepatic function, indication for anticoagulation, type of anticoagulant, time from presentation until FEIBA bolus, baseline hemoglobin, indication for reversal, type of bleed, site of bleed, if re-bleeding occurred, clotting during hospitalization and overall clinical outcome. All data collected will be de-identified and password protected. The means will be determined for all demographics. Outcomes will be analyzed using means and medians and compared to outcomes determined by the andexanet alfa study.

**Results:** In progress

### Learning Objectives:

Identify the off-label uses of 4-factor PCC's

Discuss appropriate dosing of Factor Eight Inhibitor Bypassing Activity (FEIBA) for reversal of factor-Xa oral anticoagulants

### Self Assessment Questions:

4-factor PCC's are FDA approved for what indication?

- A Oral Factor Xa inhibitor reversal
- B: Direct thrombin Inhibitors reversal
- C: Hemorrhage in patients with hemophilia
- D: Vitamin K antagonist reversal

What is an appropriate dose of Factor Eight Inhibitor Bypassing Activity (FEIBA) for reversal of factor-Xa oral anticoagulants in acute major bleeding?

- A 5 units/kg
- B 10 units/kg
- C 15 units/kg
- D 50 units/kg

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A HEALTH SYSTEM-INTEGRATED SPECIALTY PHARMACY ON ANNUAL INPATIENT ADMISSIONS IN PATIENTS WITH CYSTIC FIBROSIS

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This project describes the impact a health system-integrated specialty pharmacy has on reducing the number and duration of annual inpatient admissions due to exacerbations of cystic fibrosis (CF) in patients who use the health system-integrated specialty pharmacy compared to patients who do not. A retrospective chart review was conducted on patients who received care at Nationwide Children's Hospital CF clinic. Investigators reviewed patient medication fill histories for target CF-specific medications between January 1, 2016 and June 30, 2017. Target CF medications included inhaled antibiotics, mucolytic agents, pancreatic enzyme replacement therapy, and Cystic Fibrosis Transmembrane Regulator (CFTR) modulators. Inclusion criteria are patients of the NCH CF clinic with a diagnosis of CF (ICD-10 E84.X), and who have a target CF medication on their medication list during the study period. Exclusion criteria includes death and lung transplantation prior to or during the study period. Eligible patient records were reviewed for one year from the date of the initial medication fill up to and including June 30, 2018, to determine inpatient admission rates and length of stay. Data for both study populations were then compared. There were 288 patient records initially reviewed and eligible for inclusion. 14 patients received lung transplants and 29 patients did not meet other inclusion criteria. 133 patients were assigned to the specialty pharmacy group and 112 patients assigned to the non-specialty pharmacy group. Preliminary results between the specialty pharmacy group and the non-specialty pharmacy group suggest an average of 0.83 versus 0.72 admissions per patient and an average length of stay of 8.686 days versus 9 days, respectively. Results are still being compiled and will be presented in full at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize common genotype variations in CF.

Describe the financial and socioeconomic impact cystic fibrosis has on patients.

### Self Assessment Questions:

What is the most common genotype observed in the study population?

- A F508del/F508del
- B: R117L/F508del
- C: R553x/g551d
- D: F508del/R553X

Which of the following is correct?

- A Life expectancies for patients with CF decreased slightly over the past decade
- B The aggregate cost of hospital visits increased 138% from 2003 to 2017
- C The number of annual adult inpatient admissions due to CF has decreased 15% from 2003 to 2017
- D New therapies have significantly decreased inpatient length of stay

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## FIXED DOSE G-CSF AND TIME TO NEUTROPHIL ENGRAFTMENT FOLLOWING AUTOLOGOUS STEM CELL TRANSPLANT

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Granulocyte-colony stimulating factors (G-CSF) are utilized in autologous stem cell transplant to decrease time to neutrophil engraftment by stimulating proliferation of neutrophils. Guidelines recommend post-transplant G-CSF doses of 5 mcg/kg/day, which is challenged by a few small studies demonstrating similar efficacy with much smaller doses. The objective of this study is to determine if fixed-dose G-CSF is safe and effective following autologous stem cell transplant. The primary outcome is time to neutrophil engraftment, and secondary outcomes include time to platelet engraftment, number of transfusions, length of stay, duration and incidence of febrile neutropenia, incidence of microbiologically-documented infection, and days of intravenous antibiotics. A retrospective chart review was conducted at the University of Cincinnati Medical Center including 72 patients with multiple myeloma or lymphoma who have received an inpatient autologous stem cell transplant. A fixed dose (300 mcg) of daily G-CSF is provided to all patients in this setting; therefore, by dividing patients into two weight groups (<80 kg and ≥80 kg), two dose-per-weight groups can be compared. Median time to neutrophil engraftment among patients weighing >80 kg was 11 days (IQR 0.25), and for patients weighing ≥80 kg was 11 days (IQR 1.25) (P=0.187). Median days of IV antibiotics for <80 kg and ≥80 kg was 4 days and 6 days, respectively (P=0.166). Median length of stay was 13 days for both groups (P=0.306). When using a fixed-dose of G-CSF, time to neutrophil engraftment is not different between patients weighing <80 kg and ≥80 kg. A power of 80% was achieved to detect a difference in time to neutrophil engraftment of one half day. A fixed-dosing strategy for G-CSF after autologous stem cell transplant appears to be safe and effective to promote neutrophil engraftment. Further analysis of secondary outcomes will aid in the clinical application of this data.

### Learning Objectives:

Describe the impact of Granulocyte-colony stimulating factors (G-CSF) on time to neutrophil engraftment following autologous stem cell transplant

Discuss the effect of fixed-dose versus weight-based (guideline-recommended) G-CSF in autologous stem cell transplant on time to neutrophil engraftment, other pre-engraftment clinical outcomes, and application to clinical practice

### Self Assessment Questions:

Which daily dose of G-CSF following autologous stem cell transplant is recommended by national guidelines?

- A Weight ≥ 80 kg: 480 mcg; weight < 80 kg: 300 mcg
- B: 5 mcg/kg
- C: Fixed-dose 300 mcg
- D: Weight ≥ 70 kg: 480 mcg; weight < 70 kg: 300 mcg

What is the primary purpose of G-CSF following autologous stem cell transplant which has been best-established in literature?

- A Promotion of platelet engraftment
- B Reduction in microbiologically-documented infection
- C Promotion of neutrophil engraftment
- D Reduction in number of red blood cell transfusions required

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT OF A CLINICAL RISK SCORING TOOL FOR PREDICTING EXTENDED-SPECTRUM BETA-LACTAMASE INFECTIONS IN PATIENTS ADMITTED TO THE EMERGENCY DEPARTMENT

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### Background:

Extended-spectrum beta lactamase (ESBL) producing bacteria can cause life threatening infections. Although the beta-lactam antibiotic class remains a mainstay of treatment for the majority of bacterial infections, increasing rates of resistance due to ESBL producing organisms threatens the utility of beta lactams. Carbapenem antibiotics are the mainstay of therapy for ESBL infections; however, overuse of carbapenems have been associated with the development of carbapenem resistance. Because of this, clinicians must choose between conserving therapies effective against ESBL producing organisms and using these agents empirically to prevent treatment failures. The ability to identify patients at significant risk for ESBL producing organism infection would allow clinicians to selectively utilize carbapenem therapy for high-risk patients, while limiting overuse. Several scoring tools have been developed to determine patient risk factors for ESBL infections; however, risk factors vary between institutions. Thus, there is a need to develop a local scoring tool that can identify patients at high risk of an ESBL infection.

### Methods:

This is a retrospective cohort study conducted at Beaumont Health that evaluated patients who presented to the emergency department between July 2016 and June 2018. Patients greater than 18 years old were included if they had: antibiotics given, cultures drawn within 24 hours of admission, and a discharge ICD-10 code consistent with an infection. The primary objective was to create a predictive model to identify patients at high-risk of having an ESBL infection. Data points collected include: antibiotic and culture history, demographics, and comorbidities. Analysis will include stepwise linear regression to identify risk factors associated with an ESBL infection. Sensitivity, specificity, positive predictive value, and negative predictive value will be assessed using a receiver operating characteristic curve.

Results and Conclusions: Full results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe current literature evaluating clinical risk scoring tools for extended-spectrum beta-lactamase infection

Identify possible risk factors for development of an extended-spectrum beta-lactamase infection

### Self Assessment Questions:

Which of the following have previously been identified as risk factors for developing an extended-spectrum beta-lactamase infection?

- A Prior antibiotic use
- B: Male gender
- C: Prior extended-spectrum beta-lactamase infection
- D: Both A and C

Extended-spectrum beta-lactamase infections have been associated with which of the following:

- A Increased length of stay
- B Increased time to appropriate therapy
- C Increased treatment cost
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST-INITIATED MRSA NASAL PCR PROTOCOL ON PNEUMONIA THERAPY

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**Purpose:** Previous national guidelines have recommended vancomycin for patients with suspected hospital acquired pneumonia (HAP) or ventilator-associated pneumonia (VAP) until they have ruled out methicillin-resistant *Staphylococcus aureus* (MRSA). However, a study by Jacobs and colleagues showed that MRSA pneumonia prevalence decreased steadily from 2009 to 2012. Traditional sputum culture and susceptibility methods may take several days to obtain final results and clinicians may be hesitant to de-escalate antibiotic therapy prior to these results. This may lead to delays in de-escalation and prolonged unnecessary antibiotic exposure. At Mercy Health Saint Mary's (MHSM), the microbiology laboratory utilizes GeneXpert MRSA/SA Nasal Complete Assay to quickly assess the risk of MRSA infections in patient with suspected pneumonia. This is a non-invasive method that demonstrates a high negative predictive value and rapid turnaround time compared to traditional bacterial culture methods. Beginning in May of 2018, MHSM implemented a protocol which allows clinical pharmacists to order a MRSA nasal PCR in patients receiving vancomycin or linezolid with an indication of pneumonia. The purpose of this study is to evaluate the impact of implementation of pharmacist-initiated MRSA nasal PCR testing on patient care.

**Methods:** This is a retrospective quasi-experimental study of admitted patients greater than 18 years of age who received at least one dose of vancomycin or linezolid for the treatment of pneumonia between June 1 to November 1, 2017 (pre-PCR group) and June 1 to November 1, 2018 (PCR group). The pre-PCR group will be compared to the post-PCR group to determine the impact of the protocol on the duration of anti-MRSA and anti-pseudomonal therapy, conversion of intravenous to oral antibiotics, total duration of antibiotics, length of stay, and 30-day readmission. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the clinical consequences of prolonged exposure to unnecessary anti-MRSA drug therapy

Describe the advantages and disadvantages of utilizing Xpert MRSA/SA Nasal Complete Assay

### Self Assessment Questions:

Which of the following is a potential consequence of prolonged vancomycin exposure?

- A: Thrombocytopenia
- B: Decreased drug monitoring
- C: Nephrotoxicity
- D: Red Man's syndrome

Which of the following is not an advantage of utilizing Gene Xpert MRSA/SA Nasal Complete Assay?

- A: Reduced laboratory cost
- B: High specificity
- C: Rapid turnaround time
- D: All of the above are the advantages of nasal PCR

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## BUNDLE APPROACH IN VENOUS THROMBOEMBOLISM PROPHYLAXIS IN PATIENTS WITH NON-TRAUMATIC SUBARACHNOID HEMORRHAGE

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The incidence of asymptomatic venous thromboembolism (VTE) is reported to be as high as 25% in patients with non-traumatic subarachnoid hemorrhage (SAH) using routine compressive venous Doppler. Moreover, the largest study to date in patients with SAH demonstrated an overall rate of symptomatic VTE of 4.4%. At the University of Illinois Health (UIH), a retrospective, observational study was completed in 2010 to identify incidence and risk factors of VTE in patients with non-traumatic hemorrhagic stroke, primarily in SAH and ICH. This study found that lower compliance to low-dose subcutaneous heparin (SQH), increase in length of intensive care unit (ICU) stay, and lower physical therapy session as independent risk factors for developing VTE. As a result, a bundle was launched in 2016 aiming to reduce the rates of newly diagnosed VTE within the neurosurgical ICU (NSICU). This bundle included lower-extremity Doppler ultrasonography upon admission, patient/family education on prevention of VTE within 48 hours of admission, prospective and daily audit on the use of intermittent pneumatic compression devices (proper position of sleeves and functional status of the device) and low-dose SQH within 24 hours of admission to the NSICU, unless contraindicated, and daily evaluation and documentation of ambulation status. In order to assess the efficacy and safety of this bundle approach, a retrospective chart-review study will be conducted between April 2014 and July 2018, encompassing two years before and after the bundle implementation. All patients will receive the standard of care at UIH for the treatment of SAH, including surveillance lower extremity venous duplex ultrasound scan performed twice weekly. The findings of the study will help clinicians gain a better understanding of the safety and effectiveness of UIH VTE bundle on the incidences of VTE and bleeding events in patients with SAH.

### Learning Objectives:

Identify risk factors associated with the development of venous thromboembolism in patients with subarachnoid hemorrhage.

Discuss safe and effective strategies to reduce the incidence of venous thromboembolism in patients with subarachnoid hemorrhage.

### Self Assessment Questions:

What is the preferred agent of choice and timeline to start VTE chemical prophylaxis in patients with SAH?

- A: Subcutaneous heparin within 48 hours after presentation
- B: Subcutaneous heparin within 24 hours after presentation
- C: Subcutaneous enoxaparin within 24 hours after presentation
- D: No chemical prophylaxis should be given in patients with SAH

Which of the following approach has been found to be the most effective in reducing the VTE incidence in patients with SAH?

- A: Pharmacologic prophylaxis with heparin
- B: Mobility
- C: Routine use of intermittent pneumatic compression devices
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF BODY WEIGHT ON HEMODYNAMIC RESPONSE TO FIXED DOSE VASOPRESSIN IN SEPTIC SHOCK

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**Purpose:** Sepsis and septic shock are significant causes of morbidity and mortality in critically ill patients. Current management strategies include early initiation of intravenous fluids, antibiotics, and vasopressors. The Surviving Sepsis Campaign recommends the addition of vasopressin to catecholamine-refractory septic shock in order to increase mean arterial pressure (MAP) and reduce catecholamine requirements. In contrast to weight-based, titrated dosing of catecholamine infusions, vasopressin is commonly administered at a fixed rate. The purpose of this study is to evaluate the impact of body weight on hemodynamic response to fixed dose vasopressin in patients with septic shock.

**Methods:** This was a single center, retrospective cohort study of adult patients admitted to the medical intensive care unit between March 1, 2017 and August 31, 2018. All patients were required to have a diagnosis of sepsis or septic shock and be initiated on a catecholamine infusion prior to vasopressin for inclusion. Patients were divided into groups based on body mass index. The primary endpoint was the proportion of patients who achieved target MAP within 4 hours. The secondary endpoints included the intensive care unit length of stay, hospital length of stay, in-hospital mortality, norepinephrine infusion duration, and change in MAP after 4 hours of vasopressin infusion.

**Results/Conclusions:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the differences in dosing techniques between vasopressin and other vasopressors used for the treatment of septic shock.  
Describe the potential benefits of vasopressin when compared to other adjunctive vasopressors.

### Self Assessment Questions:

Based on administration, how does vasopressin differ from other vasopressors?

- A Vasopressin is titrated; other vasopressors are administered at a fixed rate
- B Vasopressin is administered at a fixed rate; other vasopressors are titrated
- C Vasopressin is administered based on weight; other vasopressors are administered based on weight
- D Vasopressin is administered based on weight; other vasopressors are administered based on weight

Which of the following is most likely to occur as a result of vasopressin use in septic shock?

- A Decreased catecholamine requirements
- B Increased cardiac output
- C Renal protective effects
- D Decreased corticosteroid requirements

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ANALYSIS OF CLINICAL AND FINANCIAL OUTCOMES OF RESPIRATORY HEALTH AFTER PHARMACY BENEFIT MANAGER INTERVENTION TO PRESCRIBERS IN A COMMERCIAL CLIENT

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**PURPOSE:** To determine the clinical and financial impact of mailed interventions to members and prescribers regarding high risk asthma and COPD patients after six months.

**METHODS:** A retrospective cohort study was conducted with subjects identified through a PBM's Respiratory Health Program. Members with potentially uncontrolled asthma and COPD were identified through pharmacy claims data and diagnosis codes. Inclusion criteria were asthma medication ratio (AMR) <0.5 or COPD treatment ratio (CTR) <0.3, at least six prescriptions for rescue medications in the past year, and at least five years old with asthma or 40 years old with COPD. Intervention letters included a full profile listing all rescue and controller medication fills and were sent to members and their prescribers. A total of 25 members, 18 asthma and 7 COPD, were identified.

**RESULTS:** Repeated analysis of variance with post hoc analysis of significant main effects indicated a significant ( $p < 0.05$ ) decrease of 52% ( $8.05 \pm 2.139$  to  $3.85 \pm 2.621$ ) in rescue inhaler use between pre and post intervention. The number of controller medications increased by 46% (1.2 to 1.75). There were no other significant changes clinically. Financially, baseline AMR/CTR are positively correlated with baseline plan cost ( $r = 0.410$ ) but not with member cost ( $r = 0.139$ ). Post AMR/CTR showed strong correlation with post plan cost ( $r = 0.885$ ) and post member costs ( $r = 0.479$ ).

**CONCLUSION:** After the intervention, there was a statistically significant decrease in rescue inhaler fills and an increase in controller medication fills. There were no significant changes in plan or member cost though AMR/CTR seemed to be positively correlated with plan cost. There were no other significant changes clinically or financially but research shows these benefits can take up to 5 years to be apparent. Additional follow up is warranted to determine if positive cost correlations continue.

### Learning Objectives:

Recognize strategies used from a PBM perspective regarding member medication optimization

Identify outcome measurements related to asthma and COPD

### Self Assessment Questions:

What is the asthma medication ratio (AMR) used for inclusion?

- A <0.2
- B <0.3
- C <0.4
- D <0.5

Which measurement decreased by 52% six months after the intervention?

- A Rescue Medication Fills
- B Controller Medication Fills
- C Plan Cost
- D Member Cost

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF PRESCRIPTION ABANDONMENT AND DELAY IN TREATMENT WITH ORAL ANTICANCER AGENTS IN A PHARMACIST-LED ORAL CHEMOTHERAPY CLINIC

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**Purpose:** The number of novel oral anticancer agents has increased considerably. However, the availability of newer agents comes with increased financial burden. Insurance companies place these medications in specialty tier pricing, resulting in substantial out-of-pocket (OOP) costs. Studies show that higher OOP costs are associated with higher rates of abandonment (up to 50 percent with OOP costs greater than \$2,000). In 2017, Baptist Health Lexington established a pharmacist-led oral chemotherapy clinic equipped with a financial navigator to assist with the acquisition of oral anticancer prescriptions. This study seeks to describe rates of treatment abandonment and delay in this patient population. **Methods:** This retrospective study was submitted to and approved by the local Institutional Review Board. The study will include patients 18 years or older enrolled in the oral chemotherapy clinic at Baptist Health Lexington with a new prescription for an oral anticancer agent prescribed between August 1, 2017 to January 31, 2018. Exclusion criteria include: pregnant, incarcerated, or expired within 30 days of prescription submission. After identifying patients, collected data will include baseline demographics, type of cancer, oral anticancer agent prescribed, medication start date, dispensing date, dispensing pharmacy, type of insurance, initial co-pay prior to application of financial resources, patient's final OOP expense for initial dispensed prescription, and financial assistance (coupons, grants, etc.), if any. The primary outcome is defined as the percentage of patients who did not fill the oral anticancer prescription within 90 days or who experienced a delay in treatment greater than 30 days of index prescription submission. Secondary outcomes include analysis of length of delay and receipt of an alternative chemotherapy agent. **Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the financial burden of oral anticancer treatment  
Describe the impact of a pharmacist-led oral chemotherapy clinic on oral anticancer prescription abandonment and delay

### Self Assessment Questions:

Which of the following is a concern with increased availability and prescribing of novel oral anticancer agents?

- A: Ease of administration
- B: Convenience
- C: Increased out-of-pocket costs
- D: Less invasive treatment

Approximately what percent of prescriptions with an OOP cost of greater than \$2,000 were abandoned?

- A: 10%
- B: 35%
- C: 50%
- D: 75%

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DIRECT ORAL ANTICOAGULANTS VERSUS WARFARIN FOR INITIAL MANAGEMENT OF ATRIAL FIBRILLATION AFTER BIOPROSTHETIC VALVE REPLACEMENT

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**Introduction:** Abnormal conduction patterns of atrial fibrillation (AF) puts patients at an increased risk of stroke. CHA2DS2-VASc is a risk stratification tool to determine annual stroke risk in AF patients. A score of at least 2 is an indication for anticoagulation. The 2017 ACC/AHA valvular heart disease (VHD) guidelines recommend anticoagulation in patients with AF and a bioprosthetic heart valve (BVR) regardless of CHA2DS2-VASc score. Warfarin is the recommended anticoagulant for AF patients with VHD due to a lack of evidence to support the use of newer agents despite benefits to patients through reduced lab monitoring, drug interactions, and simplified dosing regimens.

**Objective:** To compare the safety and efficacy of warfarin and direct oral anticoagulants (DOAC) for anticoagulation management in first 30 days post-BVR in patients with AF.

**Methods:** This study was approved by the Indiana University Institutional Review Board. A retrospective chart review was completed for patients who underwent an aortic or mitral BVR between August 1, 2014 and July 31, 2018 within the Indiana University Health system. Patients included were at least 18 years of age with a history of AF or post-operative AF who received warfarin or a DOAC at discharge for anticoagulation. Patients were excluded if they did not attend their follow-up appointment within 60 days of discharge. Patients were assigned to either the warfarin or DOAC group based on anticoagulation therapy at discharge. The primary outcome was a composite endpoint of incidence of stroke or systemic embolism. Secondary outcomes include incidence of systemic embolism, ischemic stroke, hemorrhagic stroke, major bleeding, incidence of stroke or systemic embolism at 90 days, and 30-day readmission rate.

**Results and Conclusions:** Data collection is ongoing. Final results will be presented at the Great Lakes Residency Conference

### Learning Objectives:

Relate CHA2DS2-VASc score to annual risk of stroke in atrial fibrillation patients.

Identify appropriate anticoagulant management in atrial fibrillation agent with valvular heart disease.

### Self Assessment Questions:

1. What is the annual incidence of stroke associated with a CHA2DS2-VASc score of 2?

- A: 1.3%
- B: 2.2%
- C: 3.2%
- D: 4.0%

2. Which oral agent is recommended by the 2014 AHA/ACC Valvular Heart Disease guidelines for anticoagulation management in patients with atrial fibrillation and valvular heart disease?

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

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT OF A SPECIALTY PHARMACY INTERNAL BENCHMARKING MODEL

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Benchmarking in healthcare is used to evaluate productivity on the basis of workflows, policies, and performance in hopes of optimizing current practices and improving patient outcomes. Benchmarking has long been used in pharmacy practice, whether in tracking dispensing activities or optimizing clinical workflows. Internal benchmarking allows organizations to examine internal processes to determine allocation of institutional resources. Currently there is no validated model to evaluate productivity in specialty pharmacy workflows. This goal of this study is to design and implement a validated internal benchmarking tool for specialty pharmacy workflows. A timer tool was developed to allow pharmacists to track the time spent performing activities, which were identified as key performance indicators. Key performance indicators were identified as: prior authorizations, appeals of coverage denial, financial assistance activities, clinical onboarding activities, care plan activities, and clinical assessments. These times were utilized to establish benchmarks for each key performance indicator. Raw activity numbers were tracked for each specialty pharmacy service line utilizing data from the specialty pharmacy case-management software. From these data, internal benchmark standards were derived and service lines were evaluated. Data collection and analyses are still ongoing. Preliminary results and conclusions will be presented at the 2019 Great Lakes Residency Conference.

### Learning Objectives:

Discuss the current paucity of validated productivity benchmarking models designed for specialty pharmacy workflows.  
Recognize the strengths and weaknesses of internal benchmarking and understand when utilizing internal benchmarking is appropriate.

### Self Assessment Questions:

What is the main difference between internal and external benchmarking?

- A: Internal benchmarking evaluates performance metrics within an organization
- B: External benchmarking focuses on improving an organization's processes
- C: Internal benchmarking is essentially the same as external benchmarking
- D: Internal benchmarking occurs only within the current fiscal year, while external benchmarking occurs over a longer period

What are some difficulties associated with internal benchmarking?

- A: Identifying appropriate comparator groups.
- B: Selecting measurable key indicators that will result in meaningful data
- C: Determining an unbiased way to evaluate metrics.
- D: All of the above.

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## NARCOTIC MINIMIZATION FOLLOWING KIDNEY TRANSPLANTATION: IS IT WORTH THE PAIN?

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At the University of Illinois Hospital and Health Sciences System, an informal protocol for pain management following renal transplantation was implemented in 2015 that urged a rapid reduction in intravenous morphine in the immediate postoperative period followed by a prompt transition to oral nonopioid analgesics. Our primary objective is to examine prespecified clinical outcomes in those who were maintained on opioid therapy as compared to those with opioid cessation at one month post-transplantation. This data will serve as a baseline to institute a formal pain protocol following kidney transplantation at our institution. A retrospective chart review will be conducted on patients  $\geq 18$  years of age who received a kidney transplant at the University of Illinois Hospital and Health Sciences System between the dates of 01/01/2015 and 09/25/2017. All patients will be followed for a period of 12 months following transplantation. Chronic post-transplant opioid therapy was defined as opioid therapy continuance or escalation for more than one month post-transplantation. The primary endpoint is to compare graft function as represented by estimated glomerular filtration rate (eGFR) at 12 months post-renal transplantation between patients receiving chronic post-transplant opioid therapy and those patients with opioid cessation within one month of transplantation. Secondary endpoints include utilization of opioids during initial transplant hospital stay (as expressed in morphine milligram equivalents per day), and differences in hospital readmission related to transplant, rate of rejection, rate of death censored allograft loss, and rate of death all at 12 months between groups. Data will be analyzed and characterized using descriptive, comparative, and regression analyses. The study is approved by the IRE at our institution and data collection is ongoing. Results, data analyses, and conclusions are pending and will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the known implications of chronic opioid use in the pre- and post-renal transplant settings on transplant outcomes  
Identify appropriate uses for non-opioid analgesics for pain control in the post-renal transplant setting

### Self Assessment Questions:

Per the CDC Guideline for Prescribing Opioids for Chronic Pain, which of the following is NOT a consideration for prescribers on the safe use of opioids?

- A: Prescribing the lowest effective dosage
- B: Prescribing of extended-release instead of immediate-release opioids
- C: Prescribing a quantity no greater than needed for the expected duration of therapy
- D: Identifying a history of substance use disorder or concurrent benzodiazepine use

Which of the following mechanisms contributes to the nephrotoxic properties of nonsteroidal anti-inflammatory drugs (NSAIDs)?

- A: Sodium and fluid retention leading to an increase in mean systolic blood pressure
- B: Formation of intratubular obstructions
- C: Afferent arteriole vasoconstriction
- D: A & C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING THE EFFECT OF A NEONATAL VANCOMYCIN DOSING PROTOCOL ON THERAPEUTIC TROUGHS

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**Background:** Neonatal sepsis contributes substantially to morbidity and mortality with as much as 20% of live births in the United States experiencing at least one episode of sepsis. Common pathogens in late-onset sepsis include coagulase-negative Staphylococcus (CONS) and methicillin-resistant Staphylococcus aureus (MRSA). Vancomycin is a glycopeptide antibiotic for treatment of coagulase-negative Staphylococcus (CONS) and methicillin-resistant Staphylococcus aureus (MRSA). The pharmacokinetics of vancomycin in neonates is highly variable because of significant differences in weight, malnutrition, and development of renal function. Currently, there are no standard guidelines regarding vancomycin dosing in the neonatal population. Population-specific references for neonatal drug dosing include The Harriet Lane Handbook, Neofax, Lexicomp, Red Book, and Pediatric Injectable Drugs: the Teddy Bear Book. The approach to dosing vancomycin in neonates varies widely including the utilization of drug databases, institution-specific protocols, or individualized dosing strategies. This study aims to determine if protocol-driven dosing of vancomycin offers improved target trough attainment when compared to individualized dosing methods.

**Methods:** This retrospective cohort study will evaluate neonates admitted to the neonatal intensive care unit at Northwestern Memorial from January 2012 to July 2017. All neonates admitted to the NICU and receiving intravenous vancomycin will be included. Neonates receiving indomethacin will be excluded. Neonates will be separated into a before and after protocol institution group. The dosing protocol was implemented in August 2016. Data will be collected from the electronic medical record on neonates receiving at least one dose of vancomycin. The primary outcome for this study is to determine if instituting a vancomycin dosing protocol shows an improvement in neonates reaching therapeutic vancomycin troughs. Secondary outcomes will assess the effect of a vancomycin dosing protocol on clinical outcomes and safety profile.

**Results/ Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference.

**Disclosure:** The authors have no conflicts of interest.

### Learning Objectives:

Explain the differences between early onset sepsis and late onset sepsis in the neonatal population.

Review empiric antibiotic therapy regimens for early and late onset neonatal sepsis.

### Self Assessment Questions:

Which of the following pathogens cause late-onset neonatal sepsis?

- A Coagulase-negative staphylococci
- B: E.Coli
- C: Listeria monocytogenes
- D: Group B Streptococcus

Which of the following empiric antibiotic regimens are used for early-onset neonatal sepsis?

- A Ampicillin and gentamicin
- B Vancomycin and gentamicin
- C Clindamycin
- D Linezolid

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING QUALITY OF CARE: ANALYSIS OF THE IMPACT OF A CLINICAL PHARMACY PROGRAM ON THE DIABETES CARE OF AN UNDERSERVED POPULATION WITHIN A MEDICAL HOME

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**Purpose:** Studies have shown that utilizing pharmacists in the primary care setting improves glycemic control markers, however it is unknown where to best concentrate these collaborative efforts in order to maximize utility. The primary objective of this study is to determine the number of pharmacy contact hours needed for diabetic patients to achieve glycemic control as defined by the American Diabetes Association (ADA) standards. The secondary objective evaluates patient specific factors associated with achieving glycemic control with greater success under pharmacist directed care as compared to physician directed care in the primary care setting.

**Methods:** A retrospective chart review of patients at Bluegrass Community Health Center (BCHC) will be conducted in affiliation with the University of Kentucky College of Pharmacy (UKCOP). For this retrospective chart review patients must be managed for their diabetes by a BCHC provider or clinical pharmacist within the specified study period. Patients primarily managed for diabetes by a healthcare provider or clinical pharmacist outside of BCHC will be excluded. Data will be collected from randomly selected adults identified as meeting criteria for the study within the specified study period. A retrospective chart review will be conducted to obtain the goal hemoglobin A1C as well as hemoglobin A1C measurements within the study period, diabetic medications at the initial pharmacy visit, and diabetic medications at the visit glycemic control is obtained. Baseline patient demographic information including but not limited to sliding scale payment to measure socioeconomic status, preferred language, and ethnicity will be obtained. Data Analysis will be performed using Microsoft Excel or SAS statistical software with an a priori alpha of 0.05 set for significance.

**Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recall current evidence regarding pharmacists role in improving glycemic control in the primary care setting.

Discuss barriers to communication and care within a patient centered medical home.

### Self Assessment Questions:

Studies have shown that utilizing pharmacists in the primary care setting improves which of the following?

- A Blood pressure
- B: Hemoglobin A1C
- C: LDL-Cholesterol
- D: All of the above

Patients in the community health center setting often present with various levels of what?

- A Health literacy, cultural differences, and socioeconomic factors
- B Health literacy, cultural differences, and health promotion
- C Cultural differences, socioeconomic factors, and health promotion
- D Health literacy, socioeconomic factors, and health promotion

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**GENETICS OR ALPHABET SOUP? INTERPRETING RESULTS THROUGH IMPLEMENTATION OF A PHARMACOGENOMICS PROGRAM FOR ACUTE MYELOID LEUKEMIA**

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**Purpose:**

The purpose of this project is to standardize UW Health's interpretation of pharmacogenomics and treatment of acute myeloid leukemia (AML).

**Methods:**

A multi-pronged approach was taken to standardize pharmacogenomics in AML. First, a medication utilization evaluation (MUE) in AML patients was performed assessing time to genetic results. Second, a multidisciplinary workgroup was created to develop a clinical practice guideline for diagnosing and treating AML. Third, various functionalities within the electronic health record were explored to develop a standardized way for pharmacists to document pharmacogenomic results. Finally, a survey will be distributed to other institutions to assess pharmacogenomic utilization.

**Preliminary results:**

The MUE revealed a total of 190 genetic tests resulted in patients suspected to have or diagnosed with AML over a two-year period. On average, these genetic tests resulted between 7 to 11 days. Next, a clinical practice guideline focused on AML risk stratification, induction therapies, and bone marrow transplant referral was created. Currently, implementation of a standardized documentation within EHR is underway, which will enhance laboratory coordination, improve visibility of pharmacogenomic information within the EHR, and help clinicians quickly identify appropriate treatment options. Additionally, documentation of mutations within the electronic treatment plan will decrease time required to verify treatment regimens and assist with medication procurement issues. Results from our survey will be presented at the meeting.

**Conclusions:**

Pharmacogenomics is becoming increasingly prevalent and can drive treatment decisions. Pharmacists serve an essential role by helping determine if the correct pharmacogenomic labs are ordered, reported, and interpreted appropriately. The creation of guidelines and standardizing documentation of pharmacogenomic results improves continuity of care and ensures every patient receives remarkable healthcare. This process has begun at UW Health with AML and will continue to be refined as it is integrated into the care of cancer patients throughout UW's Carbone Cancer Center.

**Learning Objectives:**

Define the roles of a pharmacist in pharmacogenomics  
Identify difficulties in genomic visibility within an electronic health record

**Self Assessment Questions:**

What is/are the role(s) of a pharmacist in pharmacogenomics as defined by ASHP?

- A Order pharmacogenomic tests
- B: Reporting pharmacogenomic results
- C: Interpreting pharmacogenomic results
- D: All of the above

Where does genetic information populate within the electronic health record?

- A Results
- B Miscellaneous send out test
- C Scanned in documents
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**SURGICAL OPIOID STRATIFICATION (SOS) TOOL: STANDARDIZATION OF POST-OPERATIVE OPIOID PRESCRIBING PRACTICES**

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Current post-operative opioid prescribing practices are a large contributor to the increased amount of opioids diverted for abuse in the community, as well as increased risk for the transition from acute to chronic opioid use. The lack of resources available to guide these practices results in the prescribing of arbitrary round numbers of opioids for post-operative pain management, which results in either unused tablets that contribute to the community opioid reservoir or increased risk for chronic opioid use. This Continuous Quality Improvement (CQI) initiative was designed to provide standardization for post-operative opioid prescribing practices to minimize opioid-associated risks while optimizing pain management. This is a prospective, single-center, quality improvement study. The surgical opioid stratification (SOS) tool was developed through review of literature and data, in tandem with expert opinion from surgeons within the health system. Surgeries were assigned to specific levels within the stratification tool, depending on the difficulty of post-operative pain management, with higher levels indicative of more painful recoveries. Each level has a designated maximum amount of opioids that can be prescribed upon patient discharge, which is based on oral morphine equivalents (OMEs). The tool has a fluid aspect in the form of modifying factors, which are surgery- or patient-specific characteristics that warrant a higher or lower amount of opioids to be initially prescribed. After all surgeries had been assigned to their designated levels, the tool was distributed to surgery providers to guide post-operative opioid prescribing. The prescribers were educated on how to use the tool, followed by standard evaluations to assess proper implementation and use. Lastly, patient education is focused on proper utilization of analgesic medications and opioid disposal upon patient discharge. Effectiveness of implementing the SOS tool will be assessed by achieving greater than 80% of surgical providers using the tool one month after department-wide rollout.

**Learning Objectives:**

Identify the risks and consequences of prescribing arbitrary amounts of opioids, not based on patient- nor operation-associated factors, at post-operative discharge  
Describe the role of pharmacists in implementing the proper usage of the SOS tool and their impact on the opioid community reservoir and associated epidemic

**Self Assessment Questions:**

At what days' supply does the initial post-operative opioid prescription see an inflection in the risk of long-term opioid use?

- A 3-days' supply
- B: 5-days' supply
- C: 9-days' supply
- D: 12-days' supply

The introduction of the orthopedic surgery level system at the Mayo Clinic led to a decrease in post-operative opioid prescribing by what percentage?

- A 25%
- B 35%
- C 50%
- D 60%

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## MINIMIZING ALERT FATIGUE: OPTIMIZING CLINICAL DECISION SUPPORT BY REDUCING UNNECESSARY MEDICATION ALERTS

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Healthcare institutions increasingly rely on clinical decision support tools to aid in the prevention of adverse drug events. Despite their potential benefits, clinical decision support systems have also been recognized for producing excessive, unnecessary alerts. Irrelevant warnings contribute to diminished responsiveness to alerts, recognized as alert fatigue. When appropriately designed and applied, medication alerts can improve clinician workflow, improve patient care, and decrease healthcare costs. The purpose of this study is to minimize alert fatigue by reducing the total number of medication alerts that inpatient pharmacists are exposed to in a 325-bed community hospital. This quasi-experimental study was approved by the institutional review board. Hospital pharmacists were surveyed to obtain information regarding their personal views of medication alert volume and management within the institution. Data was collected by running two medication alert reports in the electronic health record in two- to four-week increments and then was organized based on the frequency of clinician override rates. Alerts of limited clinical value were submitted to the institution's Medication Management and Safety committee and the Clinical Decision Support committee for review. Alerts approved for filtering were run in a testing environment prior to implementation within the live environment of the electronic health record. Data was gathered for a four-week period and assessed to determine if there was a reduction in the total number of medication-related alerts. Results from the pre-intervention phase show an average of 3643 medication-related alerts per day, where the most common alert types were duplicate therapy and drug-drug interactions. A total of 185 unique alert types were adjusted in the electronic health record and tested prior to implementing changes in the production environment. The outcome of the first phase of alert adjustments is predicted to result in a 11% reduction in medication-related alerts.

### Learning Objectives:

Review the benefits of optimizing medication warnings to reduce alert fatigue.

Discuss the problem of alert fatigue and how it relates to pharmacists and providers at the point of order entry and order verification.

### Self Assessment Questions:

What is the primary benefit from suppressing clinically irrelevant medication alerts?

- A: Creating space for new, clinically irrelevant medication alerts.
- B: Increasing the override rate of all medication-related alerts.
- C: Reduction in useful clinical decision support tools.
- D: Reduction in clinician alert fatigue.

What is alert fatigue?

- A: A series of alerts that signify clinician exhaustion from work
- B: An exhaustive resource for electronic medical record downtime.
- C: Diminished responsiveness to alerts triggered by excessive, unnecessary
- D: Poor outcomes associated with poorly designed medication alerts.

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ADHERENCE TO PRE-TREATMENT DENTAL EXAMINATIONS AND DOCUMENTATION PRACTICES IN ONCOLOGY PATIENTS RECEIVING INTRAVENOUS BISPHOSPHONATES OR DENOSUMAB

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Purpose: Antiresorptive agents including denosumab, pamidronate, and zoledronate are used in oncology patients to manage bone related complications associated with malignancy. Medication-related osteonecrosis of the jaw (MRONJ) is a rare, but serious adverse effect associated with the use of these agents. To reduce the risk of MRONJ, it is recommended that patients receive dental examination prior to and throughout therapy. Current institutional practices do not include a protocol ensuring reception or documentation of this dental care. As a result, oncology patients receiving antiresorptive therapy at OhioHealth may not be receiving recommended dental care, placing them at a higher risk for the development of MRONJ. The primary objective of this study is to assess whether oncology patients receiving intravenous therapy with bisphosphonates or denosumab received dental examination prior to initiating or throughout treatment. Additionally, this study will aim to identify documentation practices of this information within the electronic medical record, and describe barriers patients face in accessing prophylactic dental care.

Methods: This is an IRB-approved, retrospective and prospective, multi-center study comprised of a retrospective chart review and prospective scripted patient phone call. This study includes oncology patients who have received intravenous treatment with an antiresorptive agent at any of nine OhioHealth care sites between the dates of July 1, 2017 and July 31, 2018. The primary outcome of this study is to describe the frequency at which oncology patients receiving antiresorptive drugs received dental care before and/or throughout their therapy. Secondary endpoints include patient-reported barriers to accessing recommended dental care and documentation of this information within the electronic medical record. Patients less than 18 years of age, non-oncology patients, those receiving pamidronate, zoledronate, or denosumab for a non-oncology related indication, and hospice patients will be excluded.

Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the mechanism by which antiresorptive agents cause adverse effects and review indications for these agents in oncology patients

Describe current recommendations regarding dental care amongst oncology patient receiving treatment with intravenous antiresorptive agents

### Self Assessment Questions:

Which of the following is not an indication for using intravenous bisphosphonates/denosumab in oncology patients

- A: Bone metastases from solid tumors
- B: Hypercalcemia of malignancy
- C: Febrile neutropenia
- D: Bone loss from androgen deprivation treatment in prostate cancer

Current recommendations regarding dental care in oncology patients receiving intravenous bisphosphonates/denosumab include:

- A: Pre-treatment dental exam
- B: Annual dental exams
- C: Post-treatment dental exams
- D: There are no recommendations regarding dental care in this patient

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF VALPROIC ACID FOR AGITATION AND DELIRIUM IN THE ICU

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**Purpose:** Agitation and delirium are extremely prevalent in the intensive care unit (ICU) with rates as high as 87% depending on the type of ICU, acuity of illness, and presence of mechanical ventilation. Agitation and delirium are a major cause of distress for patients and providers and inadequate treatment can lead to increased healthcare costs, length of stay, and mortality. Analgesics, sedatives, and antipsychotics are commonly prescribed for agitation and delirium, but their use can be limited by adverse effects or lack of efficacy. Valproic acid is a treatment option that is available in enteral and intravenous formulations with an alternative mechanism of action and different side effect profile compared to first-line agents. The primary objective of this study is to identify the valproic acid prescribing practices in the Cleveland Clinic Main Campus ICUs when used for agitation and/or delirium. Secondary objectives are to evaluate measures of effectiveness as well as safety of valproic acid in the treatment of agitation/delirium.

**Methods:** This is a single-center, retrospective cohort study of adult inpatients admitted to the Cleveland Clinic Main Campus ICUs between January 1, 2018 and August 31, 2018. Our electronic medical records were used to identify patients. Adult patients who received valproic acid for the treatment of agitation or delirium for at least 24 hours will be included. Patients taking valproic acid prior to admission or those admitted to the neurosciences ICU will be excluded. Prescribing practices will be evaluated by dose, frequency, route of administration, and titration strategies. Secondary outcomes will assess effectiveness of valproic acid via changes in sedation, agitation, and delirium assessment tools and quantity of adjunctive agents for pain, agitation, and delirium required. Safety endpoints including thrombocytopenia, hyperammonemia, and hepatotoxicity will also be evaluated. Descriptive statistics will be used to describe our data.

Results: Pending

Conclusions: Pending

### Learning Objectives:

Discuss the role of valproic acid in the treatment of ICU agitation and delirium

Describe prescribing practices of valproic acid at a tertiary academic medical center

### Self Assessment Questions:

Which statement is correct regarding treatment of agitation/delirium with valproic acid?

- A: Valproic acid levels should be monitored frequently to assess efficacy
- B: Valproic acid can be used as monotherapy or as adjunct treatment
- C: Valproic acid has no major drug interactions to consider
- D: Valproic acid should not be used in a patient already receiving anti

Which of the following is a major side effect of valproic acid therapy?

- A: QTc prolongation
- B: Extrapyrmidal symptoms
- C: Hepatotoxicity
- D: Respiratory depression

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ACETAMINOPHEN IN ADVANCED CANCER PAIN

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### Purpose

Pain is a distressing and debilitating symptom for millions of patients with cancer. The mainstay of treatment in advanced cancer pain is opioids, but non-opioid medications such as acetaminophen continue to be included in guidelines in this population despite a lack of evidence of efficacy. The objective of this study is to determine if acetaminophen improves pain control, reduces length of stay, or decreases opioid requirements in patients receiving strong opioids for cancer pain.

### Methods

The Institutional Review Board approved this retrospective study. The study will include adults (18 years and older) admitted to Michigan Medicine from January 1, 2017 to December 31, 2017 who had a solid tumor diagnosis and were seen by the Palliative Care consult service for pain management. Patients will be split into two groups: those who received acetaminophen in addition to opioids (morphine, oxycodone, hydromorphone, and fentanyl) and those who were not prescribed acetaminophen. Patients receiving methadone or buprenorphine will be excluded. The following data will be collected: demographic data, primary tumor site and whether the disease is metastatic, opioids administered, non-opioid and adjuvant drugs administered, average daily pain intensity (numeric rating scale 0 to 10), total daily acetaminophen dose, and AST/ALT at admission and discharge. The primary outcome will be the number of patients who have at least a moderate decrease in pain, defined as a 30 percent reduction in average daily pain score from baseline. Secondary outcomes include number of patients with a substantial reduction in pain, defined as a 50 percent reduction in average daily pain score, length of stay, and change in opioid utilization.

### Results

In progress

### Conclusion

In progress

### Learning Objectives:

Explain the WHO Pain Relief Ladder and its approach to cancer pain therapy.

Discuss current literature on acetaminophen and strong opioids for cancer pain.

### Self Assessment Questions:

Which of the following medications is an example of a strong opioid user at Step 3 of the WHO Pain Relief Ladder?

- A: Morphine
- B: Tramadol
- C: Codeine
- D: Naproxen

Which of the following is TRUE about the 2004 Stockler et al. study on acetaminophen in advanced cancer pain?

- A: It was a prospective study in >600 patients.
- B: The treatment arm consisted of 3 grams of acetaminophen per day
- C: The difference in pain at the end of the study was of unclear clinical significance
- D: The study did not include patients on strong opioids.

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF THE EMERGENCY DEPARTMENT MANAGEMENT OF IMMUNOTHERAPY-RELATED TOXICITIES

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Immune checkpoint inhibitors attack tumor cells by stimulating an immune response. Due to immune system upregulation, patients may be more prone to immune side effects or toxicities. Currently, there is no standardized management protocol of these toxicities in the emergency departments (ED) at the study sites. No literature exists for potential interventions to help standardize management of these immune-related adverse effects (irAE). The purpose of this study is to evaluate the current state of ED management of irAEs throughout a large health-system and adherence to evidence-based standards.

This is an IRB-approved, retrospective chart review looking to determine the proportion of patients undergoing immunotherapy that presented to the ED with each type of irAE, including: dermatologic reactions, peripheral edema, pneumonitis, hepatitis, colitis, endocrinopathies, nephritis, and encephalitis. Secondary endpoints include: proportion of patients undergoing combination immunotherapy prior to ED presentation and the proportion of patients that received appropriate evidence-based treatment in the ED per National Comprehensive Cancer Network (NCCN) and American Society of Clinical Oncology (ASCO) standards. The study population will include all adult cancer patients who presented to any study site ED with an irAE between June 1, 2016 and June 1, 2018 who received at least one dose of immunotherapy within the previous year. The data collected will include: age, comorbidities, cancer type, staging, immunotherapy received, date of first and last dose of immunotherapy received, ED site encounter, type of irAE, pharmacologic treatment utilized and dose administered.

Ten patients were identified over a total of 11 ED encounters with irAEs within the study time-period. Five patients received pembrolizumab, four patients received nivolumab, and one patient received combination nivolumab/ipilimumab therapy. The most common irAEs were pneumonitis (55%), colitis (18%), dermatologic reactions (9%), hepatitis (9%), and hyperglycemia (9%). Data analysis in progress.

Conclusion will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the mechanism by which immunotherapies cause adverse effects and recall the toxicities associated with their use

Describe evidence-based treatment for immunotherapy-related toxicities as defined by the National Comprehensive Cancer Network and American Society of Clinical Oncology

### Self Assessment Questions:

Which of the following is considered an immunotherapy-related toxicity?

- A: Fatigue
- B: Cough
- C: Pneumonitis
- D: Pneumonia

A patient presents with grade 3 pneumonitis after being treated with 4 cycles of pembrolizumab. Which of the following is the best treatment choice according to the NCCN guidelines?

- A: Hold immunotherapy and administer methylprednisolone 0.5-1mg/
- B: Permanently discontinue immunotherapy and administer methylpr
- C: Continue immunotherapy and administer prednisone 1mg/kg/day
- D: This is not a toxicity of pembrolizumab, no further treatment needed

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF EXTENDED INFUSION CEFEPIME FOR THE TREATMENT OF HIGH RISK FEBRILE NEUTROPENIA IN HEMATOLOGIC MALIGNANCIES: A SINGLE-CENTER, RETROSPECTIVE STUDY

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Purpose: Febrile neutropenia (FN) occurs when chemotherapy-induced neutropenia is accompanied by fever. Fever is defined as an oral temperature of 101 F or higher or 100.4 F or higher sustained over one hour. Neutropenia is defined as an absolute neutrophil count less than 500 or expected to decrease to less than 500 cells/mm<sup>3</sup> in 48 hours. Patients with acute leukemia treated with induction chemotherapy and those undergoing bone marrow transplant (BMT) are at high risk for infections due to prolonged neutropenia. Guidelines recommend empirical treatment with an anti-pseudomonal beta-lactam such as cefepime due to high mortality associated with this pathogen. Kinetic studies demonstrated that extended infusion (EI) cefepime has improved bactericidal activity when compared to standard infusion (SI) cefepime. The objective of this study is to evaluate clinical success of EI cefepime for empiric treatment of high risk FN in hematological malignancies.

Methods: This study includes adult patients who received EI cefepime for empiric FN treatment during hospitalization for acute leukemia induction chemotherapy or undergone BMT. Exclusion criteria include concurrent gram negative coverage and/or use of intravenous antibiotics with gram-negative coverage within 24 hours prior to cefepime initiation. The primary outcome is to compare the rate of clinical success associated with EI cefepime to the historical rate of clinical success associated with SI cefepime. Clinical success is defined as defervescence at 72 hours from time of cefepime initiation plus clearance of infection. Defervescence is further defined as a single oral temperature less than 100.4 F sustained for 48 hours. Secondary endpoints include time to defervescence, hospital length of stay, and all-cause mortality. Continuous variables will be assessed using a student t-test or Mann-Whitney U test. Categorical variables will be assessed using a Chi-square or Fischer exact test.

Results: Data collection and analysis are currently on-going.

### Learning Objectives:

Define high risk febrile neutropenia and outline antimicrobial treatment

Explain the pharmacodynamics of extended infusion cefepime

### Self Assessment Questions:

JT is a 42 years-old male receiving induction chemotherapy for acute leukemia. On physical exam, JT has a temperature of 100.5 F. Complete blood count with differential returns with absolute blood count

- A: High risk: ANC is expected to decrease to < 500 in the next 48 hours
- B: Low risk: JT is not neutropenic (ANC > 500 cells/m<sup>3</sup>). No treatment
- C: Intermediate risk: JT does not have significant comorbidities. Treatment
- D: High risk: ANC is expected to decrease to < 500 in the next 48 hours

Extended infusion cefepime was shown to be effective in achieving optimal T > MIC. It was also associated with lower mortality in pseudomonas infections in which patient population?

- A: Critically ill patients
- B: Patients with febrile neutropenia
- C: Patients with hematological malignancies
- D: Patients undergoing bone marrow transplant

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE EFFICACY OF USING ANTIPSYCHOTICS AS ADJUNCT THERAPY TO BENZODIAZEPINES IN SEVERE ALCOHOL WITHDRAWAL

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Despite an appropriately implemented treatment strategy, severe alcohol withdrawal patients admitted to critical care units often require large amounts of benzodiazepines. It is observed that at high doses, benzodiazepines reach a threshold where the agonist effect on GABA is maximized leading to breakthrough symptoms. In these situations adjunct medication therapy is often utilized. The purpose of this study is to evaluate the safety and efficacy of antipsychotics as adjunct treatment in patients with severe alcohol withdrawal admitted to the medical intensive care unit (MICU). It is thought that the dopamine antagonist properties of these agents may help blunt symptoms of withdrawal. Evidence, however, is lacking for the safety and efficacy of adding these agents to benzodiazepine therapy. This is a retrospective cohort study of patients admitted to the MICU at John H. Stroger Hospital from June 2013 to June 2018. Inclusion criteria are as follows: patients  $\geq 18$  years of age diagnosed with alcohol withdrawal and a clinical institute withdrawal assessment for alcohol (CIWA) score of  $\geq 15$ . Patients were excluded if they received an antipsychotic within 48 hours of admission, had a history of significant neurologic disorder including non-alcohol related seizures, or required deep sedation. The primary endpoint is the difference in the composite percentage of time spent at goal symptom control between patients who received benzodiazepines alone versus those who were given adjunct antipsychotics. The percentage of time spent at goal symptom control was defined as the total number of hours spent with a CIWA score of  $< 15$  or Richmond Agitation and Sedation Scale (RASS) of  $-2$  to  $1$  during their MICU stay. Student's t-test or Mann Whitney U will be utilized to determine if there is a significant difference in symptom control between these two treatment strategies. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize appropriate first line medication therapy for severe alcohol withdrawal.

Identify the proposed mechanism by which adjunct antipsychotics may help improve symptom control in patient with severe alcohol withdrawal.

### Self Assessment Questions:

Which of the following is the most preferred initial treatment strategy for patients presenting with severe alcohol withdrawal?

- A: Scheduled administration of benzodiazepines
- B: Symptom triggered administration of benzodiazepines
- C: Symptom triggered administration of antipsychotics
- D: Scheduled administration of antipsychotics

Antipsychotics are thought to improve symptoms in patients with severe alcohol withdrawal refractory to high doses of benzodiazepines due to their:

- A: GABA agonist effects
- B: Serotonergic effects
- C: Dopamine antagonist effects
- D: Histamine antagonist effects

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DELAYS IN ADMINISTRATION OF THE SECOND ANTIBIOTIC DOSE IN SEVERE SEPSIS AND SEPTIC SHOCK

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**PURPOSE:** The Surviving Sepsis Campaign recommends starting broad spectrum antibiotics within one hour of sepsis recognition, as studies have found that longer time to antibiotic administration correlates with increased mortality. Despite this emphasis on time to first dose, delays may still occur in administration of subsequent doses, potentially resulting in adverse outcomes. The objective of this study is to determine our institution's incidence of significant delays in administration of the second antibiotic dose for severe sepsis and septic shock. This study will also assess clinical outcomes in patients with and without second dose delays. **METHODS:** This single-center, retrospective chart review evaluated patients admitted to Kettering Medical Center from September 1, 2016 to September 1, 2018 who received at least two antibiotic doses for the treatment of severe sepsis or septic shock. Recommended dosing intervals for the first antibiotic agents administered were determined using institutional dosing policies. Patients were defined as having experienced a significant delay in administration if the actual interval between the first and second antibiotic doses was greater than 125% of the recommended interval. **PRELIMINARY RESULTS:** Of 197 patients meeting inclusion criteria, 38 (19.3%) were determined to have experienced a significant delay. The rate of significant delays was similar when comparing location of first dose administration (emergency department versus other hospital location). When comparing outcomes in patients with and without second dose delays, no significant differences were identified in hospital mortality, need for mechanical ventilation, ventilator days, hospital length of stay, or intensive care unit length of stay. **CONCLUSION:** Final results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss institutional factors that may increase the rate of delays between first and second antibiotic doses in septic patients.

Describe the influence of the choice of antibiotic regimen on the rate of second dose delays.

### Self Assessment Questions:

For which of the following antibiotic regimens is a dose delay most likely to occur?

- A: Ceftriaxone 2 g IV every 24 hours
- B: Meropenem 500 mg IV every 6 hours
- C: Vancomycin 1000 mg IV every 12 hours
- D: Piperacillin-tazobactam 3.375 g IV every 8 hours

Which of the following factors has been correlated to a higher rate of antibiotic second dose delays in patients with sepsis?

- A: Inpatient status at time of sepsis recognition
- B: Choice of antibiotic with long half-life
- C: Patient age greater than 75 years
- D: Boarding in the emergency department after admission

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

**COMPARISON OF REDUCED-INTENSITY CONDITIONING TO BUSULFAN TARGETED AUC CONDITIONING IN PATIENTS UNDERGOING HEMATOPOIETIC STEM CELL TRANSPLANT FOR ACUTE MYELOID LEUKEMIA OR MYELODYSPLASTIC SYNDROME**

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The development of reduced-intensity conditioning (RIC) regimens has allowed more patients with acute myeloid leukemia (AML) or myelodysplastic syndrome (MDS) to proceed to hematopoietic stem cell transplant (HSCT) by reducing toxicities associated with myeloablative conditioning (MAC). The cornerstone of RIC is modification of busulfan exposure, expressed as an area under the curve (AUC). A recent study demonstrated RIC regimens produced less toxicity at the cost of potentially decreased survival relative to MAC. To date, no studies have compared an AUC target of 4,000  $\mu\text{mol}\cdot\text{min}/\text{L}$  to either RIC or MAC.

At our institution, a busulfan target AUC of 5,000  $\mu\text{mol}\cdot\text{min}/\text{L}$  in combination with fludarabine is used for MAC regimens, replacing the standard myeloablative dose. RIC regimens use a lower, fixed dose of 0.8 mg/kg for eight doses. Patients who fall between eligibility MAC or RIC receive a busulfan AUC target of 4,000  $\mu\text{mol}\cdot\text{min}/\text{L}$ .

A retrospective cohort study of 88 patients was conducted to compare the efficacy and safety of three different busulfan dosing strategies. IRB approval was received prior to beginning data collection. The primary outcome was relapse-free survival. Key secondary outcomes included overall survival; time to count recovery; incidence of graft-versus-host disease (GVHD), venoocclusive disease, infection, and select grade 3-5 toxicities. Patients included met the following: age 18-89 years, diagnosis of AML or MDS, HSCT from 2015-2018, and receipt of fludarabine + busulfan conditioning with or without antithymocyte globulin. Data collected included: demographics, malignancy and treatment characteristics, conditioning regimen, performance status, donor characteristics, date of transplant, date of relapse or death, and labs or documentation pertinent to the study outcomes.

Findings will be presented at the 2019 Great Lakes Pharmacy Resident Conference. The results of this study may influence practice by showing whether an AUC 4000 regimen can balance the advantages of RIC and MAC conditioning.

**Learning Objectives:**

Classify the risks and benefits of various busulfan dosing strategies  
Recognize common toxicities or adverse events associated with busulfan/fludarabine-based conditioning regimens

**Self Assessment Questions:**

Which of the following busulfan dosing strategies can be expected to produce the least toxicity?

- A Reduced intensity
- B: Myeloablative
- C: Targeted AUC 4000
- D: Targeted AUC 5000

Of the following events, which is most likely to occur in a patient who received a busulfan AUC 5000/fludarabine-based conditioning regimen?

- A Hyperkalemia
- B Mucositis
- C Neutropenic fever
- D Hypersensitivity reaction

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**IMPACT OF PROPHYLACTIC INTRATHECAL CHEMOTHERAPY ON CENTRAL NERVOUS SYSTEM RELAPSE RATES IN ACUTE MYELOID LEUKEMIA PATIENTS PRESENTING WITH SIGNIFICANT LEUKOCYTOSIS**

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**Purpose:**

Despite the identification of significant leukocytosis at initial presentation as a risk factor for CNS relapse in acute myeloid leukemia (AML), there is no standard of practice for CNS relapse risk reduction in this patient population. Given the poor prognosis of patients with CNS relapse, any reduction in the incidence of CNS relapse could improve morbidity and mortality in AML patients. The objective of this retrospective cohort study is to evaluate the efficacy of prophylactic IT chemotherapy in reducing the risk of CNS relapse in AML patients with significant leukocytosis at initial presentation.

**Methods:**

This study is a single-center, retrospective cohort study of adult AML patients who presented with significant leukocytosis (WBC > 100,000 cells/mL) to Michigan Medicine. Study subjects will be identified using DataDirect and the Michigan Medicine Leukemia Database. Demographic and clinical data will be collected via manual chart review of the electronic medical record. Data to be collected includes: age, gender, presence of CNS relapse after diagnosis, time to CNS relapse, WBC count, monocytic differentiation, LDH at diagnosis, blast percentage in peripheral blood, bone marrow blast percentage, FLT3-ITD positivity, NPM1 positivity, cytogenetics, and systemic induction chemotherapy regimen. Patients will be divided into two cohorts, "IT prophylaxis" cohort and "no IT prophylaxis" cohort. Patients will be propensity score matched 1 to 2 (IT prophylaxis to no IT prophylaxis) to reduce bias. The primary outcome is incidence of CNS relapse. Secondary outcomes include time to CNS relapse and presence of additional risk factors for CNS relapse. An estimated sample size of 85 patients will be required to show a reduction in CNS relapse rates from 11 percent to 1 percent with 80 percent power. This study was submitted to the Michigan Medicine Institutional Review Board for approval.

**Results/Conclusions:**

Results and conclusions to be presented at GLPRC.

**Learning Objectives:**

Describe Describe central nervous system (CNS) relapse data and risk factors  
Review Review current acute myeloid leukemia (AML) treatment standard of care and utilization of CNS prophylaxis

**Self Assessment Questions:**

Which of the following is a risk factor for CNS relapse in AML?

- A female sex
- B: Age > 65
- C: Wbc > 100
- D: peripheral blast count 15%

Utilization of intrathecal chemotherapy prophylaxis has largely fallen out of favor due to the use high-doses of which type of chemotherapy?

- A doxorubicin
- B cytarabine
- C etoposide
- D blinatumomab

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THE SIGNIFICANCE AND IMPACT OF SCREENING PRESERVATION FLUID CULTURES IN RENAL TRANSPLANT RECIPIENTS

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**Purpose:** Preservation fluid (PF) is necessary to maintain organ viability but serves as a vector for infection. The utility of routine PF screening and impact of culture-positive PF is controversial. This study aims to compare incidence of post-operative infection in patients with culture-positive PF versus those with culture-negative PF.

**Methods:** Renal transplant recipients between 1/1/12 and 12/31/17 were retrospectively identified for analysis. The primary outcome assessed incidence of infection PF in patients with culture-positive PF compared to patients with culture-negative PF at 30 days post-transplant. Infection was considered related to PF if it was the same organism as the PF culture. Secondary outcomes included: infection rates in treated versus untreated culture-positive PF, distribution of organisms, antimicrobial use, duration of therapy, sequelae of PF treatment.

**Results:** A total of 153 patients were analyzed. Demographics were similar between groups. There was no difference in the incidence of infection at 30 days post-transplant in patients with culture-positive PF or culture-negative PF (9.5% vs. 14.7%,  $p = 0.42$ ). There were no cases of infection related to PF regardless of whether culture-positive PF was treated or untreated. The incidence of *C. difficile* infection and multidrug-resistant organisms was similar. Of the organisms found in PF cultures, 75% were non-pathogenic, and coagulase-negative *Staphylococcus* was most common. Fifty-four percent of culture-positive PF received antimicrobial treatment for an average duration of 4.6 days. Vancomycin and cefazolin were most commonly used for treatment.

**Conclusions:** Culture-positive PF was primarily caused by coagulase-negative *Staphylococcus* which is often a contaminant and of low virulence. There was no difference in overall infection rates based on PF status, and subsequent infection related to PF did not occur regardless of PF treatment. This suggests antimicrobial treatment for culture-positive PF may be avoided with pathogens that are common contaminants and of low virulence. Interventional studies are needed to validate this strategy.

### Learning Objectives:

Discuss the role of preservation fluid and the utility of its routine screening in solid organ transplant.

Describe the pattern of organisms in culture-positive preservation fluid and the implications of treatment.

### Self Assessment Questions:

What is the role of preservation fluid in solid organ transplant?

- A: Prevent microbial growth
- B: Eliminate toxins
- C: Prevent cellular edema and destruction
- D: Promote cytokine release

What is a common organism to be cultured in a preservation fluid?

- A: *Listeria monocytogenes*
- B: Coagulase-negative staphylococci
- C: *Pseudomonas aeruginosa*
- D: *Klebsiella pneumoniae*

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT AND IMPLEMENTATION OF A CLINICAL PHARMACIST POSITION IN THE OPERATING ROOM

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**Purpose:** The American Society of Health-System Pharmacists (ASHP) Guidelines on Surgery and Anesthesiology Pharmaceutical Services recommend direct pharmacist involvement in perioperative management. The perioperative environment is a medication-intensive setting where a pharmacist can be a vital resource for physicians, anesthesiologists, and nursing staff. The purpose of this project is to create an operating room clinical pharmacist position to facilitate cost-savings and improve patient safety. Methods: The primary purpose of this pilot is to determine the perceived value of an operating room pharmacist and implement pharmacy services to support operating room staff. Pharmacist participation within the Aspirus Wausau Hospital Surgery Department occurred from 12/13/18 to 1/31/19 for a total of 19 days. The pharmacist's role was to provide consultation services and drug utilization reviews to improve workflow and safety of medication therapy. Daily activities included providing drug information, medication order verification, medication optimization, and team-based care coordination. Physicians, anesthesiologists and nursing staff completed a survey before and after completion of the pilot study to evaluate the perceived value and overall satisfaction with having a clinical pharmacist in the operating room. The secondary objective is to evaluate discrete data outcomes to analyze the benefit of a pharmacist. The category and number of pharmacist interventions, consultations, recommendation acceptance rate, cost savings and drug utilization have been collected and outcomes will be evaluated. These interventions will be tracked to analyze pharmacist impact and utilization over the five-week period. Following the completion of the pilot, survey and discrete data will be compiled and a statistical analysis conducted to determine effectiveness and feasibility of implementing a perioperative pharmacist position in the future. Results/Conclusion: To be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the benefits of incorporating pharmacists into perioperative medication management that have been shown in the literature as well as those targeted in this pilot.

Identify the strategies utilized to justify the return on investment of the addition of a perioperative pharmacist.

### Self Assessment Questions:

According to ASHP, which of the following are reasons a pharmacist should participate in the perioperative clinical team?

- A: Establish a leadership role in medication-use management
- B: Provide accurate drug information and consultation services
- C: Develop a narcotic-diversion process
- D: All of the above

Which of the following served as the greatest barrier to implementation of this project?

- A: Support from clinic staff
- B: Financing for an additional pharmacist
- C: Lack of pharmacists trained to fill the position
- D: Lack of potential benefit of the addition of a pharmacist to the oper

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPACT OF IMPLEMENTING A VALIDATED SLEEP QUESTIONNAIRE ON PHARMACOLOGIC AND NON-PHARMACOLOGIC MANAGEMENT OF ADULT BURN PATIENTS

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**Purpose:** Sleep disruption is consistently identified as a major stressor in critically ill patients. Patients with burn injuries in particular experience significant changes in sleep architecture due to pain, itching, dressing changes, and psychological disturbances associated with the post-trauma period. This disruption in the sleep cycle has a detrimental effect on the recovery process and is associated with an increased risk of mortality. Despite the deleterious impact on recovery and rehabilitation, there is a paucity of literature on the management of sleep disturbances in burn patients. Currently, all validated, guideline-recommended sleep assessments are subjective evaluations of patients' perceptions of sleep. One example is the Richards Campbell Sleep Questionnaire (RCSQ), which assesses sleep depth, time to fall asleep, nighttime awakenings, and overall sleep quality. The objective of this study is to evaluate the effect of implementation of a modified RCSQ on prescribing patterns of both pharmacologic and non-pharmacologic interventions for sleep disturbances in burn patients.

**Methods:** This is a retrospective observational study of adult patients admitted to the Richard M. Fairbanks Burn Center at Eskenazi Health between 1/1/19-6/30/19 with any burn and/or inhalation injury. All included patients will complete at least one modified RCSQ during admission with at least one corresponding questionnaire to be completed by the night shift nurse. Patients requiring mechanical ventilation or those taking sleep medications prior to admission will be excluded. The primary outcome is incidence of pharmacologic interventions for sleep disturbances based on modified RCSQ scores. Secondary outcomes include ease of use and content validity of the questionnaire, rate of non-pharmacologic interventions, and correlation of modified RCSQ scores between patients and nurses.

**Preliminary Results/Conclusions:** Data collection is currently ongoing. Results will be compared to a Phase I study examining prescribing patterns of pharmacologic sleep agents in a similar patient population prior to questionnaire implementation.

### Learning Objectives:

Identify environmental and patient-specific factors contributing to sleep disturbances in adult burn patients  
Discuss limitations of the Richards Campbell Sleep Questionnaire for the assessment of sleep disturbances in adult burn patients

### Self Assessment Questions:

Which of the following is an environmental factor that may contribute to sleep disruption in burn patients?

- A: Pain
- B: Itching
- C: Alarms
- D: Anxiety

Which of the following components of the modified RCSQ was added to allow for a more targeted approach to assess sleep disturbances in burn patients?

- A: Noise level
- B: Time to fall asleep
- C: Nighttime awakenings
- D: Itching

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## INTRAVENOUS PHYTONADIONE GIVEN ORALLY IN REDUCING WARFARIN-RELATED COAGULOPATHY

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### Purpose:

Phytonadione is indicated for reversing warfarin-related coagulopathy. The only available tablet was the target of price inflation in the U.S., which led to our institution changing to the use of the intravenous formulation of phytonadione as an oral solution. This formulation is significantly less expensive, however, there is no literature that directly compares the efficacy of the oral tablets to the intravenous solution given orally for correction of coagulopathy. The primary objective of this study was to compare the correction of warfarin-related coagulopathy in patients who received tablets of phytonadione orally to those who received intravenous (IV) solution orally.

### Methods:

A retrospective, observational cohort study of adult patients (age > 18 years) admitted to the UKHealthCare during the period of January 1, 2015 - August 1, 2018 was performed. Patients were included in this study if they received oral phytonadione for warfarin-related coagulopathy. Patients were excluded if they were less than 18 years of age, received phytonadione via parenteral route, were known to be pregnant, or received phytonadione for treatment of coagulopathy due to liver disease.

### Results and Conclusions:

Over the study period, 338 patients met inclusion criteria, with 57.4% (n=194) patients receiving IV phytonadione solution orally and 42.6% (n=144) receiving phytonadione tablets. The average age was 66 years old, mean initial dose received was 4.8mg ± 2.78, and Data collection and analysis are ongoing. Preliminary results and conclusions will be presented at the 2019 Great Lakes Residency Conference.

### Learning Objectives:

Discuss the lack of data regarding the use of intravenous phytonadione given orally compared to the oral tablets  
Describe the role of oral phytonadione in warfarin-related coagulopathy

### Self Assessment Questions:

Which of the following is true with regard to Phytonadione for correction of coagulopathy?

- A: The literature regarding the efficacy of the oral tablets to the intravenous solution
- B: The literature regarding the efficacy of the oral tablets to the intravenous solution
- C: There is no literature that directly compares the efficacy of the oral tablets to the intravenous solution
- D: There is robust literature that directly compares the efficacy of the oral tablets to the intravenous solution

Which of the following is true with regard to correction of coagulopathy when administering Phytonadione oral tablets?

- A: Onset of action for correction of coagulopathy is typically seen at 2 hours
- B: Onset of action for correction of coagulopathy is typically seen at 4 hours
- C: Full correction of coagulopathy is typically seen at 4 hours
- D: Full correction of coagulopathy is typically seen at 24 hours

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF AREA UNDER THE CURVE MONITORING ON VANCOMYCIN INDUCED NEPHROTOXICITY

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The purpose of this study is to assess the impact of an AUC vancomycin monitoring guideline on patient outcomes. Traditionally trough monitoring has been used as a surrogate marker to monitor vancomycin therapy. However the efficacy of vancomycin is better correlated to the AUC to minimum inhibitory concentration values. Overall, trough monitoring has been shown to significantly underestimate AUC to minimum inhibitory concentration (MIC) values, thus AUC monitoring may be implemented to reduce the incidence of adverse events.

This study is a pre/post quasi experimental study that assesses the impact of a new guideline for AUC monitoring. A calculator utilizing two-level kinetics was formatted and validated to estimate patient specific AUC values. Pharmacists were educated with live training sessions and online training modules.

The primary outcome is to assess the impact on the rate of acute kidney injury (AKI) as defined by the Acute Kidney Injury Network criteria and the Kidney Disease: Improving Global Outcomes' Risk, Injury, Failure, Loss, and End-stage Renal Disease criteria. Secondary outcomes include 30-day readmission due to AKI, percent of patients achieving therapeutic AUC at 7 days, average trough concentrations, 30-day all-cause mortality, and clinical impact of AUC monitoring by recorded pharmacist interventions. Patients were excluded if they were receiving vancomycin therapy prior to admission or were discharged to a long-term acute care hospital.

When clinical decisions were assessed, 33.3% (17/51) of the time pharmacists were able to decrease the dose due to an AUC >600 and a trough level within goal range. Pharmacists were able to avoid an increase in dose 19.6% of the time where it would traditionally have been increased with trough monitoring. In conclusion, the implementation of AUC monitoring has led to dose decreases and increased avoidance of dose increases. Outcome data will continue to be analyzed.

### Learning Objectives:

Describe the advantages of utilizing area under the curve monitoring for patients receiving vancomycin therapy

Discuss the methods for implementing vancomycin area under the curve monitoring in select patient populations

### Self Assessment Questions:

Which of the following patient populations may benefit most from utilizing vancomycin area under the curve monitoring?

- A Obese patients
- B: Patients with skin and soft tissue infections
- C: Patients with meningitis
- D: Patients with urinary tract infections

The purpose of utilizing AUC monitoring is to:

- A Make vancomycin dosing more efficacious
- B Increase vancomycin penetration to the CNS
- C Reduce the number of patients who receive vancomycin
- D Prevent the occurrence of nephrotoxicity and decrease total exposure

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMIZATION AND VALIDATION OF HEPARIN NOMOGRAMS AT AN ACADEMIC MEDICAL CENTER

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Purpose: Unfractionated heparin is a high-risk drug that requires a complex dosing scheme. National patient safety goals written by The Joint Commission, recommends using approved protocols for the initiation and maintenance of heparin. Evaluation of safety practices and protocolled heparin nomograms have been evaluated in the literature. To date it has been shown that there are delays in achieving and maintaining anticoagulation in patients with thromboembolic disease. Various reasons for subtherapeutic anticoagulation include initial heparin bolus and infusion rates, lack of nomogram compliance and incorrect measurements of aPTT levels. The purpose of this review is to validate the efficacy and compliance of the four heparin infusion nomograms that currently exist at Cabell Huntington Hospital. Methods: A retrospective chart review was conducted to obtain patient demographics, heparin indication, protocol order selection and reported levels and timing of aPTT draws. The primary outcome measure is time to first therapeutic aPTT. Secondary outcome measures include the following: number and type of nomogram deviations, percentage of incorrect nomogram selections, and time to first therapeutic aPTT in obese patients (BMI >40). Results/Conclusion: Results and conclusion will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe current guideline recommendations for unfractionated heparin therapeutic dosing.

Explain the implications and harm that come from delayed time to therapeutic heparin levels.

### Self Assessment Questions:

According to the CHEST guidelines, which of the following is the recommended maximum infusion rate (units/hr) for a patient with an acute VTE?

- A 10,000 units/hr
- B: 1,000 units/hr
- C: No maximum
- D: 5,000 units/hr

Obtaining therapeutic aPTT levels within the first \_\_\_\_\_, is associated with lower in-hospital and 30 day mortality rates.

- A 36 hours
- B 24 hours
- C 2 days
- D 3 days

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EXPANSION OF SERVICES OF PHARMACIST-RUN MEDICATION MANAGEMENT CLINIC

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**Purpose:** To identify and expand the services provided by the pharmacist-run outpatient Management Clinic at Columbus Regional Hospital.  
**Methods:** Prospective data collection in the form of a needs assessment survey was developed and distributed to the primary care providers and hospitalists that currently have signed collaborative practice agreements for the management of warfarin by the CRH MMC to determine the most appropriate service for expansion. Based upon the results of the needs assessment survey a complete business plan will be developed. This plan will include a proposal of services, SWOT analysis, management and organizational plan, marketing plan, market analysis and financial analysis. Providers were asked what area of their practice they found most difficult to manage, which area of practice they felt would benefit from pharmacist intervention, and which potential service offered they would be most likely to utilize for their patients. **Results:** Of the 42 providers surveyed, 27 provided a completed hardcopy survey (64%). Of the 11 practices contacted, at least one provider from 10 practices provided a completed survey. Of the 11 practices, 91% had representation through a completed survey. Providers reported that transitions of care is the most difficult area of practice to manage. 44% of providers indicated they felt complex patients (taking > 10 unique medications) would benefit most from pharmacist intervention. 26% of providers indicated they felt patients with hypertension and/or hyperlipidemia would benefit most from pharmacist intervention. The three most reported potential services providers would be most likely to utilize are complex patient medication management, hypertension/hyperlipidemia management, and diabetes management. **Conclusions:** Final conclusions will be made after completion of business plan and financial analysis.

### Learning Objectives:

Identify the role of a pharmacist in medication therapy management in the outpatient setting and define the ambulatory patient care model.

Describe the benefits of a medication therapy management service within a pharmacist-run medication management clinic.

### Self Assessment Questions:

Which of the following are benefits of a pharmacist-run medication therapy management service in an ambulatory care clinic?

- A Improved medication adherence
- B: Decreased rate of inappropriate therapy
- C: Optimization of medication therapy
- D: All of the above

What aspects of ambulatory care can pharmacists participate in?

- A Conduct physical assessments
- B Provide point of care testing
- C Provide medication education and counseling
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A NEW SIMPLIFIED INSULIN TITRATION PROTOCOL FOR PATIENTS WITH DIABETIC KETOACIDOSIS

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**Purpose:** Data collected from our community teaching hospital has shown that it takes greater than 24 hours for the anion gap to normalize in patients with diabetic ketoacidosis after initiation of the insulin infusion. Current guidelines recommend decreasing blood glucose by 50-70 mg/dL per hour, but limited data exists regarding specific insulin infusion titration parameters to efficiently and safely reach this goal. The objective of this study is to evaluate a simplified insulin titration protocol and compare its effectiveness to the previous titration methods by evaluating anion gap closure time, number of hypoglycemic events, length of stay, and healthcare expenditures.

### Methods:

A retrospective study will be performed to analyze the effects of the newly implemented, simplified insulin titration policy in comparison to the previous insulin titration method. This study has been approved by the Institutional Review Board. The primary endpoint of this study is the time to anion gap resolution. Secondary endpoints will include overall/ICU length of stay, percentage of time blood glucose levels were within treatment goal range, percentage of time blood glucose was less than 70, insulin drip duration, and overall cost savings.

### Results:

In progress

### Conclusions:

In progress

### Learning Objectives:

Recall the recommended rate of blood glucose reduction per the American Diabetes Association statement on hyperglycemic crises in adult patients with diabetes.

Identify the recommended criteria required for the resolution of diabetic ketoacidosis and patient specific parameters that suggest resolution of diabetic ketoacidosis.

### Self Assessment Questions:

Utilizing the most recent guidelines and literature, what is the recommended rate of blood glucose reduction for a patient presenting with diabetic ketoacidosis?

- A 100-200 mg/dL per hour
- B: 70-100 mg/dL per hour
- C: 50-70 mg/dL per hour
- D: 25-70 mg/dL per hour

A 54 yo WF (62 kg, 5'4") presented yesterday with blood glucose of 426 mg/dL, pH 7.2, serum bicarbonate 12 mEq/L, anion gap 14, and positive urine ketones. She was diagnosed with diabetic ketoacidosis

- A DKA unresolved, due to BG > 150 mg/dL, serum bicarbonate  $\geq$  15
- B DKA unresolved, due to BG < 200 mg/dL, serum bicarbonate  $\geq$  15
- C DKA resolved, due to BG < 250 mg/dL, serum bicarbonate  $\geq$  20
- D DKA resolved, due to BG < 200 mg/dL, serum bicarbonate  $\geq$  15

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DESIGN AND IMPLEMENTATION OF A PROFESSIONAL DEVELOPMENT PATHWAY FOR PHARMACISTS

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### Purpose:

Professional development pathways, similar in nature to career ladders or career advancement programs, have been implemented by many professions within health care organizations. Pathways are designed to improve employee retention, foster professional growth, and increase employee satisfaction and engagement. This concept was first described in the profession of pharmacy in the 1980s but has not been widely adopted.

Froedtert Health has successfully implemented professional development pathways for other professions such as nursing and pharmacy technicians. Pharmacist opportunities for recognition and professional development have been consistently identified as areas for improvement in employee engagement surveys.

The primary aim of this study is to develop and implement a professional development pathway for pharmacists across the Froedtert Health enterprise. The primary outcome measure is change in pharmacist engagement, as measured by employee engagement survey results in the following: overall power score, overall engagement readiness, and level of agreement with the statements: "I am satisfied with the recognition I receive for doing a good job" and "this organization provides career development opportunities."

### Methods:

This is an uncontrolled pre-post study. Pharmacists were surveyed to determine what professional activities they felt should be included in the pathway as well as their preferences for potential incentives for those who advance through the pathway. A workgroup of frontline pharmacist evaluated potential professional development pathway structures. A steering committee consisting of pharmacy leaders will implement the new pathway.

### Preliminary Results:

Of 143 respondents, 85% indicated they felt board certification should be a component of the pathway. Other high-scoring professional development activities were: precepting residents (49%), publishing (47%), precepting IPPE and/or APPE students (42%), obtaining additional certifications (41%), presenting at professional meetings (40%), and serving as an active member of a multidisciplinary committee (39%).

### Learning Objectives:

Identify common characteristics of professional development pathways  
Describe benefits of professional development pathways

### Self Assessment Questions:

Which of the following is a common characteristic of a professional development pathway?

- A More than 5 levels of advancement
- B: Nationally standardized structure
- C: No pay increase, incentives, or title change
- D: Predetermined, clearly defined criteria for advancement

Implementation of a professional development pathway is generally associated with a decrease in which of the following?

- A Employee compensation
- B Employee engagement
- C Employee turnover
- D Employee satisfaction

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A PHARMACIST-DRIVEN COLLABORATIVE PRACTICE AGREEMENT FOR MICROBIOLOGY FOLLOW-UP IN A COMMUNITY EMERGENCY DEPARTMENT

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Purpose: Evidence exists supporting pharmacists' role in culture follow-up after patient discharge from the emergency department (ED) through the utilization of protocols. While there is published literature describing the utilization of a collaborative practice agreement (CPA) in an urgent care setting, no current literature is available to describe the use of an ED CPA. The purpose of this study is to describe the utilization of an ED pharmacist driven antimicrobial follow-up CPA at a community hospital. Methods: Patients with a positive microbiology culture resulting after ED discharge between January 1 and December 31, 2018 were reviewed. Patients transferred to another inpatient facility and all influenza cultures were excluded from this study. The primary objective of this study is to describe the utilization of an ED pharmacist driven antimicrobial follow-up CPA. The primary outcome is enumeration of cases reviewed by the ED pharmacist and of applicable cases independently reviewed by the ED pharmacist under the CPA. Secondary outcomes include ED provider satisfaction with CPA, averaged number of individual culture cases reviewed per day, time devotion to microbiology, and reasons for CPA exclusion.

Preliminary results: Nearly 6 months of data indicates CPA utilization in 67% of cultures, of which 68% was determining the treatment was appropriate. The CPA was not utilized in 33% of cultures reviewed from the preliminary data set, primarily because of asymptomatic bacteriuria. The average number of cases reviewed per month was 215. Estimated daily average devotion to micro follow-up was 2.5 hours. The ED provider survey showed a large trend in favor of the current CPA and support in expanding responsibilities of the ED pharmacist.

Conclusions: Preliminary data supports that the CPA has a high intervention rate and support of ED providers. This data indicates potential for CPA expansion in cases of asymptomatic bacteriuria.

### Learning Objectives:

Identify the benefit of an ED pharmacist driven antimicrobial follow-up collaborative practice agreement

Recognize ways in which the ED pharmacist can expand the collaborative practice agreement to fit the current needs of the ED providers.

### Self Assessment Questions:

Within this institution's collaborative practice agreement process, the most common culture reviewed is

- A Sexually transmitted infections
- B: Wound
- C: Urine
- D: Blood

A potential area for expansion of this institution's collaborative practice agreement is

- A Blood cultures
- B Asymptomatic bacteriuria
- C Pediatric cases
- D Cerebral-spinal fluid cultures

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PREEMPTIVE MULTIMODAL ORAL PAIN MANAGEMENT IN AN ORTHOPEDIC POPULATION: A RETROSPECTIVE STUDY

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**Purpose:** The number of orthopedic surgeries in the United States continues to rise every year, with the vast majority of procedures being performed in elderly populations. Pain management is needed postoperative, but there are significant risks associated with opioid use such as overprescribing, addiction, and falls. Preemptive and post-operative multimodal analgesic strategies utilizing medications such as acetaminophen, gabapentin, and tramadol have been proposed as an alternative to opioids as primary pain control agents. The purpose of this study is to determine if preemptive administration of oral analgesics in orthopedic surgery patients will reduce overall narcotic use and average pain scores during the first 24-hour postoperative period.

**Methods:** A retrospective chart review of patients undergoing orthopedic (partial or total hip arthroplasty [THA], partial or total knee arthroplasty [TKA], or joint revision) surgery at Jewish Hospital (JH) will be conducted. Patients over the age of 18 who received a partial or total hip arthroplasty (THA), partial or total knee arthroplasty (TKA), or joint revision with a subsequent admission to JH between September 1, 2017 and September 1, 2018 will be included. Patients with orthopedic procedures performed by one surgeon using a preemptive analgesic plan will be included in the control group; patients with orthopedic procedures performed by surgeons other than the control surgeon (ie not using the same preemptive analgesic plan) will be included in the intervention group. The primary outcome is overall narcotic utilization during the first 24-hour postoperative period. Data collected will include patient data (medication and orthopedic history; gender; age; weight; height; and kidney function), average pain scores, length of hospitalization, and preoperative, perioperative, and postoperative medications given.

**Results/Conclusions:** Data collection is in progress. Final results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss American Pain Society guideline recommendations for postoperative pain management

Identify the risks associated with opioid use in orthopedic surgery patients

### Self Assessment Questions:

American Pain Society guidelines make which of the following recommendations for postoperative pain management?

- A: Nonsteroidal anti-inflammatories (NSAIDs) are preferred over acetaminophen
- B: Preoperative considerations can include celecoxib, gabapentin, or tramadol
- C: Postoperative use of benzodiazepines and opioids should be used
- D: Use of intravenous pain medications inpatient with a transition to oral

Which of the following is NOT a risk factor for adverse events associated with the use of opioids in postoperative orthopedic surgical pain control?

- A: The majority of surgeries occur in patients greater than 65 years of age
- B: Tighter restrictions on availability of parenteral narcotic products
- C: Patients can overuse opioids and put themselves at risk for addiction
- D: Commonly used medications such as oxycodone/acetaminophen

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL IMPACT OF AN ENTERAL OPIATE OPTIMIZATION PROGRAM IN THE ADULT MICU SETTING

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**Purpose:** The primary objective of this study is to compare clinically relevant outcomes for adult medical intensive-care unit (MICU) patients before and after the implementation of an enteral opiate optimization process (EOOP). Due to the nationwide impact of the 2017 intravenous opiate shortage, the implementation of such a process was crucial to ensure patients were receiving appropriate pain control. Currently, there is little evidence published comparing clinically relevant outcomes for patients receiving intravenous vs. oral opiates. This study will determine whether or not the implementation of such a process will have an impact on clinically relevant outcomes for adult patients in the MICU.

**Methods:** This study was approved by the local Institutional Review Board under exempt status, and will be a retrospective cohort analysis of patient electronic medical records. Data will be collected from January 1, 2017 to October 30, 2017, and from January 1, 2018 to October 30, 2018. Patients will be included if they meet the following criteria: admitted to MICU at OSF Saint Francis Medical Center, ≥ 18 years of age, and prescribed opioids. Patients will be excluded if they meet the following criteria: > 90 years of age, on a comfort care plan within 72 hours of ICU admission, undergoing targeted temperature management, current prisoners, pregnant, or admitted to ICU as a result of EtOH withdrawal. The primary objective of this study is to compare critical-care pain observation tool (CPOT) and Richmond agitation-sedation scale (RASS) scores between adult MICU patients before and after the implementation of EOOP. Secondary analyses will be conducted to examine ICU length of stay, hospital LOS, sedation use, and days requiring mechanical ventilation between patient groups.

**Results:** In process

**Conclusion:** In process

### Learning Objectives:

Describe pharmacokinetic alterations that have been shown to occur in critically-ill patients.

Identify outcomes that can be improved following the implementation of an assessment-driven, protocol-based, stepwise approach pain management protocol.

### Self Assessment Questions:

Which acute process in critically-ill patients may account for many of the associated pharmacokinetic (ADME) alterations?

- A: pH changes
- B: Inflammation
- C: Blood-brain barrier alterations
- D: Fluid shifts

The implementation of assessment driven and standardized pain management protocols has been shown to improve which of the following outcome(s)?

- A: Adverse events
- B: ICU LOS
- C: Constipation
- D: A and B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF COMMUNITY PHARMACIST TARGETED INTERVENTIONS FOR STATIN MEDICATIONS IN DIABETES PATIENTS

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### InstitutionSite

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**Purpose:** The purpose of this study is to describe community pharmacist interventions for statin medication use in patients with diabetes. This study will include patients flagged by the Outcomes MTM platform for the "Needs Drug Therapy" target intervention program (TIP) for statin medications for three different geographical regions within Albertsons Companies pharmacies across the United States. The primary objective is to evaluate the rate of successfully completed TIPs made by community pharmacists for initiating statin medications in patients with diabetes. Secondary objectives are to evaluate maintenance of pharmacist-initiated statin therapy percentage, acceptance rates by prescriber type, and reasons for unsuccessfully completed TIPs.

**Methods:** A retrospective review will be performed from January 2016 to July 2018. A report from the Outcomes MTM platform will be run for the statin related "Needs Drug Therapy" TIP for the specified study dates and locations. Through this report the primary investigator will gather patient geographic information, identify successful statin initiation TIPs, and consensus of all statin TIPs performed for approximately 2,300 claims. Data analysis will consist of categorizing TIPs based on the performed outcome by pharmacists. Inclusion criteria are patients flagged by the Outcomes MTM platform for a statin-related "Needs Drug Therapy" TIP (40-75 years old with at least two anti-hyperglycemic medications and no fill history of a statin medication). A baseline characteristic report will also be recorded from patient profiles on Outcomes MTM to evaluate demographic trends. Statin therapy maintenance will be determined through review of patient profiles six (6) months post-TIP completion within pharmacy dispensing software. Descriptive statistics and SPSS software will be used to analyze collected data.

**Results and Conclusions:** This study is in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review clinical guideline recommendations for the use of statins in patients with diabetes.

Discuss pharmacists' role in the management of cardiovascular disease

### Self Assessment Questions:

Which of the following statements is recommended by the ACC/AHA Blood Cholesterol Guidelines?

- A In patients 40 to 75 years of age with diabetes and LDL  $\geq 70$  mg/dL
- B In patients 40 to 75 years of age with diabetes and LDL  $\geq 70$  mg/dL
- C In patients 40 to 75 years of age with diabetes and LDL  $\geq 70$  mg/dL
- D In patients  $\geq 75$  years of age with diabetes and LDL  $\geq 70$  mg/dL, st

How are pharmacists involved in the management of cardiovascular risk per published guidelines?

- A Implementation of published guidelines
- B Team-based collaborative care
- C Adherence interventions
- D All the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST INTERVENTION ON PNEUMOCOCCAL CONJUGATE VACCINE-13 VALENT (PCV13) VACCINATION RATES IN A FAMILY PRACTICE RESIDENCY CLINIC

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**Purpose:** The Advisory Committee on Immunization Practices (ACIP) recommends that adults at or above 65 years of age receive pneumococcal 13-valent conjugate vaccine (PCV13). Currently, there is not a consistent process at the E. Blair Warner Family Medicine Center for adult vaccination screening. In January 2018, an ambulatory care pharmacist embedded in the clinic began screening adult patients for eligibility to receive PCV13. The purpose of this study is to assess the impact of a pharmacist-driven screening process in identifying PCV13 eligible patients being seen in the clinic. The primary endpoint will be a comparison of the number of eligible patients who did not receive a PCV13 recommendation prior to January 1, 2018 versus the number of eligible patients who did receive a recommendation after January 1, 2018. Secondary endpoints include vaccination rate differences in identified eligible patients based on pre-specified subgroups, such as provider training, patient age, insurance status and visit type. **Methods:** This retrospective review will evaluate 100 patients over the age of 64 years old who were seen prior to January 1st 2018, and 100 patients evaluated by the embedded pharmacist after January 1st 2018. The data pertaining to patients after January 1st 2018 was collected prospectively by the ambulatory pharmacist, and all analysis of this as well as the retrospective data will be completed by the primary author. The following data will be collected: age, sex, insurance type, name and status of provider, presence of comorbid conditions, previous pneumococcal vaccination(s), PCV13 recommendation, reason(s) for "no" PCV13 recommendation, and if PCV13 was given at the appointment. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the Centers for Disease Control and Prevention (CDC) adult immunization recommendations for pneumococcal vaccinations.

Discuss the impact of a pharmacist-driven pneumococcal vaccine screening process on PCV13 vaccination rates in adults.

### Self Assessment Questions:

CM is a 65 year old male with a past medical history of chronic obstructive pulmonary disease (COPD) and hypertension who is being seen in your office today. He received his PPSV23 vaccine on 06/23/20

- A He should receive the PCV13 vaccine at today's visit
- B He should have received the PCV13 vaccine 1 month after the PP
- C He should receive the PCV13 vaccine 1 year after he received the
- D He should never receive a PCV13 vaccination

It is hypothesized that the implementation of a pharmacist-driven screening process for PCV13 eligible patients will impact the clinic in what way?

- A The PCV13 vaccination rate will increase
- B The PCV13 vaccination rate will remain the same
- C The PCV13 vaccination rate will decrease
- D The PCV13 vaccination rate will increase initially and then decline

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **NO-COPS: NALOXONE AND OPIATE CO-PRESCRIBING STRATEGIES IN A FAMILY MEDICINE RESIDENCY PROGRAM**

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**Purpose:** Increasing prescription opiate related deaths have grown to epidemic proportions nationwide. Co-prescribing naloxone with opioid prescriptions is encouraged by the Centers for Disease Control (CDC) as a risk mitigation strategy to combat the rise in opioid related deaths. Within our family medicine residency program (FMRP) there are few prescriptions for naloxone written, suggesting naloxone co-prescribing is underutilized. This provides an opportunity to examine patients prescribed opiates within our FMRP clinics to determine their level of risk and benefit from naloxone co-prescribing. The goal of the project is to assess the prevalence of high-risk opiate prescriptions with potential for naloxone co-prescribing. We hypothesize that there are opportunities to promote safer prescribing practices at the Family Medicine Clinic by co-prescribing naloxone with opiates to at-risk patients. **Methods:** This institutional Review Board approved, retrospective, cross sectional chart review will include patients who received an opioid prescription from a FMRP at an academic medical center between 01/01/17 and 06/30/17. The primary outcome is the prevalence of high-risk opioid prescriptions based on the CDC recommendations and the Risk Index for Overdose or Serious Opioid-induced Respiratory Depression (RIOSORD). Secondary outcomes include patient specific variables of the CDC recommendations and RIOSORD, opiate drug doses, quantities, morphine equivalents, duration of therapy, and any opiate or non-opiate related ED visit during 12 months before the baseline data, within the study dates, or 6 months after the prescription date. Statistical analyses of study endpoints will be assessed using descriptive, comparative, and regression statistics. **Results and Conclusions:** To be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### **Learning Objectives:**

Recognize the risks and benefits of naloxone co-prescribing to at-risk patients in a primary care setting

Identify the potential impact of utilizing the Risk Index for Overdose or Serious Opioid-Induced Respiratory Depression (IOSORD) screening tool in primary practice.

### **Self Assessment Questions:**

Which of the following statements is false?

- A The risk for opioid overdose is one that persists throughout the course
- B: The co-prescription of naloxone has been encouraged by the CDC
- C: Naloxone co-prescribing has been widely accepted in primary care
- D: One of the most prominent barriers to naloxone co-prescribing is the lack of education

Which of the following are potential benefits of utilizing the Risk Index for Overdose or Serious Opioid-induced Respiratory Depression (RIOSORD) screening tool?

- A To support clinical decision making and safer opioid prescribing
- B To implement naloxone co-prescribing stewardship practices
- C To facilitate more rational prioritization of preventative intervention
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **WE ARE STUDYING THIS TOPIC TO EXPRESS OUR SINCERE INTEREST IN THE LACK OF ORIGINALITY OF LETTERS OF INTENT**

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**Purpose:** Letters of Intent (LOI) are a required component of residency applications that have become increasingly similar over time. Literature is available regarding characteristics between LOI for medical residency and physician assistant programs, however, literature for pharmacy residency LOI is not available. Therefore, an analysis of LOI submitted to the Post-Graduate Year 1 (PGY-1) Pharmacy Practice residency at this institution is warranted. The study objective is to determine if characteristics of Letters of Intent affected this program's decision to interview and Rank candidates. **Methods:** This is a retrospective descriptive analysis of all LOI submitted in 2015, 2016, and 2017 to this institution's PGY-1 program. A list of the 569 LOI submitted during this timeframe will be generated from the Pharmacy Online Residency Centralized Application Service (PhORCAS). The study will have three primary endpoints for the LOI: similarity index, number of program-specific characteristics, and theme identification. Secondary endpoints include analyzing page length and similarity indexes between LOI from the same pharmacy schools. For each endpoint, the candidates invited to interview vs. non-invited and candidates Ranked vs. not Ranked will be compared. An analysis of the same comparison groups will be conducted for each of the five themes identified. The following data will be collected: candidate's name, candidate's pharmacy school attended, candidate's gender, similarity index, number of program specific characteristics, Letter of Intent theme, and document length. All data will be analyzed using descriptive statistics. Data collection is ongoing. **Results and conclusions** will be presented at the Great Lakes Pharmacy Residency Conference.

### **Learning Objectives:**

Review previous literature regarding Letters of Intent

Identify similarities between Letters of Intent

### **Self Assessment Questions:**

Which of the following personal statements have been previously studied?

- A Nursing school applications
- B: Pharmacy residency applications
- C: Physical therapy school applications
- D: Physician assistant program applications

What are PGY-1 Letters of Intent lacking?

- A Candidates' career goals
- B Candidates' past pharmacy experiences
- C Originality
- D Specific aspects of the residency program

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**PHARMACIST-LED EDUCATION IN THE EMERGENCY DEPARTMENT REGARDING TIME TO ANTIBIOTIC ADMINISTRATION IN PATIENTS DIAGNOSED WITH SEPSIS OR SEVERE SEPSIS**

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Title: Pharmacist-led education in the emergency department regarding time to antibiotic administration in patients diagnosed with sepsis or severe sepsis

Purpose: Sepsis and severe sepsis are responsible for the mortality of 1 out of every 4 people affected in the world each year. Mortality increases by 8% each hour treatment is delayed and as many as 80% of deaths could be prevented with prompt treatment. The aim of this study is to show that pharmacist-led education will positively impact the effect of time to antibiotic administration for patients with sepsis and severe sepsis.

Methods: This study was approved by the local Institutional Review Board under exempt status, and will be a retrospective chart review with a quasi-experimental (QE) research design that will look at the time to antibiotic administration in patients with sepsis and severe sepsis during October through December of 2017 and 2018 in the emergency department (ED). Pharmacist interventions during the three-month period in 2018 included educating ED physicians and nurses on the CMR recommended antibiotics for sepsis and severe sepsis, offering feedback on outlying patient cases, assessment of patient drug allergies, and expediting bedside antibiotic administration. The primary endpoint will be the time to antibiotic administration in patients diagnosed with sepsis or severe sepsis in the emergency department. Secondary outcomes include percentage of antibiotics that are CMS compliant given to patients with diagnosed sepsis or severe sepsis, survival to discharge, and CMS compliant antibiotics selected.

Results: In process

Conclusion: In process

**Learning Objectives:**

Review the current literature in regards to early goal-directed therapy and multidisciplinary teams containing pharmacists caring for septic patients.

Discuss elements of the recently released Surviving Sepsis Campaign Hour-1 Bundle.

**Self Assessment Questions:**

According to current literature, early goal-directed therapy and multidisciplinary teams containing pharmacists caring for septic patients have shown what?

- A: Decreased time to antibiotic administration
- B: Increased appropriate selection of medications
- C: Decreased cost and mortality
- D: All of the above

Which of the following is part of the Surviving Sepsis Campaign Hour-1 Bundle?

- A: Prompt initiation of 30mL/kg crystalloid fluids and broad-spectrum
- B: Prompt initiation of 50mL/kg crystalloid fluids and broad-spectrum
- C: Obtaining blood for measuring lactate and blood cultures last
- D: Initiation of vasopressors if patient hypotensive to maintain MAP  $\geq$

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**EVALUATION OF SODIUM POLYSTYRENE SULFONATE AND LACTULOSE FOR THE TREATMENT OF ACUTE HYPERKALEMIA**

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Purpose: Sodium polystyrene sulfonate (SPS) is commonly used as a treatment for acute hyperkalemia. In recent years, the efficacy and safety of SPS have come into question. Several cases of colonic necrosis have been reported in literature, and the efficacy data within literature is unclear. Due to questions regarding efficacy and safety, some physicians at our institution have begun using lactulose to treat acute hyperkalemia, on the theory that laxation itself is the mechanism of potassium excretion, not the SPS resin. The primary objective is to evaluate the efficacy and safety of SPS and lactulose at our institution for acute hyperkalemia. Methods:

Via a prescription report, patients were identified who received lactulose or SPS while hospitalized from August 1, 2011 to August 1, 2018. Based on patients identified, we conducted retrospective chart reviews for inclusion criteria, including age greater than or equal to 18, inpatient receipt of SPS or lactulose, serum potassium greater than 5.3 mEq/L prior to administration of SPS or lactulose, and availability of before and after drug administration levels of serum potassium. Patients were excluded if they were pregnant, incarcerated, used SPS chronically, had hemolyzed samples, or had cirrhosis. Data collected included serum creatinine, height, weight, age, estimated glomerular filtration rate, possible causes of hyperkalemia, administration of drugs affecting potassium, dialysis (date and times if applicable), adverse drug reactions, colonic necrosis, serum potassium levels, bowel movement(s) post administration of SPS or lactulose, and time points of the above from time zero (identification of hyperkalemia) through forty-eight hours. If colonic necrosis was present, additional data were collected. The primary outcome is the change in serum potassium between SPS and lactulose. A secondary outcome is the incidence of adverse effects. Results/Conclusion: Data collection/analysis are ongoing; results/conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

**Learning Objectives:**

Discuss the current use of sodium polystyrene sulfonate, and data behind risks and benefits.

Describe the effect of SPS and lactulose on potassium levels and the incidence of adverse effects in the use of two drugs at the University of Illinois.

**Self Assessment Questions:**

Sodium polystyrene sulfonate has been associated with all of the following adverse effects, except for?

- A: Nausea
- B: Vomiting
- C: Colonic Necrosis
- D: Status Asthmaticus

HK is a 62 year old female admitted to the hospital with acute hyperkalemia of 6.7 mEq/L, and peaked T-waves on ECG. Which of the following would be appropriate for the acute management of hyperkalemia?

- A: Sodium polystyrene sulfonate
- B: Calcium + dextrose + insulin
- C: Patiromer
- D: Sodium zirconium cyclosilicate

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) NASAL SCREENING TO STREAMLINE ANTIBIOTIC THERAPY IN PEDIATRIC PNEUMONIA**

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**Purpose:** The current Pediatric Infectious Diseases Society (PIDS) and Infectious Diseases Society of America (IDSA) pneumonia guidelines recommend vancomycin for infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA). However, MRSA therapy de-escalation can be challenging due to turnaround time or lack of respiratory cultures. Antimicrobial stewardship literature in adults has highlighted the MRSA nasal screen as an initiative to avoid unnecessary antibiotic therapy. Studies in adults have shown the nasal screen has a negative predictive value of 96.5%. Unfortunately, it is unknown if results are similar in pediatric patients. The objective of this study is to evaluate if MRSA nasal screening can be used to predict respiratory culture results in pediatric patients with pneumonia. **Methods:** The Institutional Review Board approved this retrospective, single-center cohort study. Patients were included if they were 18 years of age or younger, had an MRSA nasal screen within 48 hours of admission, received at least 1 dose of vancomycin or clindamycin, had respiratory cultures collected, and were diagnosed with pneumonia. Patients were excluded if they were pregnant, immunocompromised, had Cystic Fibrosis, chronic pleural effusions, chronic tracheostomies, or concomitant infections requiring MRSA therapy. The primary endpoint is sensitivity, specificity, positive predictive value, and negative predictive value of the MRSA nasal screen. Key secondary endpoints include length of stay and time to vancomycin de-escalation. **Results and Conclusion:** Data collection and analysis are ongoing.

### **Learning Objectives:**

List the negative predictive value (NPV) and positive predictive value (PPV) of the MRSA nasal screen in adult pneumonia.  
Discuss the clinical utility of the MRSA nasal screen in pneumonia. Self Assessment Questions

### **Self Assessment Questions:**

Which of the following correctly list the overall positive predictive value (PPV) and the negative predictive value (NPV) of the MRSA nasal screen, respectively, in adult pneumonia?

- A 45%, 97%
- B: 97%, 45%
- C: 50%, 50%
- D: 25%, 99%

Which of the following correctly describes the utility of the MRSA nasal screen in adult pneumonia?

- A It can be used to aid providers in ordering vancomycin
- B It can be used to aid in de-escalation of vancomycin
- C It can be used to help broaden antibiotic coverage
- D There is no clinical utility of the MRSA nasal screen

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **DOES THE ADDITION OF VASOPRESSIN AT LOWER NOREPINEPHRINE DOSES REDUCE ORGAN FAILURE IN SEPTIC SHOCK?**

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Septic shock is one of the leading causes of in-hospital mortality. The Surviving Sepsis Campaign guidelines recommend norepinephrine as the first line vasopressor after fluid resuscitation. Vasopressin can be added as a second line agent if mean arterial pressure remains <65 mmHg or to decrease norepinephrine requirements. To date, the optimal norepinephrine dose to initiate vasopressin has not been established. The purpose of this study is to determine if vasopressin initiated at lower norepinephrine doses will reduce mortality and/or organ failure as indicated by the sequential organ failure assessment score (SOFA) compared to vasopressin initiated at higher norepinephrine doses. This is a multicenter, retrospective, cohort study evaluating patients admitted to the medical intensive care unit (ICU) with septic shock who received vasopressin within the first 48 hours after shock onset. Patients admitted between October 1, 2011 to August 31, 2018 will be eligible for inclusion. Patients will be excluded if < 18 or >89 years of age, post-cardiac arrest, acute myocardial infarction, pregnant, incarcerated, received another vasopressor besides norepinephrine before initiation of vasopressin, norepinephrine dose > 1.5 mcg/kg/min prior to initiation of vasopressin, or were admitted from an outside hospital on vasopressors. The primary composite outcome is the proportion of patients with a change in SOFA score of > 3 from baseline to 72 hours after initiation of vasopressin and/or in-hospital mortality. Secondary outcomes include time to hemodynamic stability, lactate clearance at 72 hours, acute kidney injury, need for new renal replacement therapy, duration of mechanical ventilation, new onset arrhythmia, ICU and hospital length of stay, and in-hospital mortality. With this analysis, we hope to add to the current literature and determine when the most opportune time is to add vasopressin in patients with septic shock. Data collection is ongoing. Preliminary results and conclusions will be presented.

### **Learning Objectives:**

Recall current guideline recommendations for vasopressor therapy in septic shock.  
Review current literature supporting the use of vasopressin for hemodynamic support in septic shock.

### **Self Assessment Questions:**

A vasopressor should be added in septic shock, if after adequate fluid resuscitation their MAP remains less than:

- A 55
- B: 80
- C: 65
- D: 75

In septic shock, endogenous vasopressin levels are depleted within 48 to 72 hours. According to the current literature administration of endogenous vasopressin has demonstrated which of the following

- A Increase blood pressure
- B Decrease catecholamine requirements
- C Improve renal function
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A SPECIALTY HEPATITIS C VIRUS (HCV) PHARMACY SERVICE

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Current direct-acting antiviral (DAA) agents are associated with significant drug-drug interactions (DDIs). There is limited data assessing the impact of a HCV specialty pharmacy service directed by clinical pharmacists on DDIs. The objective of this study is to define and describe DDIs identified by a pharmacist-directed specialty pharmacy HCV service prior to DAA therapy initiation and 1-month into therapy. This single-center retrospective study plans to evaluate DDIs in patients infected with HCV starting DAA therapy and enrolled with a specialty pharmacy within the last year (May 2017-May 2018) whom possess sustained virologic response (SVR) results 12 weeks after DAA treatment. Pharmacists conduct two telephonic comprehensive medication reviews (CMRs), one at treatment initiation (baseline call) and the other 1-month into treatment (follow-up call). The CMR includes a thorough medication chart review via electronic medical record (EMR) and patient medication interview to identify medications that may interact with DAAs. Primary endpoints include defining the total number of identified DDIs, mean number of DDIs per patient at baseline assessment and 1-month into therapy, and the total number of DDIs by severity category based on a validated drug-interaction tool. Additional endpoints include characterization of interacting drugs, the clinical consequence of the interaction, pharmacist intervention recommended, acceptance rate of actionable recommendations, safety outcomes, and achievement of SVR results 12 weeks after DAA treatment. Data will be collected for 200 patients via manual extraction from documented encounter notes within patients' electronic medical record. Analysis will include descriptive statistics to assess the impact of the HCV service. Based on pharmacist recommendations, it is hypothesized that there will be a reduction in the number of DDIs identified from baseline to 1-month follow-up CMR. It is expected that this retrospective study will confirm the need for thorough medication reviews, not only prior to starting HCV therapy, but throughout the duration of HCV therapy.

### Learning Objectives:

Discuss the incidence and importance of treating hepatitis C virus (HCV)

Identify drug-drug interactions (DDIs) that occur between DAA therapy and maintenance medications

### Self Assessment Questions:

Which of the following is true regarding hepatitis C virus (HCV) disease progression?

- A Acute HCV infection does not spontaneously resolve.
- B: Chronic infection can lead to death from liver cancer or cirrhosis.
- C: Cirrhosis affects approximately 60-70% of people with chronic HCV
- D: Chronic liver disease affects approximately 5-20% of people with C

Which of the following is true regarding expected drug interactions with direct-acting antivirals (DAAs)?

- A Combination use of a DAA and a drug that inhibits P-gp, CYP3A4,
- B Combination use of a DAA and a drug that induces P-gp or CYP3A4
- C DAAs are not affected by acid suppression medications.
- D DAAs possess no cytochrome P450 inhibition or induction characteristics

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PRE-EMPTIVE MULTIMODAL ANALGESIA AND POST-OPERATIVE PAIN OUTCOMES IN TOTAL HIP AND TOTAL KNEE ARTHROPLAST

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Purpose: Use of multimodal analgesia (MMA) prior to orthopedic surgeries has been adopted by many practitioners as a strategy to minimize use of opioid pain medications. Studies have demonstrated that celecoxib, gabapentin or pregabalin, and acetaminophen have utility as pre-emptive analgesia and are recommended in the 2016 Guidelines on the Management of Post-Operative Pain published in The Journal of Pain. Currently at Doctors Hospital there is no standardized MMA order set, and the decision to prescribe pre-emptive medications before surgery is physician specific. The primary objective of this study is to determine whether use of celecoxib, gabapentin, and acetaminophen prior to total knee arthroplasty (TKA) or total hip arthroplasty (THA) results in lower opioid consumption without increasing pain experienced by patients.

Methods: A retrospective chart review was performed by querying the electronic medical record, Epic CareConnect®. Eligible patients underwent primary TKA or THA at one of two medical centers in OhioHealth, Doctors Hospital or Grant Medical Center, between January 2017 and July 2018. Patients were divided into groups based on surgery type, THA or TKA, and then stratified depending on whether or not they received pre-emptive MMA. Post-operative opioid administrations and patient reported pain scores collected during admission were compiled into discrete time intervals and analyzed. Additional variables collected included: demographics, comorbidities, pre-operative administration of long acting opioids, length of stay, and discharge disposition.

Results: A total of 1691 charts were collected for patients undergoing procedures at either facility. The number of eligible patients was reduced to 1416 after 275 charts were excluded. Patients undergoing THA accounted for 485 records while the remaining 931 underwent TKA. Additional results relating to opioid administrations and average pain scores will be presented at Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Review analgesic medications that have utility in surgical pain management

Describe the concept of pre-emptive multimodal analgesia and describe outcomes related to use in the setting of major orthopedic surgery

### Self Assessment Questions:

Which of the following medication classes reduces inflammation after tissue injury?

- A Opioids
- B: Gabapentoids
- C: NSAIDs
- D: Local anesthetics

The 2016 post-operative pain guidelines do not advocate use of which of the following medications prior to surgery to reduce pain after surgery?

- A Opioids
- B NSAIDs
- C Acetaminophen
- D Gabapentin

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INCIDENCE OF ACUTE KIDNEY INJURY IN PATIENTS RECEIVING A NON-SUCROSE CONTAINING IVIG PRODUCT

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**Purpose:** A medication use evaluation was performed to identify patients who received Priviligen®, a non-sucrose containing intravenous immune globulin (IVIG) product, at the max rate of 8 milligrams/kilogram/minute (mg/kg/min). Specifically, this evaluation aimed to quantify the number of patients who developed acute kidney injury (AKI) after Priviligen® infusion, to assess adherence to institutional guidelines for Priviligen® ordering and administration, and to identify opportunities to improve Priviligen® ordering and administering practices.

**Methods:** Patients were included if they received Priviligen® at a maximum rate of 8 mg/kg/min for at least one dose during fiscal year 2018 (July 1, 2017 to June 30, 2018) and were admitted to either Ohio State Wexner Medical Center (OSUWMC)'s University Hospital or James Cancer Hospital. Patients were excluded from review if they did not have a serum creatinine (SCr) measured before, during, or post-Priviligen® infusion, preventing assessment of AKI. Patients were also excluded if they did not have a rate documented in the electronic health record.

**Results:** Of 28 patients assessed, 7% (n = 2) developed AKI after receiving Priviligen® at a rate of 8 mg/kg/min. Both patients were dosed using an incorrect weight, resulting in patients receiving larger than indicated doses. In total, 31% of treatment encounters assessed used the incorrect weight for dosing, and 53% used an inappropriate infusion rate when administering the medication.

**Conclusion:** Priviligen® is a non-sucrose containing IVIG product used for a variety of indications. While Priviligen® does not contain sucrose, it does still carry a risk for renal adverse effects. Efforts should be made to increase guideline adherence to ensure patients at OSUWMC are receiving Priviligen® at the correct dose and rate to minimize the risk for renal adverse events.

### Learning Objectives:

Define IVIG's mechanism of action, indications for use, dosing recommendations, and administration instructions.

Discuss the incidence of acute kidney injury in patients receiving Priviligen® at the max allowable rate and discuss opportunities to increase dosing and administration guideline adherence.

### Self Assessment Questions:

Which of the following would be the most appropriate administration rate for a 71 year-old male patient with CIDP, diabetes, and hypertension who is receiving Priviligen®?

- A 4 mg/kg/min
- B: 8 mg/kg/min
- C: 2mg/kg/min
- D: There is no max administration rate

Which of the following is a risk factor for renal adverse effects defined by Priviligen's® package insert?

- A Hypertension
- B Age greater than 40 years
- C Diabetes mellitus
- D Infection

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## REVERSAL OF ORAL DIRECT FACTOR XA INHIBITORS USING 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE (4F-PCC): AN EVALUATION OF HEMATOMA EXPANSION FOLLOWING INTRACRANIAL HEMORRHAGE

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**Purpose:** Intracranial hemorrhage (ICH) is considered the most devastating adverse event of oral direct factor Xa inhibitor therapy and is associated with high morbidity and mortality. Negative predictors of outcomes, including hematoma expansion and elevated blood pressure, are targets of pharmacologic intervention. When ICH occurs, rapid administration of agent(s) to reverse anticoagulation and reduce elevated blood pressure are considered cornerstones of therapy. Neurocritical Care Society guidelines make conditional recommendations for administration of 4F-PCC for oral direct factor Xa inhibitor reversal based on low-quality, non-outcome-based evidence. The objective of this study is to determine the rate of hematoma expansion for acute ICH within 24 hours in patients who received 4F-PCC for reversal of oral direct factor Xa inhibitors.

**Methods:** This was a single-arm, retrospective review of patients who received 4F-PCC for reversal of oral direct factor Xa inhibitors following acute ICH at the University of Louisville Hospital. Patients were identified through Transfusion Medicine records of 4F-PCC distribution from April 1, 2016 to November 1, 2018. Patients were included if they were taking an oral direct factor Xa inhibitor at the time of ICH, received 4F-PCC, had a diagnosis of ICH as seen on baseline neuroimaging, and were 18 years of age or older. Patients were excluded if transferred from an outside hospital without access to radiographic evidence of baseline neuroimaging, had hematoma evacuation prior to follow-up neuroimaging, did not have follow-up neuroimaging within 24 hours of 4F-PCC dose, and/or were pregnant. The primary endpoint was the rate of substantial hematoma expansion within 24 hours as seen on neuroimaging. Secondary endpoints included the rate of thromboembolic events at 14 days, the rate of unfavorable outcomes at discharge, and the rate of in-hospital mortality.

**Results/Conclusion:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the role of 4F-PCC when used for anticoagulant reversal of acute intracranial hemorrhage.

Describe negative predictors of outcomes that are amenable to pharmacotherapy in patients with acute intracranial hemorrhage.

### Self Assessment Questions:

The 2016 Neurocritical Care Society and Society of Critical Care Medicine Guidelines recommend which dose of 4F-PCC for reversal of oral direct factor Xa inhibitors?

- A 25 Units/kg
- B: 50 Units/kg
- C: 100 Units/kg
- D: Dosing is determined by the INR

Negative predictors of outcomes in patients with acute intracranial hemorrhage that are amenable to pharmacotherapy include:

- A Blood pressure
- B Hematoma expansion
- C Location of bleed
- D A and B

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION AND EVALUATION OF CONVERSION TO ELECTRONIC PHARMACIST DOSING DOCUMENTATION

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**Purpose:** Electronic pharmacist documentation in the electronic medical record (EMR) presents benefits for efficiency and accuracy of documentation compared to paper-based documentation, as suggested by previous literature. The purpose of this study is to evaluate the impact of converting inpatient pharmacist dosing consults from paper-based to electronic documentation. Pharmacist dosing consults include vancomycin, aminoglycosides, warfarin, and argatroban at the studied site.

**Methods:** This study is a single-center, prospective, pre-post investigation conducted on adult dosing consults active between October 2018 and April 2019 at a 1,100-bed academic medical center. Prior to implementation, information technology features within the EMR for electronic dosing documentation were assessed, pre-defined electronic documentation templates were refined, and new workflows were developed. Upon the implementation date, the use of paper-based dosing forms will be eliminated. The primary outcome of this study is to determine the difference in pharmacist time spent on documenting dosing consults, in minutes and percent of time changed, before and after conversion to electronic documentation. Secondary outcomes include pharmacist satisfaction and perception with electronic documentation and difference in overall time spent reviewing and documenting dosing consults before and after electronic conversion. Data collection includes time spent reviewing and documenting dosing consults for each medication and consult type (new and follow-up) and pharmacist satisfaction and perception survey scores. Data analysis will utilize the independent t-test, paired t-test, and Mann-Whitney U test. Subgroup analyses will be conducted based on consulted medication and consult type.

**Results and Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Explain the benefits of electronic documentation of medical information in the healthcare setting and recommendations outlined in the Institute for Safe Medication Practices Guidelines for Safe Electronic Communication of Medication Information

Discuss available literature on the impact of converting pharmacist services to electronic documentation

### Self Assessment Questions:

In comparison to paper-based documentation, cited aspects of electronic documentation include:

- A: Ambiguous and fragmented information
- B: Reduced variation and increased standardization
- C: Robust record-keeping and information availability
- D: B & c

Previous literature on converting pharmacist documentation to electronic methods has shown the following results:

- A: There was no change in the number of medication reconciliation interventions
- B: Median time to intervention on vancomycin dosing consults decreased
- C: Pharmacist satisfaction with documentation methods worsened
- D: A & b

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## RETROSPECTIVE ANALYSIS OF THE EFFECTIVENESS OF MEDICATION EVENT AGGREGATE ROOT CAUSE ANALYSES

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**Purpose:** At the Jesse Brown Veterans Affairs Medical Center (JBVAMC), a trend of increased medication event reports in a specific area, or events with high-severity Safety Assessment Code scores are selected to be the focus of a yearly medication event aggregate root cause analysis (RCA). Despite requirements from The Joint Commission and National Center for Patient Safety to perform RCAs, there are insufficient data to support its long-term efficacy. To date, there have been no controlled or peer-reviewed studies of the RCA process and its effectiveness in preventing future adverse events. Thus, whether actions implemented from RCAs generate a sustained change in their respective institutions is largely unknown.

Given the limitations and uncertain efficacy of RCAs, the objective of this study is to determine if actions implemented by yearly medication event aggregate RCAs at JBVAMC create sustained improvements in the systematic medication use process; therefore, decreasing the number of medication events related to each respective area. The results of this study will add to the limited data evaluating the effectiveness of RCAs, especially at the local facility level, in an effort to formally validate and support its continued use in the healthcare setting.

**Methods:** This study is a retrospective chart review and analysis of medication events in relation to actions generated by the yearly medication event aggregate RCAs. Research lists were run, with respect to each aggregate RCA topic, to assess the efficacy of the actions and to catch any potentially unreported medication events in those areas. Additionally, archived medication event data at JBVAMC from 2012 to present will be analyzed for trends in medication event reporting as it relates to each aggregate RCA topic. The medical record will be reviewed from 4/1/2012 through 10/31/2018 so that data up to one year post-RCA action completion can be included.

### Learning Objectives:

Discuss the current requirements and documented efficacy of healthcare focused Root Cause Analyses

Classify the strength of Root Cause Analysis action plans based on the National Center for Patient Safety Hierarchy of Actions

### Self Assessment Questions:

Which of the following are true regarding the current standards and requirements of RCAs in the healthcare sector?

- A: The Joint Commission requires that accredited hospitals perform RCA
- B: The National Center for Patient Safety requires that Veterans Affairs perform RCA
- C: The RCA requirements by The Joint Commission and National Center for Patient Safety are the same
- D: A & B

Which of the following represents a "Stronger Action" when developing plans to prevent recurrence of similar errors during the RCA process?

- A: Warning Indicators
- B: Standardization
- C: Enhanced Documentation/Communication
- D: Double Checks

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## UTILIZATION OF RIVAROXABAN IN OVERWEIGHT AND OBESE PATIENTS

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A concern with the Direct Oral Anticoagulants (DOACs) is that fixed doses in overweight or obese populations may be under dosing patients and lending themselves to potential adverse events. This stems from a lack of weight-based dosing guidelines as well as literature showing conflicting ideas of appropriate weight cut off points to classify patients. The objective of this study is to compare the rate of adverse events in patients taking rivaroxaban for nonvalvular atrial fibrillation and/or venous thromboembolism (VTE) in those greater than 120 kg vs. 50-120 kg. This study a single-center, retrospective cohort with subjects identified using outpatient discharge prescriptions written for rivaroxaban during the 2016-2018 calendar years. Patients were included if they were 18 years old or older receiving a prescription of rivaroxaban for nonvalvular atrial fibrillation and/or VTE. Exclusions included noncompliance in electronic medical record, cancer, pregnancy, prisoners, coagulation disorders, valvular atrial fibrillation, off-label indications, and patients weighing <50 kg. EnterpriseRx was used to analyze medication refills and assess compliance. Data collection was completed by retrospective chart review and appropriateness of rivaroxaban prescribing was based on our institutions' dosing protocol. For primary and secondary outcomes, an adverse event is classified as either bleeding or a thromboembolism. The definitions of bleeding and thromboembolism are further defined in our study protocol. A total of 298 patients were screened for eligibility. There were 158 patients who met inclusion criteria; 31 patients with a BMI  $\geq 40$  and 127 patients with a BMI <40. There was a total of 23 adverse events, 5 (16.1%) and 18 (14.2%) respectively. Further data analysis is currently in process. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recall the current position on the use of rivaroxaban in overweight and obese patients based on the International Society on Thrombosis and Haemostasis (ISTH) and Anticoagulation Forum recommendations. Identify dosing recommendations for rivaroxaban based on available literature and guidelines.

### Self Assessment Questions:

Although there is a lack of clinical data and trials, based on the established recommendations, which of the following statements is true regarding the use of rivaroxaban in the overweight and obese p

- A: The Anticoagulation Forum recommends the use of the DOACs in
- B: The Anticoagulation Forum recommends avoiding the use of DOA
- C: The International Society on Thrombosis and Haemostasis (ISTH)
- D: The International Society on Thrombosis and Haemostasis (ISTH)

Which of the following patients on rivaroxaban is appropriately dosed based on indication, kidney, and/or liver function?

- A: A patient on rivaroxaban for a history of PE with a CrCl of 23 mL/r
- B: A patient on rivaroxaban diagnosed with a DVT today who was sta
- C: A patient on rivaroxaban 15 mg daily for atrial fibrillation with a CrC
- D: A patient on rivaroxaban for atrial fibrillation with a Child Pugh sco

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT AND IMPLEMENTATION OF A PHARMACIST-MANAGED VIRTUAL CONSULT SERVICE FOR PATIENTS WITH RHEUMATOLOGIC CONDITIONS REQUIRING SPECIALTY OR INFUSION MEDICATIONS

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Purpose: Optimal pharmacologic care of patients with rheumatologic conditions often requires the use of specialty or infusion medications. There are many potential adverse effects associated with these therapies such as infection, hepatotoxicity, hematologic abnormalities, malignancies, and cardiovascular toxicities. The severity of these possible problems necessitates a thorough clinical workup and often medications require prior authorization (PA) from third party payers prior to initiation. Incomplete initial clinical workup may result in the inability to successfully obtain PAs, leading to therapy delays. The first study objective is to develop a pharmacist-managed virtual consult service for rheumatology patients, which will ensure comprehensive, appropriate, and safe disease management. A second aim is to identify barriers to therapy access, which may then serve as the baseline for future quality improvement projects.

Methods: To facilitate these goals, a standardized electronic consult order was developed within the electronic medical record at UI Health. The service was implemented by the rheumatology clinic in August 2018. The consults are managed by a clinical pharmacist and the specialty pharmacy resident who work up and evaluate them for therapy appropriateness. Pharmacy benefit PAs are completed by a clinical pharmacist or specialty pharmacy resident or UI Health specialty pharmacy. The medical benefit PAs are referred to the UI Health Therapeutic Infusion Service to facilitate approval. Once approved, non-infused medications are initiated by the clinical pharmacist or specialty pharmacy resident. The consult orders from August 2018 – January 2019 will be analyzed focusing on the following components: requested medication, pharmacist interventions, and time to therapy initiation. Data on barriers to therapy initiation will also be collected and evaluated. Results: Research is ongoing.

Conclusion: The consult service is a novel form of biologic stewardship that ensures the patient receives a comprehensive therapy evaluation. It optimizes patient safety through initial clinical work up and patient education.

### Learning Objectives:

Describe the key characteristics of the biologic disease-modifying antirheumatic drugs

Recognize the benefits of implementing a pharmacist-managed virtual consult service for patients with rheumatologic conditions

### Self Assessment Questions:

Which is true regarding biologic disease-modifying antirheumatic drugs?

- A: Biologic disease-modifying antirheumatic drugs (DMRADs) are mc
- B: May increase risk of developing certain infections, cause hepatoto
- C: Require prior authorizations from third-party payers
- D: Both b and c

Which of the following are benefits of the pharmacist-managed virtual consult service?

- A: Allows pharmacists to participate in the clinical management of pa
- B: Improves medication access
- C: Can be replicated in other academic health centers
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A DIABETES FOCUSED TRANSITION OF CARE PHARMACIST

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**Purpose:** Pharmacists possess the tools and knowledge to help drive optimal therapy and provide essential education for persons with diabetes. However, there is limited evidence on the benefits of utilizing a pharmacist as the primary source for diabetes education and management in the hospital setting. The purpose of this study is to assess the impact of a diabetes-focused transition of care pharmacist in the hospital setting.

**Methods:** A prospective, randomized, pre-post intervention pilot study was conducted at St. Joseph Mercy Oakland. Patients receiving the normal standard of diabetic care provided by nursing and physicians will be compared to an intervention group consisting of a diabetes focused transition of care pharmacist. Transitions of care interventions include medication reconciliation, collaboration with the healthcare team to resolve medication related issues, diabetes education throughout their admission, and assisting patients in obtaining medications/supplies prior to discharge. Patients  $\geq 18$  years of age, with a diagnosis of diabetes who have an A1C  $\geq 10\%$  and/or a single blood glucose (BG) reading of  $\geq 250$  mg/dL, admitted to our institution, and able to give consent in English were included. Patients were excluded if they had an expected length of stay  $< 48$  hours, were pregnant, if they had cognitive deficits that precluded them from participating in informed consent, and if they were not self-managing their diabetes care upon discharge. The primary outcome is the comparison of mean daily BG between the control group and intervention group. The secondary endpoints include 30-day hospital and emergency room readmissions, mean length of stay, number of patients with an A1C drawn, and number of patients who attended a diabetes program after discharge. Lastly, results on a 10 question validated diabetes knowledge survey will be compared between the two groups.

Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify ways a diabetes-focused transition of care pharmacist can improve the care of people with diabetes in the hospital setting.

Recognize strategies to improve diabetes education for inpatients at your institution in order to reduce length of stay and hospital readmissions due to diabetic complications.

### Self Assessment Questions:

Which education style has been proven to be most effective for patients in the hospital?

- A: Short, focused, and spread-out throughout the hospital stay
- B: One long session the day after admission
- C: A longer, focused session right before the patient is discharged
- D: Long, broad, and spread-out throughout the hospital stay

Which of the following is true regarding a hemoglobin A1C in the inpatient setting?

- A: Can be used to see if the patient's diabetes regimen needs to be adjusted
- B: An A1C should not be ordered in the hospital setting, it is only appropriate in the outpatient setting
- C: If the patient's A1C is within target range, the diabetes regimen does not need to be adjusted
- D: The A1C will give us a snapshot of the patient's average BG over the last 3 months

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF MEDICATION ACCESS SERVICES ON HEMOGLOBIN A1C IN PATIENTS WITH UNCONTROLLED TYPE 2 DIABETES: A RETROSPECTIVE CROSSOVER STUDY

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**Purpose:** Type 2 Diabetes (T2D) is a chronic, progressive disease affecting thirty million Americans. Sixteen percent of these patients have uncontrolled T2D with an A1C greater than nine percent. Current T2D guidelines recommend new and costly therapeutic classes including glucagon-like peptide-1 (GLP-1) receptor agonists, sodium-glucose cotransporter-2 (SGLT2) inhibitors, dipeptidyl-peptidase 4 (DPP4) inhibitors, and insulin products for treatment intensification. The high cost of these medications is a significant barrier to adherence for uninsured and underinsured patients. A potential solution is use of a Medication Access Service (MAS) to provide medications at low or no cost via diagnosis specific foundation assistance, manufacturer based patient assistance programs, and pharmaceutical coupon cards. The primary objective of this study was to evaluate the impact of MAS on A1C in patients with uncontrolled T2D (A1C greater than or equal to nine percent).

**Methods:** This retrospective, crossover study included adult patients enrolled in University of Cincinnati Medical Center MAS receiving high cost antidiabetic medications including GLP-1 agonists, DPP-4 inhibitors, SGLT-2 inhibitors, and/or insulin products. Data was collected retrospectively to compare patients before and after enrollment in MAS. The primary outcome of A1C was assessed at baseline and compared to A1C post-enrollment at three, six, and greater than seven months. Ratios of data obtained for the primary objective was analyzed using a one-way repeated measures ANOVA. A sample size of 160 patients was necessary to adequately power the study at 90% with a p-value less than 0.05 representing statistical significance. Secondary outcomes include description of patient cost savings, therapeutic regimen selected, medication access source utilized, and patients achieving a follow up A1C of less than seven percent. In addition, patient adherence was measured using proportion of days covered.

Results/Conclusions: Data collection and analysis are ongoing.

### Learning Objectives:

Describe medication access barriers and negative impact on patient outcomes.

Outline currently available medication access services, eligible population, and sources of medication assistance.

### Self Assessment Questions:

Current literature shows that poor adherence to glucose lowering therapy results in increased rates of which of the following?

- A: Probability of hospitalization
- B: Probability of emergency department visit
- C: Probability of acute complication
- D: All of the above

Which of the following are considered to be a source of medication assistance?

- A: Pharmaceutical coupon card
- B: Manufacturer specific patient assistance
- C: Diagnosis specific foundation assistance
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **GUIDELINE-ADHERENT PRESCRIBING FOR TREATMENT OF COMMUNITY-ACQUIRED BACTERIAL PNEUMONIA THROUGH HEALTH INFORMATION TECHNOLOGY TOOLS**

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At UW Health, mechanisms to identify and empirically treat community-acquired bacterial pneumonia (CABP) patients at risk for drug-resistant pathogens are ambiguous and rely on physician judgment. With 2,546 unique patients during FY18 at University Hospital prescribed antibiotics with a suspected indication of "pneumonia", many are at risk for inappropriate broad-spectrum antibiotic exposure. Overexposure leads to adverse drug reactions, superinfections and drug resistance. This project's purpose is implementation of a comprehensive pneumonia guideline, screening tool to assess risk of drug-resistant pathogens and empiric order set to increase appropriate antibiotic use.

A guideline was developed after comprehensive literature review, identifying the most appropriate risk scoring tool and standardizing treatment recommendations. Empiric treatment for CABP without risk factors for drug-resistant pathogens with a non-pseudomonal beta-lactam and atypical antimicrobial coverage is recommended. For CABP with risk factors for drug-resistant pathogens, empiric therapy with coverage of MRSA, *Pseudomonas aeruginosa* and atypical pathogens is suggested. Patients are being followed prospectively, without intervention, through chart review and a platform that pulls data from the electronic health record before and after implementation of the tools. Data collected includes patient demographics, DRIP score, administered antibiotics, duration of treatment, causative microorganisms from cultures and empiric anti-infective order set use.

This project will result in an evidence-based clinical practice guideline, a clinical decision support tool and a modified order set to standardize empiric CABP antibiotic therapy. On preliminary review, only 46% of CABP regimens were guideline-compliant. Common causes of non-compliance included missing atypical coverage, missing nosocomial coverage in a patient at risk of drug-resistant pneumonia and broad-spectrum antibiotics given to a patient without risk factors for drug resistance. Through increased guideline-adherent prescribing, we anticipate reduced patient exposure to broad-spectrum antibiotics, improved stewardship and increased patient safety.

We anticipate that effective health information technology tools increase guideline-adherent antimicrobial prescribing in CABP.

### **Learning Objectives:**

Recognize major risk factors for drug-resistant pneumonia as defined by the DRIP score

Identify effective strategies for improving antimicrobial prescribing practices in CABP

### **Self Assessment Questions:**

Which of the following is identified as a major risk factor for drug-resistant pneumonia according to the DRIP score?

- A Immunosuppression
- B: Long-term care resident
- C: Proton pump inhibitor use
- D: Copd

Which intervention is most likely to improve antibiotic prescribing practices for the treatment of CABP?

- A Establishing a clinical practice guideline
- B Providing in-services to physicians and advanced practice provide
- C Integrating antibiotic use guidelines directly into the electronic heal
- D Publishing a newsletter that is distributed directly to physicians and

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **EVALUATION OF AN ALVIMOPAN STEWARDSHIP PROGRAM**

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Alvimopan, which is used for the prevention of postoperative ileus, is a costly drug for the institution. Previous evaluations on local utilization have identified relatively high rates of unnecessary use in patients receiving alvimopan following their first bowel movement when it was no longer indicated. Hospital policy permits discontinuation of alvimopan upon patient bowel movement, which is a part of clinical staff's daily activities. To this end, an alvimopan stewardship program has been implemented to reduce the rate of unnecessary use of the medication. This study will quantify the cost savings of the program. Methods: This retrospective study was submitted to and approved by the local Institutional Review Board. This study involves two retrospective chart reviews to compare two groups from before and after implementation of a pharmacist alvimopan stewardship program between the dates of September 1, 2018 and February 28, 2019. All patients receiving alvimopan were included in the study, with the exclusion of patients who were pregnant or incarcerated. Data recorded will include the following: number of alvimopan doses administered, cost of therapy, length of stay, age, gender, diagnoses, admission unit, physician, and comorbidities (Charlson comorbidity index). The primary outcome is defined as the average number of alvimopan doses administered per patient. Secondary outcomes include the cost of therapy and average length of stay.

### **Learning Objectives:**

Describe Describe the development process of an alvimopan stewardship program

Describe Describe the impact of a pharmacist-driven alvimopan stewardship program

### **Self Assessment Questions:**

For which of the following surgeries is alvimopan usage indicated to be given for postoperative ileus?

- A Sleeve gastrectomy
- B: Large or small bowel resection with primary anastomosis
- C: Large or small bowel resection without primary anastomosis
- D: Gastric bypass

Which best describes the method used by our stewardship program?

- A Prospective audit
- B Formulary restriction
- C Retrospective audit
- D Ordering provider restriction

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ORAL VANCOMYCIN PROPHYLAXIS FOR PREVENTION OF CLOSTRIDIODES DIFFICILE INFECTION IN HIGH-RISK PATIENTS ON BROAD-SPECTRUM ANTIBIOTICS

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**Purpose:** Clostridioides difficile infection (CDI) is one of the most common healthcare-related pathogens, associated with nearly 29,000 deaths per year, and imposes a significant economic burden estimated to cost the healthcare system nearly 6.3 billion dollars annually. Recent literature suggests that oral vancomycin prophylaxis (OVP) may be beneficial in some high-risk patient populations to help mitigate the incidence of recurrent CDI. Although some physicians may already practice OVP, there are no consensus recommendations to guide appropriate patient populations, drug dose, or drug duration. The purpose of this study is to determine if pharmacist recommended oral vancomycin prophylaxis, in pre-determined high-risk patient populations using a standardized scoring scale, decreases the occurrence of CDI during hospitalization.

**Methods:** This prospective single-site investigational study from February 11th – June 7th 2019, will assess pharmacists reviewing two alerts, one for patients on high-risk antibiotics (HRA) and one for length-of-stay (LOS) >7 days. Pharmacists are to analyze the alerts and assign points related to a patient's potential to develop CDI (HRA, LOS >7 days, history of CDI within 1 year or over 1 year, active malignancy, long-term care facility, age >65 years, age >80 years, hypoalbuminemia, proton pump inhibitor, and hospitalization within past 90 days). All patients who receive a total of >13 points will be recommended to initiate OVP for the duration of the high-risk antibiotic. The study will measure if the pharmacist-driven OVP recommendation was accepted by the physician. The primary endpoint will measure high-risk patients that developed CDI during hospital stay. The secondary endpoint will assess CDI incidence 30-days post discharge. It is predicted that in patients whom OVP was accepted, there will be a lower incidence of CDI for all endpoints, compared to those for whom OVP was denied.

**Results/Conclusions:** Project ongoing. Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify high-risk patients for developing incidence of CDI and discuss supporting evidence of OVP in this patient population.

Describe pharmacy-driven prediction tool and report findings of CDI events in those whom received/did not receive OVP.

### Self Assessment Questions:

Which antibiotic is associated with higher rates of Clostridioides difficile infection?

- A: Azithromycin
- B: Clindamycin
- C: Cephalexin
- D: Gentamicin

According to the pharmacy-driven prediction tool, which is NOT a factor that increases a patient's risk of developing Clostridioides difficile infection?

- A: History of CDI
- B: Prolonged hospital length-of-stay
- C: Poor hand hygiene
- D: Use of acid-suppressive therapy (i.e. proton pump inhibitor)

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PROTOCOLIZED VERSUS NON-PROTOCOLIZED MANAGEMENT OF SEVERE ALCOHOL WITHDRAWAL SYNDROME AND/OR DELIRIUM TREMENS IN ADULT PATIENTS IN THE MEDICAL INTENSIVE CARE UNIT

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**Purpose:** Approximately 50% of patients with alcohol use disorder (AUD) experience alcohol withdrawal syndrome (AWS), with up to 31% of these patients requiring admittance to an intensive care unit (ICU). Current management of AWS includes benzodiazepines, with other agents used as adjunct. Treatment of mild/moderate AWS is well established, but management of severe AWS refractory to benzodiazepines and/or delirium tremens (DTs) is less clear with limited evidence to guide therapy. Previous literature demonstrated a reduction in ICU length of stay, ventilator days, and intubation due to AWS when using a protocolized approach. Despite these findings, no guidelines exist for management of severe AWS and/or DTs. Treatment at our institution consists of a strategy using protocolized intravenous diazepam pushes in a dose-escalating fashion with or without adjunctive use of intravenous phenobarbital titrating to a Richmond Agitation and Sedation Scale score. This study seeks to determine the impact of protocolized versus non-protocolized management of severe AWS and/or DTs in a medical ICU (MICU). **Methods:** This is a retrospective cohort study of adults admitted to the MICU at Beaumont Hospital, Royal Oak between October 2016 and October 2018 with the primary admitting diagnosis of severe AWS and/or DTs who received a benzodiazepine. Exclusion criteria consists of mechanical ventilation prior to MICU admission, alternative medical or surgical diagnoses warranting MICU stay, poly-substance abuse/withdrawal, or children. Patients were placed into one of two groups: those treated with a protocolized approach or not based on the intensivists' discretion. The primary outcome was incidence and duration of mechanical ventilation and MICU length of stay. Secondary outcomes included hospital length of stay, in-hospital mortality and total benzodiazepine dose. Data analyzed included baseline demographics, pertinent comorbidities, severity-of-disease, and concomitant sedative and opioid therapy. **Results and Conclusion:** Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the physiological mechanism causing alcohol withdrawal

Recognize the primary treatment recommendation for alcohol withdrawal syndrome

### Self Assessment Questions:

When alcohol withdrawal occurs, the body undergoes upregulation of \_\_\_\_\_ receptors and downregulation of \_\_\_\_\_ receptors

- A: Gaba, nmda
- B: alpha, beta
- C: Nmda, gaba
- D: Glutamine, Cardiac

Which of the following classes of medications is considered first line therapy for alcohol withdrawal syndrome?

- A: Tricyclic antidepressants
- B: Benzodiazepines
- C: Alpha-2 agonists
- D: Opioids

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING THE EFFECTIVENESS OF MODAFINIL AS AN ADJUNCTIVE THERAPY TO ASSIST IN THE WEANING OF MECHANICAL VENTILATION

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**Purpose:** Ventilator weaning, via spontaneous breathing trials (SBT), may account for a significant portion of the total time spent on the ventilator. Decreased consciousness has been identified as a factor that contributes to failed SBT and prolonged ventilation. Anecdotal evidence suggests that modafinil, a unique, wake-promoting agent, could be used to help increase wakefulness in an effort to help facilitate ventilator weaning, however, there have been no studies to evaluate its use in this patient population. The purpose of this study is to evaluate the efficacy of modafinil as an adjunctive therapy to assist in the weaning of mechanical ventilation.

**Methods:** This is a retrospective, single-center, cohort study aimed to evaluate ventilator weaning times in ICU patients receiving modafinil compared to ICU patients not receiving modafinil. This study took place at a 433-bed, tertiary care hospital with 50 ICU beds in Central Kentucky. Electronic health records were used to identify patients in the ICU who received both modafinil and usual sedation, and patients who received usual sedation alone. Study groups were matched by baseline characteristics and severity of illness. Patients were included if they were 18 years or older, admitted to the ICU, and mechanically ventilated for greater than 48 hours. Patients were excluded if they were receiving another stimulant medication, have a diagnosed sleep disorder, or are transferred to a long term continuing care facility for extended ventilator weaning. The primary outcome assessed is the time from the initial SBT until extubation. Secondary endpoints include the total ventilator time, re-intubation within 24 hours, total ICU length of stay, total hospital stay, total hospital cost, incidence of delirium, hospital mortality, and 30 day readmission. Data was analyzed using appropriate statistical tests and methods.

### Learning Objectives:

Identify the risks associated with prolonged mechanical ventilation.  
Describe the rationale behind using stimulant medications to assist in ventilator weaning.

### Self Assessment Questions:

Which of the following is a risk associated with prolonged mechanical ventilation?

- A Acute Kidney Injury
- B Ventilator-associated pneumonia
- C Decreased hospital length of stay
- D Bacteremia

Stimulants have been hypothesized to help wean patients off mechanical ventilation by:

- A Decreasing respirations
- B Increasing arterial pH
- C Regenerating lung tissue
- D Increasing wakefulness

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## REQUIRING INDICATIONS ON TAKE HOME PRESCRIPTIONS: IMPLEMENTATION AND ASSESSMENT OF PATIENT SATISFACTION, SAFETY, AND ADHERENCE

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**Purpose:** Indications on take home prescriptions is theorized to improve medication use. Proposed benefits of adding the indication to a prescription includes: optimized communication; enhanced education; and improved medication adherence. We are not aware of any published data that requiring indications is directly tied to these outcomes. The purpose of this project is to implement electronic requirements for an indication on new take home prescriptions and evaluate the effects on patient satisfaction, safety and adherence.

**Methods:** Functionality within the electronic health record was identified to place a requirement for indication prior to prescription signing. The indications requirement can be satisfied via drop down menu, free text entry, or from medication specific pre-populated options. A project workgroup assessed the current state of indication use and reviewed medication safety events associated with a lack of transparent indication. The workgroup identified physician champions and gained leadership support for implementation. The number of prepopulated options was determined by review of frequency of associated diagnoses by encounter. Testing was conducted to determine optimal steps within the workflow to add indications. Pilot departments were identified. Communication was distributed through internal newsletters. Training for end users was completed in person. Post-implementation process measures included: characters per indication, prescriptions per encounter and entry by clinician type. Patient satisfaction will be measured using a telephone and electronic questionnaire. Patient safety will be assessed as the frequency and content of telephone encounters from pharmacists to clinics. Patient adherence will be assessed by the frequency of patient first fills and refills.

**Preliminary Results:** Results will be presented at the Great Lakes Pharmacy Resident Conference.

**Conclusions:** A requirement for indications on prescriptions was implemented across a health-system. It is anticipated that the requirement will improve patient satisfaction, safety, and adherence.

### Learning Objectives:

List the benefits of adding indications on take home prescriptions  
Describe potential barriers to required indications and how they can be overcome

### Self Assessment Questions:

Which of the following best explains how indications could improve patient safety?

- A Indications are visible to patients, pharmacists, and prescribers
- B Indications are only visible to pharmacists
- C Indications are only visible to patients because they may be sensitive
- D None of the above

Which of the following are potential barriers to a requirement for indications on new take home prescriptions?

- A Potentially duplicative documentation of associated diagnoses and
- B Lengthy indications that can exceed the e-prescribing character limit
- C Scope of practice issues within electronic refill authorization workflow
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF THERAPEUTIC DRUG MONITORING (TDM) OF AZOLE PROPHYLAXIS IN LUNG TRANSPLANT RECIPIENTS ON THE DEVELOPMENT OF POSITIVE FUNGAL BAL CULTURES

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**Purpose:** There is limited data on therapeutic drug monitoring (TDM) to guide prevention strategies in lung transplant recipients. The International Society for Heart and Lung Transplantation (ISHLT) guidelines encourage TDM but there is limited literature to describe its impact on clinical outcomes. Lung transplant recipients have highly variable absorption based on their underlying disease, post-operative formulations, and concomitant medications. The adjustment of azole antifungals based on TDM impacts interacting immunosuppressive agents, potentially exposing patients to increased risks of rejection or adverse events. The objective of this study was to investigate the impact of therapeutic drug monitoring of azole prophylaxis in lung transplant recipients on the development of positive fungal BAL cultures.

**Methods:** This is a retrospective cohort study conducted at Northwestern Memorial Hospital using data from January 1, 2013 through November 1 2018. The primary outcome of the study is first incidence of positive fungal BAL in post-transplant recipients, defined as presence of fungal species on BAL culture or positive Aspergillus galactomannan screen. Secondary outcomes will include time to first positive fungal BAL culture defined as days post-op, subgroup analysis of TDM based on drug formulation, impact of azole dose adjustments on tacrolimus levels, and episodes of ISHLT defined rejection. The study groups are defined based on attainment of therapeutic levels of prophylactic azole antifungal. The "therapeutic" group is defined as a posaconazole trough level  $\geq 0.7$  mcg/mL or voriconazole trough  $\geq 1-5.5$  mcg/mL. The "subtherapeutic" group includes any patient with  $\geq 2$  trough levels of posaconazole  $< 0.7$  mcg/mL or voriconazole  $< 1$  mcg/mL. Nominal data will be analyzed using Chi-squared test and descriptive data using Wilcoxon rank sum. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize azole antifungal therapies used for fungal infection prevention following lung transplantation  
Define the pharmacokinetic strategy for therapeutic drug monitoring of azole antifungals in lung transplant recipients

### Self Assessment Questions:

Which of the following pharmacokinetic parameters can be monitored for assessment of therapeutic efficacy of azole antifungals?

- A: Peak
- B: Trough
- C: Random
- D: None

Which of the following azole antifungals can be routinely used for the prophylaxis of fungal infections in lung transplant recipients?

- A: Micafungin
- B: Amphotericin
- C: Posaconazole
- D: Foscarnet

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF SHINDO CRITERIA, DRIP SCORE, AND A MODIFIED DRIP SCORE FOR PREDICTING MULTI-DRUG RESISTANT ORGANISMS FOR PATIENTS WITH PNEUMONIA

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**Purpose:** Patients are often prescribed inappropriate broad-spectrum antimicrobial therapy for community-acquired pneumonia (CAP) while in the Emergency Department (ED). The Infectious Disease Society of America (IDSA) removed the HCAP (health care-associated pneumonia) criteria from the 2016 IDSA HAP/VAP guidelines, but last updated the treatment guidelines for CAP in 2007. More recently, studies have been conducted comparing predictive scores for MDRO to the HCAP criteria, to determine predictive factors that put patients at risk for Multi-Drug Resistant Organisms (MDROs). There are two scoring tools which are gaining popularity in the healthcare community for being a better predictor of MDROs: Shindo criteria and DRIP score. The Shindo criteria was shown to be a better predictor for MDROs than the HCAP criteria, but does not provide a recommendation for clinical application. There is a need for an accurate predictive score which is easy to implement and does not include overlapping variables or factors that are no longer supported by academic literature.

**Methods:** This retrospective chart review will look at patients admitted to HFHS (Henry Ford Health System) from January 2016 to December 2018 who were diagnosed with CAP, HCAP, or other pneumonia-related diagnoses. Through certain risk factors (long term care resident, wound care, and altered mentation) from the DRIP score, we hope to retain the specificity and sensitivity of the DRIP score while still allowing for an accurate representation of MDRO risk factors. The primary outcomes for the modified score will be to assess for non-inferiority, as compared to the DRIP score and Shindo criteria and to assess for PPV and NPV. Patients were excluded if they were  $< 18$  years old, pregnant, or presented from incarceration.

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

### Learning Objectives:

Discuss different approaches of predicting risk factors for MDR pneumonia.

Describe the differences in efficacy of: Shindo criteria, DRIP score, and a modified DRIP score for predicting MDRO pneumonia

### Self Assessment Questions:

What cutoff does the DRIP score use for risk factors to determine if a patient should be treated empirically for a MDRO?

- A: Greater than or equal to 3
- B: Greater than or equal to 2
- C: Greater than or equal to 4
- D: Greater than or equal to 5

In accordance with the DRIP score, which of the following factors is considered a "Minor risk factor" for the detection of a MDRO?

- A: Antibiotic use within the previous 60 days
- B: Hospitalization within the previous 60 days
- C: Tube feeding
- D: Residence in a long-term-care facility

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EMERGENCY DEPARTMENT VISITS FOR SKIN AND SOFT TISSUE INFECTIONS RELATED TO INJECTABLE DRUG USE BETWEEN TWO HOSPITALS IN HUNTINGTON, WEST VIRGINIA

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**Purpose:** Skin and soft tissue infections (SSTIs) are one of the most common causes of hospital admissions among injectable drug users. The prevalence of these associated infections in the emergency departments between St. Mary's Medical Center and Cabell Huntington Hospital has yet to be analyzed. By quantifying patient volume and potential cost-savings, the feasibility of establishing a wound clinic in Huntington, WV could be assessed. This study aims to determine the frequency, 30-day readmission, and cost of emergency department visit for skin and soft tissue infections associated with injectable drug use between two hospitals in Huntington, WV over a 6-year period.

**Methods:** This review has been submitted to the Marshall University Medical Institutional Review Board. It is a two-center, retrospective chart review study. Patients were identified through billing data using International Classification of Diseases 10th revision (ICD-10) codes associated with skin abscesses and cellulitis. Return visits included ICD-10 codes associated with brain abscess, endocarditis, and vertebral osteomyelitis. Eligible patient records must also contain at least one ICD-10 code associated with opioid/heroin, cocaine, amphetamine/other stimulant, substance use disorder, multi-substance use disorder, or hepatitis C. The 6-year period began at September 1, 2012 – August 31, 2018. Identified medical records will be abstracted for demographic information, length of stay, insurance status, disposition, date of birth, social security number, and charges for services received in the hospital. The primary endpoints are the prevalence, 30-day return rate, and average cost of the emergency department visit for bacterial infection secondary to injectable drug use. Secondary endpoints include incidence of non-injectable drug use-associated skin and soft tissue infections, average length-of-stay, vaccination status, and proportion of patients utilizing medication assisted treatment. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify the benefits of a wound clinic for the injectable drug user population

Describe the impact of the opioid epidemic on the state of West Virginia when compared to the United States

### Self Assessment Questions:

Which of the following best describes the rationale for conducting a prevalence study of injectable drug users?

- A: Stigmatize the injectable drug user population by highlighting the problem
- B: Identify gaps to improve continuity of care and improve treatment
- C: Berate the public healthcare system
- D: Increase the likelihood of illicit drug use

Select the correct statement:

- A: In 2016, West Virginia had the highest rate of opioid-related overdoses
- B: West Virginia has never had an issue with illicit drug use
- C: Skin and soft tissue infections are not prevalent in this population
- D: The Appalachian region is not a hot-spot for opioid related overdoses

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF THE PRESCRIPTIONS AT DISCHARGE (PAD) PROGRAM ON HOSPITAL READMISSIONS AND PHARMACY METRICS

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**Purpose:** Penalties for readmissions have prompted health-systems to focus on effective transitions of care services. Since medication-related errors are a significant contributor to hospital readmissions, pharmacy services are often targeted for meaningful interventions. One key intervention, pharmacist-driven discharge reconciliation, has had variable impact on hospital readmission and reimbursement rates. Other methods for improving patient outcomes while increasing revenue through pharmacy services have yet to be studied. In October 2018, Eskenazi Health developed a Prescriptions at Discharge (PAD) program, an interdisciplinary, patient-centric discharge service. The objective of this study is to evaluate the impact of the PAD program on hospital readmission rates, prescription capture rates, and revenue generation. **Methods:** This is a quasi-experimental, case-control study including adult patients admitted to Eskenazi Health. Data collection will occur from 11/1/2018-1/31/2019. Patients from the case group are participating in the PAD program, while others will be randomly selected to serve as historical and prospective control patients who will be receiving standard of care. Demographic information will be reported using descriptive statistics. Normality will be assessed using the Anderson-Darling test. Continuous variables will be evaluated using t-test (parametric) or Mann-Whitney U (non-parametric). Chi-Square or Fisher's Exact test will be used to evaluate categorical and dichotomized variables. Sub-group analyses were determined a priori and will be evaluated to determine impact on readmission rates.

**Preliminary Results:** Since program implementation, 559 patients have been enrolled in PAD. Researchers are working with Epic analysts to generate reports regarding demographic information, prescription capture and fill rates, and time stamps throughout the prescription ordering and verification process.

**Conclusions:** Further data collection is on-going as patients are enrolled in order to determine the impact of this program on readmission rates and pharmacy revenue generation. Long-term goals of this initiative are to expand sustainable pharmacy services and reduce hospital readmissions.

### Learning Objectives:

Describe Describe gaps in the literature regarding factors impacting hospital readmissions.

Identify Identify implementation strategies for a prescriptions at discharge service

### Self Assessment Questions:

Which of the following is lacking in current data regarding factors impacting hospital readmissions?

- A: Social determinants of health
- B: Medication reconciliation at discharge
- C: Transitions of care phone calls
- D: Multimodal strategies

What strategies can be implemented to enhance a prescriptions at discharge program?

- A: Targeted provider and nursing education
- B: Buy-in from hospital leadership
- C: Enhanced pharmacy workflow
- D: All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**PHARMACIST ROLE IN DISCHARGE MEDICATION RECONCILIATION: IMPACT OF THE PHARMACIST ON THE PERCENT OF PATIENTS RECEIVING THE APPROPRIATE DURATION OF ANTIMICROBIAL THERAPY FOR COMMUNITY ACQUIRED PNEUMONIA**

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**Purpose:** It is hypothesized that patients may be discharged from hospitals on inappropriate durations of antibiotic therapy. Pharmacist involvement in discharge medication reconciliation has been shown to increase the accuracy of discharge orders and home medication regimens. The aim of this study is to assess the impact of the pharmacist on ensuring that patients with the diagnosis of uncomplicated community acquired pneumonia (CAP) receive the appropriate duration of antibiotic therapy.

**Methods:** There are two arms of the study: one arm will prospectively evaluate the antimicrobial duration of therapy for CAP with a pharmacist monitoring the total days of antibiotic therapy including at discharge, the other arm will be retrospective and without any pharmacist intervention. Pharmacist intervention will include assessment for transition from intravenous to oral antibiotics, contacting the physician to determine the plan for total duration of antibiotic therapy, and making a recommendation for five days of total antibiotic therapy for patients with uncomplicated CAP. Patient charts to be reviewed will be from patients discharged from December 6, 2018 through February 28, 2019. This data will be compared to previous data collected from January 1, 2018 through November 30, 2018. The primary outcome of the study is to assess the percent of patients diagnosed with uncomplicated CAP who receive five days of antibiotics before and after the implementation of a pharmacist's intervention. Secondary outcomes include the percent of successful pharmacist interventions and the amount of time spent per pharmacist intervention.

**Results and conclusions:** Data collection is in process. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Identify the criteria for eligibility for five days of antibiotic treatment for uncomplicated community acquired pneumonia (CAP).

Discuss the impact pharmacist interventions may have on patients receiving the appropriate duration of antibiotic therapy for uncomplicated community acquired pneumonia (CAP).

**Self Assessment Questions:**

AL is a 75 yo male with end stage renal disease (ESRD) and type II diabetes who is diagnosed with community acquired pneumonia. On day 5 of antibiotics his vitals include: Blood pressure = 140/90 mmHg

- A AL is a 75 yo male.
- B: AL has end stage renal disease (ESRD).
- C: AL has type II diabetes
- D: AL's respiratory rate is 28 beats per minute.

Of the following choices, which is the most likely pharmacist intervention to have a positive impact on patients receiving the correct duration of antibiotic therapy for CAP?

- A Add stop dates to antibiotic therapy.
- B Order Clostridium difficile testing.
- C Monitor the patient's vital signs.
- D Transition patients from IV to PO antibiotics.

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**EFFECT OF BENZODIAZEPINE RECEPTOR AGONISTS IN VETERANS WITH POST-TRAUMATIC STRESS DISORDER (PTSD)**

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**Purpose:** To determine if concomitant use of benzodiazepine receptor agonists or "Z drugs" impacts the successes or failures of evidence based post-traumatic stress disorder (PTSD) treatments including both psychotherapy and medications.

**Methods used:** Retrospective chart review will be used to assess a random sample of Veterans diagnosed with post-traumatic stress disorder enrolled in the Battle Creek Veteran Affairs Medical Center Mental Health Clinic from October 1, 2013 to April 1, 2018 (time frame when benzodiazepine Psychotropic Drug Safety Initiative (PDSI) was implemented). Those meeting inclusion criteria will be reviewed to determine "Z" drug use as well as demographic information, diagnoses, therapy duration, psychotropic medication prescription, including antidepressants, use of sedative hypnotics, incidence of co-occurring substance use disorder, and PCL scores. Treatment success will be defined as at least a 5-point reduction in score from baseline. An explanatory model will be developed using logistic regression to examine the effect of Z drugs on success or failure of treatment in the outpatient mental health clinic, adjusting for other variables. Variables to be included in the initial model include Z drug use, time in treatment, antidepressant treatment, other sedative hypnotics, and other substance use disorders.

**Summary of (preliminary) results to support conclusion:** Will be presented at Great Lakes Resident Conference.

**Conclusions reached:** Will be presented at Great Lakes Resident Conference.

**Learning Objectives:**

Describe the guidelines recommendations regarding the use of benzodiazepines in PTSD.

Recognize the controversy in use of Z drugs in PTSD.

**Self Assessment Questions:**

What is the recommendation on use of benzodiazepines in VA/DoD guidelines for PTSD?

- A Strong For
- B: Weak For
- C: Strong Against
- D: Weak Against

What limitations exist to current evidence regarding use of Z drugs in PTSD?

- A Small sample size
- B Short duration
- C Z drugs were not studied in PTSD
- D Both A and B

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMIZING THE SYNCHRONIZATION OF INVENTORY MANAGEMENT SOLUTIONS

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**Purpose:** To optimize the automation process of these technologies on a continuing basis to further cost-saving potentials of pharmacy inventory  
**Methods:** Monthly reports of activities and inventory of automated dispensing cabinets (ADCs) and carousels were collected from June 2018 through August 2018. A scorecard was created from these reports which include formulas to calculate goal minimum and maximum quantities for ADCs and carousels. The goal minimum and maximum quantities from the scorecard were implemented from September 2018 - November 2018 by changing the minimums and maximums in the carousel machines.

**Conclusion:** In progress

### Learning Objectives:

Describe the process of synchronizing inventory management solutions to optimize inventory.

Recognize the cost-saving potentials of synchronizing pharmacy inventory management solutions.

### Self Assessment Questions:

Which of the following reports were used to create a scorecard for the process to synchronize inventory management?

- A Activities/vend information from automated dispensing cabinets (A)
- B: Inventory of carousel
- C: Inventory of ADCs
- D: All of the above

Which of the following was changed to save costs by synchronizing pharmacy inventory pharmacy management solutions?

- A Number of ADCs
- B Minimum/maximum quantities
- C Pharmacy formulary
- D Pharmacy technician workflow

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION AND OPTIMIZATION OF DRUG WARNINGS

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**Background:** The baseline medication alert override rate at Palos Health is ~92%. Weingart et al demonstrated prescribers overrode high-severity drug interactions and drug-allergy alerts ~90% of the time, when the threshold for alert firing was set too low. Despite the high override rate, the majority of prescribers (61%) believe interaction alerts increase patient safety. However, this data suggests alerts must be properly managed in order to be effective and safe. Simpao et al exemplified the optimizing drug-drug interaction alerts in their hospital reduced the pharmacist override rate by 8%. A content workgroup funded by the Agency for Healthcare Research and Quality suggest that medical alert optimizations should be proposed and approved by a multidisciplinary team at local organizations.

**Purpose:** The primary objective is optimizing drug alerts to reduce alert fatigue and burden. This will be measured through alerts shown per order and override rates, both for specific medication alerts and all alerts respectively. Retrospective evaluation of adverse drug events and medication errors will occur to ensure patient safety.

**Methods:** This process improvement project included development of a medication alert optimization policy and approval process, evaluation of baseline data to determine warnings eligible for optimization, and presentation of the data and the policy to an approval body--the Pharmacy and Therapeutics Committee (P&T). Once approved, the medication alert optimizations will be implemented into the electronic medical record, and analysis of the post-implementation data will occur.  
**Results:** Two DDI alerts have been approved by P&T for optimization. These two alerts account for a fourth of our DDI alerts fired for August 2018. By initiating the optimization proposed, it is projected that the two alerts will have a reduction of 30% (approximately 3,500 alerts per month).

Complete results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

List characteristics that may identify an alert for optimization

Identify key strategies in optimizing clinical decision support

### Self Assessment Questions:

The following are characteristics one may consider using to identify an alert for optimization, except:

- A Baseline alert settings with an override rate of  $\geq 90\%$
- B: The alert resulted in medications being removed/held at a rate of  $\geq 90\%$
- C: Recommendation for optimization by a healthcare professional
- D: High ONC score

Which of the following strategies have been recommended by a content workgroup to optimize clinical decision support in local organizations?

- A Have a panel of pharmacists decide which medication alerts should be implemented
- B Have an inter-professional committee approve implementation and implementation
- C Allow individual clinicians to turn off certain alert warnings
- D B and C

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PATIENT PERCEPTIONS OF IMMUNIZATIONS POST DIABETES SELF-MANAGEMENT EDUCATION CLASSES

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Statement of purpose: The Centers for Disease Control (CDC) has encouraged aggressive efforts to increase delivery of vaccines in adults with diabetes. As the most accessible healthcare professional, pharmacists play a key role in preventive health through immunization delivery. According to the American Association of Diabetes Educators (AADE) National Practice Survey in 2015, only 19.6% of diabetes educators offered information or discussed immunizations with persons who have a diagnosis of diabetes. Diabetes management programs allow pharmacists a unique opportunity to facilitate the uptake of vaccines in person with diabetes. The primary objective of the study is to evaluate whether patient perceptions of immunizations change after completing pharmacist-led diabetes self-management education classes. The secondary objectives of the study are to (1) describe the current role of diabetes self-management education on patients' perceptions of vaccinations and self-reported vaccination rates and (2) identify areas for improvement within the existing program curriculum. Statement of methods used: In a concurrent mixed methods design, investigators performed a retrospective chart review to identify patients who met eligibility criteria: 18 years of age or older, diagnosis of diabetes or prediabetes at the time of referral, completion of diabetes group education program after January 1, 2017 and minimum attendance of one individual follow-up appointment. A 14-item Likert-scale questionnaire and semi-structured interview guide were designed using the 6 major constructs of the Health Belief Model to help researchers identify patient behavior outcomes for preventive measures. The questionnaire aims to statistically assess changes in perception while the interview aims to further elucidate patient perceptions. Eligible participants were invited to complete the survey and the semi-structured interview questions. Semi-structured interviews will continue to take place until data saturation is achieved (anticipate 15-20). The results will be analyzed by descriptive and inferential statistics as appropriate. Summary of preliminary results: Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the recommended vaccines for persons with type-2 diabetes. Describe the Health Belief Model and correlate its constructs to patients' perceptions of immunizations.

### Self Assessment Questions:

Which best describes the Health Belief Model?

- A Attempts to predict and explain health related behaviors for an individual
- B Describes how a person's region affects their health
- C Process of behavior change as occurring in stages
- D Collective thought on how health affects wealth

Which of the following vaccines are recommended for a patient who is 57 years and just diagnosed with type-2 diabetes?

- A Recombinant Zoster
- B Ppsv23
- C Hepatitis B
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INCIDENCE OF URINARY TRACT INFECTIONS POST KIDNEY TRANSPLANT WITH PROPHYLACTIC ANTIBIOTICS

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Antibacterial prophylaxis for the prevention of urinary tract infections (UTIs) is a controversial practice among transplant centers within the United States. In the post-transplant setting, UTIs increase the risk of patient morbidity and mortality. However, unnecessary antibiotic exposure can breed resistance and cause patient adverse drug effects. The purpose of this project is to assess the incidence of UTIs and to identify risk factors for UTI development in an urban population within the first 6 months of renal transplantation. This will be a retrospective, single center cohort study. A list of patients who received a renal transplant at the University of Illinois Hospital & Health Sciences System between 01/01/2015 and 12/31/2017 will be screened. For eligible patients, data collection will start from the day of the transplant to 12 months post-transplant, or 09/01/2018, whichever occurs first. Exclusion criteria includes recipients of multiorgan or ABO incompatible transplants, HIV positive patients, and patients maintained on eculizumab post-transplant. Patients less than 18 years of age, incarcerated patients, and those who became pregnant during the study period will also be excluded. The primary outcome will compare the incidence of UTIs between adult renal transplant recipients maintained on sulfamethoxazole-trimethoprim versus cephalexin UTI prophylaxis at six months post-transplantation. UTI is defined as having a urine culture > 100,000 CFU/mm<sup>3</sup> of a pathogenic organism that necessitates antimicrobial therapy in the presence of symptoms. Secondary endpoints will include the incidence of bacteremia, incidence of multiple UTIs, incidence of resistant organisms, and risk factors for UTI development. This project will also aim to identify the time to UTI and relationship between the number of UTIs and incidence of allograft rejection. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify risk factors for developing urinary tract infections post renal transplant.

Discuss various prophylactic antibiotic options for urinary tract infections post renal transplant.

### Self Assessment Questions:

Which of the following has been shown to influence the incidence of urinary tract infections post renal transplant?

- A African American Race
- B History of Hypertension
- C Tobacco Use
- D Immunosuppression Therapy

Which of the following choices is an appropriate UTI prophylactic regimen post kidney transplant?

- A Linezolid
- B Metronidazole
- C Sulfamethoxazole-trimethoprim
- D Acyclovir

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF KETOROLAC 15 MILLIGRAMS VERSUS 30 MILLIGRAMS FOR TREATMENT OF ACUTE PAIN AT THE JESSE BROWN VETERANS AFFAIRS MEDICAL CENTER EMERGENCY DEPARTMENT

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### Background/Objective:

Ketorolac is a non-steroidal anti-inflammatory (NSAID) indicated for short-term (up to 5 days) management of moderate to severe acute pain that requires analgesia. The non-opioid analgesic is commonly used in the emergency department for treatment of acute pain. In October 2016, a single-site, randomized controlled trial compared the analgesic effect of 10 milligrams (mg), 15 mg, and 30 mg doses of intravenous ketorolac for short-term treatment of acute moderate to severe pain in the emergency department (ED). No significant difference between the three doses was found in the reduction of numeric rating scale (NRS) pain scores from baseline to 30 minutes. In response to the publication, Jesse Brown Veteran Affairs Medical Center (JBVAMC) adopted a new standard of administering 15 mg of intravenous (IV) or intramuscular (IM) ketorolac, instead of 30 mg, in the emergency department. In the setting of limited literature available in the emergency department, evaluating if this change in practice at JBVAMC from ketorolac 30 mg to 15 mg provides similar efficacy in the veteran population is warranted. If similar reduction in pain scores is found with this study, there is potential to expand this new practice to other wards of the hospital, therefore reducing the overall usage of high dose ketorolac.

### Methods:

This study is a retrospective, electronic chart review of patients who presented to JBVAMC emergency department with complaints of acute, non-cancer related pain with a pain score of 4 or greater who received at least one dose of intravenous or intramuscular ketorolac 15 mg or 30 mg. The primary endpoint is reduction in NRS pain score after ketorolac administration from baseline. The secondary endpoints are time to next analgesic dose, percentage of patients requiring rescue opioid, and opioid consumption.

Results and conclusion will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review ketorolac's mechanism of action, side effect profile, and place in therapy.

Discuss the current literature published on the possible ceiling dose effect of ketorolac.

### Self Assessment Questions:

Ketorolac's package insert includes a warning recommending utilization of the lowest effective dose for the shortest duration to minimize what side effect?

- A: Edema
- B: Nausea/vomiting
- C: Gastrointestinal effects
- D: Dizziness

Studies have shown no significant difference in pain relief between various ketorolac doses in which of the following settings?

- A: Chronic pain
- B: Cancer pain
- C: Post-operative pain
- D: Both B and C

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## INTEGRATION OF THE AMBULATORY CARE PHARMACIST INTO HOME VISITS FOR GERIATRIC HOME-BOUND PATIENTS

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**Background:** The geriatric population often have extensive health care needs, which require multidisciplinary interventions to deliver care. Geriatric patients, especially those unable to seek care in-office, require management of multiple chronic disease states and complex pharmacotherapy. Medication-related problems are common among home care patients, leading to hospitalizations and emergency room visits. Mercy Health Physician Partners (MHPP) Geriatrics has a home-bound geriatric program that involves a geriatrician, care manager, and nurse practitioner going to the home to deliver care. Prior to project implementation, the role of the embedded pharmacist in home visits was limited to phone calls with the patient focusing on diabetes and anticoagulation management.

**Purpose:** Evaluate the role and effectiveness of pharmacist home visits with geriatric patients enrolled in the home program.

**Methods:** Baseline data was collected on all patients enrolled for primary care home visits by MHPP Geriatrics, including hospital admissions or emergency room visits related to medications within 6-months of program enrollment, diabetic, hypertension and anticoagulation control, number and type of pharmacy consults, and number of medications meeting Beers Criteria. After baseline data collection, the pharmacist began performing home visits with the care team upon provider referral. Home visit responsibilities for the pharmacist consisted of medication review, medication reconciliation, drug information questions and patient education. Post-intervention data was collected on patients seen in the home. The primary endpoint is the number of discrepancies identified during medication reconciliation. Secondary endpoints included the number of Beers Criteria medications, number of hospital admissions or emergency room visits related to medications, number and type of interventions performed, time needed to complete home visits, and the identification of barriers to performing home visits.

**Results/Conclusions:** Pending

### Learning Objectives:

Discuss the role pharmacists can have in medication management for geriatric home-bound patients.

Identify potential barriers for pharmacists when conducting home visits.

### Self Assessment Questions:

Which of the following are benefits of pharmacist involvement during home visits in the geriatric population?

- A: Improved patient compliance
- B: Identification of unnecessary medications
- C: Accurate medication reconciliation
- D: All of the above

Which of the following are potential barriers for pharmacists conducting home visits for geriatric patients?

- A: Time limitations
- B: Lack of reimbursement incentive
- C: Staffing requirements
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## MEDICAL STAFF PERCEPTIONS OF MEDICATION-ASSISTED TREATMENT THERAPY IN A FEDERALLY QUALIFIED HEALTH CENTER

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### Statement of purpose:

Indiana ranks higher than the national average of residents misusing opioid medications. Medication Assisted Treatment (MAT) is one way of managing opioid use disorder (OUD). MAT has been proven to decrease opioid use, opioid related overdoses, and the need for inpatient detoxification services while increasing the retention in treatment therapy. Staff members including providers and pharmacists are readily accessible when located in a Federally Qualified Health Center (FQHC) so they are in a position to provide MAT services.

The objective is to describe the medical staff's attitudes and perceived behaviors towards MAT services in a Federally Qualified Health Center (FQHC). The secondary objective is to identify the staff's perceptions of utilizing a pharmacist during MAT services.

### Statement of methods used:

A twenty-eight item web-based survey was developed using The Theory of Planned Behavior to provide a conceptual framework for the study. This theory was appropriate, as it's guided by the principle of determining the why behind why people act the way they do. This theory is illustrated by four constructs: attitude, perceived behavioral control, subjective norm, and intent. The survey will be piloted by one of the eight FQHC's sites. Staff will be notified of the survey via company email and during the FQHC's "All-Staff Meetings". The survey will be available for 6 weeks. Descriptive statistics will be computed to (1) characterize the staff's perceptions of using MAT and utilizing a pharmacist to assist in MAT therapy, and (2) to compare the relationship between medical staff roles and perceptions. Descriptive statistics for demographics will also be determined.

Preliminary Results: In progress

### Conclusion/Implications:

Results will help gauge FQHC staff member's attitudes towards MAT and their intentions to assist in managing OUD treatment. The staff's opinions on utilizing pharmacists will be assessed, which may play a role in providing care for a patient with OUD.

### Learning Objectives:

Identify why medication assisted treatment could be important in patient with opioid use disorder.

List the different constructs associated with the Theory of Planned Behavior.

### Self Assessment Questions:

Which are the four constructs of the theory of planned behavior?

- A Attitude, demographic differences, subjective norm, and intent
- B: Attitude, perceived behavioral control, information integration, and
- C: Attitude, perceived behavioral control, subjective norm, and intent
- D: Attitude, perceived behavioral control, subjective norm, and impres

Medication assisted treatment is comprised of medication therapy and which of the following?

- A Exercising
- B Psychotherapy counseling
- C Family involvement
- D Cold turkey

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## POPULATION HEALTH MANAGEMENT IN AMBULATORY ONCOLOGY

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Purpose: Symptoms associated with worsened survival among patients with advanced cancer receiving treatment often precipitate emergency department utilization. The most common presenting symptoms include pain, shortness of breath, nausea and vomiting, and fever. Treatment-related problems leading to emergency department visits may reflect symptom management not adequately addressed during routine cancer care. Reducing unplanned hospital admissions is a quality metric evaluated by Centers for Medicare and Medicaid Services, accomplished through development of programs that improve care transitions. Limited data regarding the implementation of a pharmacist-led symptom management program is available in patients receiving chemotherapy infusions at ambulatory clinics. The purpose of this study is to evaluate the efficacy of the pharmacist-led monitoring program to improve patient outcomes and decrease adverse events and admission rates in newly initiated chemotherapy patients in the outpatient setting. Methods: This study is a quasi-experimental trial of patients who have received intravenous chemotherapy at the Henry Ford Hospital hematology/oncology ambulatory infusion center. Patients will be identified for the pre-intervention cohort from the hematology/oncology ambulatory infusion center schedule in the electronic medical record. Data will be collected from initiation of the first cycle of chemotherapy through six months thereafter. For the prospective cohort, the hematology/oncology ambulatory infusion center schedule will be assessed for eligible patients daily to determine enrollment and will be contacted via telephone by an oncology pharmacist within 72 hours of intravenous chemotherapy cycle initiation to complete the standardized toxicity assessment form and after each cycle thereafter for six months from initiation of the chemotherapy regimen. The primary outcome is to evaluate the impact of a pilot pharmacist-led symptom management program on emergency department presentation within six months of initiation of treatment among patients receiving outpatient chemotherapy infusions. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the risk factors for the development of toxicities in patients receiving intravenous chemotherapy in the outpatient setting

Discuss the potential benefits of a pharmacist-led symptom management program in patients receiving intravenous chemotherapy in the outpatient setting

### Self Assessment Questions:

SD is a 78 year old female recently diagnosed with pancreatic cancer with an ECOG performance status of 0. She will be receiving her first cycle of chemotherapy next week. Which of the following is

- A Poor performance status
- B: Age greater than 65
- C: First chemotherapy treatment
- D: A and B

Which of the following are potential benefits of a symptom management program in patients receiving intravenous chemotherapy in the outpatient setting?

- A Decreased incidence of grade 3-4 toxicities
- B Delays in administration of scheduled chemotherapy cycles
- C Reduction in emergency department presentations and inpatient admissions
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A PHARMACIST-MANAGED QUALITY IMPROVEMENT INITIATIVE ON THE APPROPRIATE USE OF STRESS ULCER PROPHYLAXIS IN CRITICALLY ILL ADULTS

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**Purpose:** Critically ill patients have an increased risk of developing acute gastrointestinal (GI) bleeding; the American Society of Health-System Pharmacists (ASHP) therapeutic guidelines on stress ulcer prophylaxis (SUP) indicate that patients with risk factors should be administered a histamine-2 receptor antagonist (H2RA) or proton pump inhibitor (PPI) to reduce bleeding risk. Recent studies have shown that critically ill patients often receive SUP even when no risk factors are present. The aim of this study is to assess the impact of a pharmacist-managed protocol on the appropriateness of stress ulcer prophylaxis before and after education to physicians, nurses, and pharmacists.

**Methods:** This quality improvement study is a retrospective chart review of SUP treatment practices for adults admitted to the OhioHealth Mansfield Hospital intensive care unit (ICU) between November 1st and November 30th, 2017 or November 1st and November 30th, 2018. Education aiming to review the OhioHealth protocol for initiation of SUP, guideline recommendations, and literature evaluating the use of SUP was provided to pharmacists, nurses, and physicians via presentations, pocket reference cards, and e-mail. The primary objective is to compare the percentage of total patient days with inappropriate vs. appropriate SUP pre- and post-education. Utilization of SUP will be considered appropriate if risk factors for GI bleeding or an indication for a PPI or H2RA are present; inappropriate if a patient has no risk factors for GI bleeding, received SUP via intravenous route when oral route could be tolerated, or if SUP is continued beyond ICU discharge; and unknown appropriateness if a PPI or H2RA is on the home medication list. Secondary outcomes include comparing the cost of SUP medications and comparing the number of patients who continued SUP after ICU discharge for both intervention periods. Results and conclusions will be discussed at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the adverse events associated with inappropriate use of medications for stress ulcer prophylaxis.

Identify when a patient is indicated to receive stress ulcer prophylaxis.

### Self Assessment Questions:

What is true about medications used for stress ulcer prophylaxis?

- A: Every patient who is NPO should be started on a proton pump inhibitor
- B: Proton pump inhibitors may increase the risk of developing infective
- C: Every patient in the ICU should be started on a H2 receptor antagonist
- D: Proton pump inhibitors and H2 receptor antagonists can be bought

Which of the following patients is indicated to receive stress ulcer prophylaxis?

- A: An internal medicine patient who is scheduled to be NPO for a colon
- B: A patient in the ICU who is mechanically ventilated and receiving total
- C: A patient in the ICU who is on a heparin drip and on a cardiac diet
- D: A patient with septic shock who is NPO and on a ventilator

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## STERIOD DOSING IN ACUTE EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (AECOPD) IN CRITICALLY ILL ADULTS

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**Purpose:** Acute exacerbations of COPD (AECOPD) are estimated to result in approximately 110,000 deaths and more than 500,000 hospitalizations each year. Systemic corticosteroids have demonstrated a shortened recovery time and a decreased hospital length of stay in patients with acute exacerbations. The GOLD guidelines recommend 40mg prednisone daily for 5 days for AECOPD. Research specifically evaluating acute exacerbations in critically ill patients is limited, and a survey of experts in the field suggest significant variability in dosing regimens of corticosteroids in this population. The purpose of this study is to characterize the correlation between corticosteroid dosing regimens and patient outcomes.

**Methods:** This is an IRB-approved retrospective, multi-center chart review of corticosteroid utilization for AECOPD in the intensive care unit (ICU). The study will include approximately 900 patients from six ICUs across a large-community health system admitted between June 1st, 2017 and May 31st, 2018. Patients were excluded if they were admitted to critical care for less than 24 hours, expired during admission, transitioned to comfort care measures, transferred from an outside facility, presented with tracheostomy or required tracheostomy during hospital stay, or were less than 18 years old. The primary objective of this study is to determine the impact of various corticosteroid dosing strategies on patient outcomes including ICU length of stay and the duration of mechanical ventilation. Characteristics of corticosteroid regimens will include dose, duration, and route of administration. The secondary objective is to characterize the incidence of steroid-induced hyperglycemia, hypertension, psychosis, and gastric ulcers in relation to corticosteroid regimen. Data will be obtained from the electronic medical record, de-identified, and recorded into an electronic database.

**Results:** Data collection and analysis are currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe current guideline recommendations for dose and duration of corticosteroids to treat AECOPD.

Identify limitations of current literature on the dosing of corticosteroids in AECOPD in critically ill patients.

### Self Assessment Questions:

What is the current dose and duration of corticosteroid therapy recommended by the GOLD guidelines for treatment of AECOPD?

- A: Methylprednisolone 40 mg q8h x 1, followed by prednisone 40 mg
- B: Methylprednisolone 40 mg q6h x 5 days
- C: Prednisone 40 mg daily x 5 days
- D: Methylprednisolone 125 mg x 1, followed by prednisone 40 mg x 4

Which of the following benefits have oral glucocorticoids shown in patients with AECOPD?

- A: Improve FEV1
- B: Prevention of future exacerbations
- C: Improve mortality
- D: Decrease ICU stay

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## **RAPID SUSCEPTIBILITY RESULTS AND PHARMACIST IMPACT ON ANTIBIOTIC STEWARDSHIP FOR GRAM-NEGATIVE BLOODSTREAM INFECTIONS IN A COMMUNITY HOSPITAL**

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**Purpose:** Bloodstream infections caused by gram-negative bacteria (GNB) are concerning due to the increasing prevalence of multi-drug resistant organisms. Inappropriate antibiotic usage has been associated with increased length of stay and mortality. Improvement in technology for rapid identification of pathogens combined with antibiotic stewardship has shown improvement in patient care and shorter time to optimal antibiotic therapy. The purpose of this study is to assess the effect of rapid identification and susceptibility results for bacteremia caused by GNB in combination with a pharmacist to improve antibiotic stewardship and time to optimal antibiotics.

**Methods:** This study is a mixed retrospective and prospective study that was approved by the Institutional Review Board. Patients with bacteremia caused by GNB were assessed retrospectively from October 17, 2017 to July 16, 2018 and prospectively from September 24, 2018 to January 4, 2019. Data collected includes: age, gender, weight, white blood cell count, serum creatinine, venous lactic acid, heart rate, respiratory rate, temperature, blood pressure, blood culture results and susceptibilities, administered antibiotics, and pharmacist recommendations to providers (when available). Primary endpoints are difference in time to identification and susceptibility of the organism by current microbiology lab procedure versus utilization of the rapid susceptibility system and time to optimal antibiotic selection based on results. Secondary endpoints are acceptance rate of pharmacist recommendations by physicians and accuracy of the rapid diagnostic results compared to standard practice using minimum inhibitory concentration data. Retrospectively, patients meeting inclusion criteria will be evaluated to determine if antibiotics were changed as a result of the rapid susceptibility system. Prospectively, a team of pharmacists will assess patients with GNB bacteremia and make recommendations to physicians according to the susceptibility results, considering the site of infection and organism isolated.

**Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

### **Learning Objectives:**

Describe advantages to rapid susceptibility results compared to standard laboratory results

Identify time differences between rapid susceptibility results and standard laboratory results

### **Self Assessment Questions:**

What is a potential advantage to having susceptibility results faster than the standard turnaround time?

- A Increased hospital length of stay
- B: Increased time on empiric antibiotics
- C: Increased time on optimal antibiotics
- D: Increased mortality

What is the median time difference between rapid susceptibility results and standard susceptibility results?

- A 0-1 days
- B 2-3 days
- C 4-5 days
- D 6-7 days

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **TREATMENT OF ACUTE HEPATIC ENCEPHALOPATHY IN THE INTENSIVE CARE UNIT**

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**Purpose:** Hepatic encephalopathy (HE), a neuropsychiatric complication of chronic liver disease, is thought to be due to the inability of the liver to clear toxins from the body. The 2014 American Association for the Study of Liver Diseases guidelines recommend lactulose, an osmotic laxative, as first-line therapy. Various treatment regimens have been utilized, including the addition of rifaximin, an oral broad spectrum antibiotic. New literature now suggests the use of polyethylene glycol (PEG) in this patient population. The primary purpose of this study is to compare the efficacy of treatment regimens in patients diagnosed with acute HE.

**Methods:** A retrospective, multi-center chart review was conducted which included subjects at least 18 years of age with a diagnosis of HE, who were admitted to the intensive care unit (ICU) between June 1, 2016 and May 31, 2018. Subjects had to receive lactulose, rifaximin, and/or polyethylene glycol for at least 24 hours. Subjects were excluded if they were continued on their prophylactic home regimen or if no baseline ammonia level was obtained prior to treatment initiation. The primary endpoint was the 24-hour change in Glasgow Coma Scale and West Haven Criteria (if available). Secondary endpoints were ICU length of stay and change in ammonia levels at 24 hours after initiation of therapy

**Results:** Research In Progress

**Conclusions:** Research In Progress

### **Learning Objectives:**

Discuss the pathophysiology and causes of hepatic encephalopathy.

Review the treatment regimens for acute hepatic encephalopathy based on current literature and guidelines.

### **Self Assessment Questions:**

Which of the following is NOT a major precipitating factor of hepatic encephalopathy?

- A Infection
- B: Gastric bleeding
- C: Constipation
- D: Probiotic use

Which of the following is the best indicator of therapeutic efficacy when treating hepatic encephalopathy?

- A Increased frequency of bowel movements
- B Reduction of ammonia levels
- C Improved mentation
- D Decreased albumin levels

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PROCALCITONIN USE ON DURATION OF ANTIBIOTIC THERAPY IN PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

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**Purpose:** Procalcitonin (PCT) is a precursor hormone of calcitonin that is upregulated in response to bacterial infection. It is approved by the Food and Drug Administration for use to guide antibiotic therapy in sepsis and lower respiratory tract infections. Within Community Health Network (CHNw) the use of PCT has increased over the past two years due to rapid availability of results. Antibiotic prescribing and PCT ordering practices have yet to be formally studied in community acquired pneumonia (CAP) within CHNw. It is important to understand its utilization, impact on duration of antibiotic therapy, and effect on patient outcomes to optimize use. **Methods:** A retrospective chart review was conducted via the electronic medical record of patients admitted to CHNw hospitals with an admitting diagnosis of CAP. Patients admitted from November 2016 – January 2017 without a PCT drawn and from November 2017 – January 2018 with a PCT drawn within 24 hours of admission were randomly selected for inclusion. Patients with comorbidities or medications that may falsely elevate PCT were excluded. The first primary objective was to evaluate duration of antibiotic use (in days of therapy) in patients with CAP prior to and after the rapid availability of PCT at CHNw. The second primary objective was to evaluate provider antibiotic ordering practices after the rapid availability of PCT at CHNw. Patients with an initial positive PCT ( $\geq 0.25$  mcg/ml) who had antibiotic therapy discontinued within 24 hours of a subsequent negative result were compared with patients who did not have antibiotics discontinued within 24 hours of a subsequent negative result. Data collection and analysis are ongoing. Results and conclusion will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the utility of procalcitonin for the management of antibiotic therapy in community-acquired pneumonia.

Identify opportunities for the optimization of procalcitonin use to guide antibiotic therapy in community-acquired pneumonia.

### Self Assessment Questions:

Based on available literature including the ProHOSP trial, antibiotic therapy is recommended for which of the following initial procalcitonin values in community-acquired pneumonia?

- A <0.1 mcg/ml
- B: 0.1-0.25 mcg/ml
- C: >0.25 mcg/ml
- D: B and C

Which of the following factors could explain a falsely low procalcitonin?

- A The initial procalcitonin may have been drawn too early in the infla
- B Recent surgical procedure (within the past 5 days)
- C History of liver transplant
- D Chronic kidney disease

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## LACTATE CLEARANCE IN MICU PATIENTS WITH SEPTIC SHOCK IN THE SETTING OF CHRONIC HYPERTENSION

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### Purpose:

Septic shock is a profound dysregulation in host response to infection resulting in hemodynamic instability. Guidelines recommend hemodynamic support to a mean arterial pressure (MAP)  $\geq 65$  mmHg in all patients to maintain organ perfusion. However, SEPSISPAM, a study evaluating higher versus lower MAP goals, showed patients with chronic hypertension had significantly increased need for renal-replacement therapy and doubling of blood creatinine levels with lower MAPs. Further, guidelines recommend lactate trends as a surrogate for adequate resuscitation. In septic shock, elevated lactate and delayed clearance have associated with mortality. The purpose of this study is to determine the impact of chronic hypertension on lactate clearance during septic shock.

### Methods:

This was a retrospective cohort study of adults admitted to the medical ICU with septic shock at the University of Kentucky Medical Center between June 2013-2018. Patients were excluded for any of the following reasons: previous end stage renal disease or cirrhosis, chronic dialysis dependence, concurrent midodrine or epinephrine, outside hospital admission, or cardiac arrest during admission. The primary outcome was the proportion of patients with lactate clearance of at least 10% within 6 hours. Secondary endpoints included ICU and hospital length of stay and mortality, average MAP at 6 and 24 hours, duration of mechanical ventilation, incidence of renal failure, time to lactate clearance and presence of delirium.

### Results:

In this cohort of 251 patients, 176 had baseline hypertension. Those without hypertension had higher baseline severity scores and increased incidence of congestive heart failure. In bivariate analysis, no difference was seen in the rate of lactate clearance at 6 hours between those with hypertension and those without. Further multivariate analyses are necessary to adjust for such confounders.

### Conclusion:

Conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss cerebral auto regulation and the differences in patients with chronic hypertension versus those without

Describe the role of lactate clearance in septic shock

### Self Assessment Questions:

In hypertensive individuals, the cerebral autoregulation curve is shifted in which direction to tolerate higher blood pressures and maintain perfusion?

- A Right
- B: Left
- C: Down
- D: No change

How is lactate predominately cleared from the body?

- A Liver
- B Bile duct
- C Feces
- D Heart

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A CLINICAL PHARMACIST PROFILE REVIEW TOOL TO CAPTURE AND TRACK CLINICAL ACTIVITIES THROUGH THE ELECTRONIC MEDICAL RECORD

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### Purpose:

Defining and capturing clinical pharmacy data is a key element in demonstrating the value of the clinical pharmacist as a member of the interdisciplinary medical team. Accurately defining clinical pharmacy data is the first step towards developing a clinical pharmacy productivity model that serves to allocate pharmacy resources through various patient care service lines. Literature exists surrounding methods to capture clinical pharmacist activities, but limited literature describes leveraging the electronic medical record (EMR) to seamlessly capture clinical data. The purpose of this project is to leverage the EMR to capture clinical pharmacist activities across different patient populations at The Ohio State University Wexner Medical Center (OSUWMC). The final result will be the ability to capture clinical pharmacy activities, identify gaps in services, and develop a data driven approach to clinical pharmacy services.

### Methods:

The project committee consisted of clinical specialists, clinical generalists, pharmacy informaticists, medication safety pharmacists, and pharmacy administrators. The committee generated a comprehensive list of clinical activities routinely performed by pharmacists at OSUWMC. The activities were compiled and grouped into broader categories (e.g. pharmacist profile review, emergency response, drug information questions, pharmacy consults). The clinical pharmacist profile review was prioritized by the committee as an activity that was variable among pharmacists, undefined, and the largest clinical activity not captured at OSUWMC. The committee defined a profile review based on three increasing levels of clinical review: targeted, general, and advanced. A profile review tool was built by the pharmacy informatics team in October 2018 and testing occurred in November 2018. An instructional voice-over PowerPoint and a pre/post survey were distributed to pharmacists to standardize the use of pharmacist profile review tool in January 2019.

### Results:

Post-implementation results to be presented at the Great Lakes Pharmacy Residency Conference (GLPRC).

### Conclusions:

Final conclusions to be presented at the GLPRC.

### Learning Objectives:

Describe how the EMR can be leveraged to capture clinical pharmacist activities

Review the pharmacist profile review tool and its use to capture clinical pharmacist activities

### Self Assessment Questions:

What types of clinical activities can be captured through the EMR?

- A Pharmacist profile reviews
- B: Clinical scoring
- C: Pharmacy consults
- D: All of the above

An OB resident calls you and states that their patient was growing *Escherichia coli* and *Proteus mirabilis* from both a urine and pelvic abscess culture. The patient's blood cultures have now also result

- A Targeted Profile Review
- B General Profile Review
- C Advanced Profile Review
- D This is not considered a profile review

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INCIDENCE OF ANTIBIOTIC ADMINISTRATION BEFORE LUMBAR PUNCTURE AND CSF GRAM STAIN IN CRITICALLY ILL PATIENTS WITH SUSPECTED BACTERIAL MENINGITIS AND THE EFFECT ON PATIENT OUTCOMES

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**Purpose:** Even though the incidence of bacterial meningitis in the United States has declined over the past two decades, it still causes significant morbidity and mortality in patients. It is highly encouraged that patients are quickly diagnosed and therapy is initiated in a timely manner in order to improve patient outcomes. Currently guidelines recommend the completion of a gram stain test and a culture on cerebrospinal fluid (CSF) in all patients with suspected bacterial meningitis. Guidelines recommend that empiric antibiotic be started as soon as blood cultures and lumbar puncture have been performed and that dexamethasone should only be given in patients with suspected or proven pneumococcal meningitis before the first dose of antibiotics. The question of whether or not antibiotic treatment prior to CSF gram stain could alter the results of the gram stain, potentially altering the diagnosis of bacterial meningitis, has been posed. This study is being conducted to determine if practice changes need to be made to optimize the treatment of bacterial meningitis at Memorial Hospital of South Bend.

**Methods:** This will be a retrospective chart review of patients admitted into the ICU with suspected bacterial meningitis from May 1, 2017 through May 31, 2018. Data collected will include patient demographics, CSF gram stain and culture results, other culture results, antibiotics selected and timing of administration, provider prescribing antibiotics and ordering diagnostic tests, length of stay in the ICU and hospital, as well as mortality. The primary outcome of this study is the rate of antibiotic administration prior to lumbar puncture and the effect on the gram stain result. The secondary outcomes of this study include the appropriateness of antibiotic timing, selection, and dosing, antibiotic appropriateness by prescribing group, length of stay and mortality. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the appropriate diagnosis and treatment of suspected bacterial meningitis and the role of CSF gram stain in this process.

Identify whether or not antibiotic administration could be affecting the diagnosis of bacterial meningitis at Memorial Hospital of South Bend based on the outcomes of this retrospective study.

### Self Assessment Questions:

What cerebrospinal fluid abnormal finding listed below indicates a suspicion for bacterial meningitis?

- A Red Blood Cells
- B: CSF:serum glucose ratio greater than 1
- C: Protein greater than 0.45 mg/dL
- D: Protein less than 0.45 mg/dL

What is the rationale behind administering dexamethasone 20 minutes prior to antibiotic administration?

- A It increases vancomycin penetration into the cerebrospinal fluid
- B It helps decrease intracranial pressure by decreasing inflammation
- C It inhibits the production of TNF-alpha by macrophages only if it is
- D It has a synergistic effect with cephalosporin antibiotic

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL OUTCOMES OF LOW-DOSE KETAMINE FOR PERIOPERATIVE ANALGESIA IN SPINE SURGERY

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**Purpose:** A multimodal approach to analgesia is recommended to manage pain. Due to the undesired consequences of excess opioid use and in context of the current opioid epidemic, there is a driving force to utilize other forms of analgesia to reduce the risk of chronic opioid use after acute exposure. Ketamine is a non-opioid analgesic that is used in low doses in the perioperative setting to minimize opioid use and optimize pain control. The guidelines on the use of ketamine for acute pain recommend its use for patients undergoing painful surgery, as well as in opioid-tolerant patients undergoing surgery. While it has been shown to reduce opioid use, there is limited evidence on the magnitude of this effect, its impact on pain scores, and on appropriate patient selection. It is selectively used at our institution as an adjunct for perioperative analgesia, but patients have mixed tolerability, some requiring early discontinuation of treatment. This quality improvement study aims to evaluate the clinical impact of perioperative ketamine infusions on the pain-related outcomes of spinal surgery patients.

**Methods:** This retrospective chart review includes adult hospital patients who have undergone spine surgery between January 2015 – August 2018. Outcomes will be compared between patients who received perioperative ketamine infusions and a control group of spine surgery patients who did not receive ketamine. The primary endpoint is 48-hour opioid consumption, measured in morphine equivalents. Secondary endpoints include perioperative pain scores for 48 hours and adverse effects potentially attributable to ketamine. Descriptive statistics will be used to analyze the data. Continuous variables will be compared using the Student's t-test or the Mann-Whitney U test, as appropriate. Categorical variables will be compared using chi-square or Fisher's exact test, as appropriate. Results/Conclusion: Data analysis is in progress. Results and conclusion will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the current literature and recommendations on the use of perioperative ketamine.  
Discuss the clinical impact of perioperative ketamine infusions.

### Self Assessment Questions:

It is currently recommended to use perioperative ketamine as an analgesic for which patient population?

- A: Opioid-tolerant patients
- B: Spine surgery patients
- C: Patients undergoing painful surgery
- D: A and C

Ketamine is most closely associated with which type of side effects?

- A: Renal
- B: Pulmonary
- C: Psychiatric
- D: Hepatic

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## BLOOD PRESSURE CONTROL WITH LABETALOL VS. NICARDIPINE AFTER MECHANICAL THROMBECTOMY FOR ACUTE ISCHEMIC STROKE

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**PURPOSE:** In recent years, literature has shown an expanded role for mechanical thrombectomy (MT) in patients presenting with acute ischemic stroke up to 24 hours after last known well time. There has been limited data to guide blood pressure goal and optimal therapy during and after MT. The 2018 AHA/ASA guidelines for early management of patients with acute ischemic stroke made a weak recommendation to maintain the blood pressure  $\leq 180/105$  mmHg for patients who underwent MT. The purpose of this study was to determine the optimal antihypertensive agent for management of blood pressure comparing nicardipine versus labetalol for patients with acute ischemic stroke who underwent MT.

**METHODS:** This was a retrospective cohort study evaluating blood pressure control in patients who underwent MT for acute ischemic stroke over a 5-year time period. Patients were included if they received either at least one dose of IV labetalol or an IV nicardipine infusion for at least 3 hours within the 12 hours prior to or following MT. Exclusion criteria included age less than 18 years, pregnancy, code status changed to comfort measures or death within 24 hours of hospital admission. The primary endpoint was the percent of time spent within blood pressure goal range during the first 24 hours following initiation of either labetalol or nicardipine. The secondary endpoints included mean systolic blood pressure, time to blood pressure goal attainment for 3 consecutive hours, blood pressure variability, treatment failure, presence of bradycardia or hypotension, intracranial hemorrhage, disposition on discharge, ICU and hospital length of stay, and in-hospital mortality.

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss current literature supporting expanded role of mechanical thrombectomy in patients with acute ischemic stroke  
Review evidence supporting the importance of early blood pressure control in patients who underwent mechanical thrombectomy

### Self Assessment Questions:

According to the DAWN trial, mechanical thrombectomy can be considered in select patients up to how many hours after last known well time?

- A: 6 hours
- B: 3 hours
- C: 24 hours
- D: 16 hours

In a recent study, in patients who underwent mechanical thrombectomy, higher peak systolic blood pressure was associated with which of the following patient outcomes?

- A: Improved NIH score
- B: Increased rate of hemorrhagic complications
- C: Improved functional status at 90 days
- D: Increased mortality

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## AN EVALUATION OF EPINEPHRINE AUTO-INJECTOR USE FOR ANAPHYLAXIS IN A PEDIATRIC EMERGENCY DEPARTMENT

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Current American Academy of Pediatrics (AAP) recommendations for anaphylactic allergic reactions recommend an intramuscular weight based dose of 0.01 mg/kg epinephrine, which is based on anecdotal evidence. The FDA has approved additional products in the form of auto injectors with fixed dosing for anaphylactic reactions: 0.15mg (for children 15-29kg) and 0.30mg (for children and adolescents over 30kg). The pediatric emergency department (ED) at our institution supplies both epinephrine auto-injectors for immediate use in the case of anaphylactic reactions. Registered nurses administer the drug, utilizing real-time administration as a teaching opportunity for the patient and family. Dosing children under 15kg using an auto-injector remains controversial due to risk of intraosseous (IO) administration and over dosing per weight-based guidelines. Children over 15kg have a potential need for repeat epinephrine doses due to underdosing on a weight basis, as well as risk for IO or subcutaneous administration. The aim of this study is to report efficacy of using two standardized doses of epinephrine auto-injectors (EAI) for anaphylactic reactions in a pediatric ED, by analyzing dosing requirements, length of stay in the ED, admission rates and requirement for ancillary medications.

This is a retrospective cohort study evaluating patients presenting to the emergency department from July/2014 to July/2018. Patients 1 month to 18 years were included using ICD codes associated with anaphylaxis. Patients must have received a minimum of one dose of epinephrine. Patients were categorized into two groups: <0.01mg/kg and >0.01mg/kg for comparison. Our primary objective is to evaluate epinephrine dosing requirements, while the secondary outcomes include: admission rates, length of stay, ancillary medications and adverse events.

An internal data collection software tool was utilized to collect the following variables: allergy history, age, vitals, weight based epinephrine dose, time to redose with epinephrine, number of doses of epinephrine, adverse effects, adjuvant therapies, admission, emergency department length of stay, and total hospital length of stay.

### Learning Objectives:

Describe current AAP recommendations for anaphylactic allergic reactions

Identify the importance of evaluating the differences in dosing based on the 0.01 mg/kg regimen

### Self Assessment Questions:

Describe the current AAP recommendations for anaphylactic allergic reactions

- A 0.3 mg epinephrine autoinjector
- B: 0.15 mg epinephrine autoinjector
- C: 0.01 mg/kg IM epinephrine
- D: A and C

What is the importance of evaluating the differences in dosing based on the 0.01 mg/kg regimen

- A Assessing whether the epinephrine auto-injectors are more appropriate
- B Assessing whether it is appropriate to use this dose in the ED in pediatric patients
- C To discourage epinephrine autoinjector use due to inappropriate dosing
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF IMMUNOLOGIC AND VIROLOGIC FUNCTION IN RE-INCARCERATED INMATES LIVING WITH HIV

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According to the United States Bureau of Justice Statistics, as of 2015, 17,150 prisoners (130 per 10,000), or 1.3% of the state and federal prison population, carry a diagnosis of HIV/AIDS. Studies have shown that re-incarcerated patients lack viral suppression, have decreased immunologic function, and develop ART resistance due to non-compliance. In a large cohort of PLWH with a 3-year post-release evaluation, retention in care diminished significantly over time, but was associated with HIV care during incarceration and early linkage to care post-release. However, no data is available that shows virologic and immunologic function upon re-incarceration in an individual that has followed up at an HIV clinic after release from their initial incarceration. The aim of this study is to determine the virologic and immunologic states of individuals living with HIV who are re-incarcerated within the Illinois Department of Corrections (IDOC), based on reported followup and prescription refills after initial release from prison. This study will be a retrospective cohort study of HIV positive patients that were released and re-incarcerated in IDOC receiving medical care provided by the telemedicine physician, pharmacist, and case manager at the University of Illinois Hospital (Chicago) between January 1st, 2016 and August 31st, 2018.

Patients will be included in this analysis if they carry the diagnosis of HIV, are greater than 18 years of age, were receiving antiretroviral treatment while incarcerated, are released from prison and re-incarcerated within the State of Illinois during the specified time frame, have CD4 counts, CD4%, and viral load data available at both time of release and at re-incarceration, and during the incarcerated periods received telemedicine HIV care.

Developing correlations for success in virologic suppression upon re-entering the correctional setting will provide valuable data in treating these patients as well as developing treatment strategies for patients being released from incarceration.

### Learning Objectives:

Identify first line recommendations for initial HIV treatment.

State risk factors for increased viral load upon re-incarceration in patients living with HIV.

### Self Assessment Questions:

Per guideline recommendation, which of the following would be a first line treatment of HIV?

- A efavirenz + tenofovir disoproxil + emtricitabine
- B: tenofovir disoproxil + emtricitabine
- C: bictegravir + tenofovir disoproxil + emtricitabine
- D: rilpivirine + tenofovir disoproxil + emtricitabine

Which of the following is/are risk factor(s) for increased viral load upon re-incarceration in patients living with HIV?

- A Absence of out of prison followup at an HIV clinic
- B Presence of substance abuse history in patients living with HIV
- C Absence of refilling of antiretroviral medication(s) while out of prison
- D Both A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## FILGRASTIM USE FOR NEUTROPENIA IN SOLID ORGAN TRANSPLANTATION

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**Purpose:** The primary objective of this medication use evaluation was to evaluate current prescribing and administration patterns associated with filgrastim in solid organ transplant (SOT) patients with suspected or confirmed neutropenia at The Ohio State University Wexner Medical Center (OSUWMC).

**Methods:** Retrospective data collection was performed on a total of sixty three patients using OSUWMC's Integrated Health Information System. Eligible patients included all kidney, kidney/pancreas, and liver transplant recipients who received at least one dose of filgrastim from July 1st, 2016 to June 29th, 2018. Two patients diagnosed with graft-versus-host disease were deemed ineligible and excluded from the study. Data was collected and analyzed within Microsoft Excel.

**Results:** Cumulatively there were 152 doses of filgrastim administered over the two fiscal years. It was determined that 19 doses were dosed inappropriately based on dose of 5mg/kg rounded to the nearest 300mg or 480mg. It was also determined that 12 doses were inappropriate based on WBC  $\geq 1.5$  K/ $\mu$ L, 20 doses based on ANC  $\geq 1.0$  K/ $\mu$ L, and 2 doses based on ANC  $\geq 0.5$  K/mL (with alemtuzumab induction) on the first day of filgrastim administration. Considering these parameters, the appropriateness of use was analyzed. Ultimately, it was determined that 50 doses or 32.9% should not have been administered.

**Conclusion:** The use of filgrastim is an effective option for the treatment of neutropenia in SOT. However, its use is prone to being inappropriate and often results in over utilization. Filgrastim administration cost OSUWMC \$75,105.80 over the fiscal years reviewed. With approximately 33% of filgrastim use being inappropriate, the health-system lost roughly \$25,000 as a result. Moreover, it is critical that our healthcare providers are appropriately prescribing filgrastim to ensure patient safety and optimal care. Creation of separate policy for use of filgrastim in SOT patients at OSUWMC will reduce inappropriate administration and improve the overall quality of healthcare provided.

### Learning Objectives:

Review the results of a medication use evaluation on filgrastim use for neutropenia in solid organ transplantation at a large, academic medical center.

Recognize the importance of accurate monitoring and dosing to ensure appropriate prescribing and administration of filgrastim in transplant recipients.

### Self Assessment Questions:

Which of the following is NOT an FDA labeled indication for filgrastim use?

- A Myelosuppression following chemotherapy
- B: Bone marrow transplantation
- C: Neutropenia following solid organ transplantation
- D: Severe chronic neutropenia

Which of the following are important monitoring parameters when considering filgrastim administration for neutropenia in transplant recipients?

- A White Blood Count (WBC)
- B Absolute Neutrophil Count (ANC)
- C Neutropenic causative agents
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT AND TREATMENT OF GLUCOCORTICOID-INDUCED OSTEOPOROSIS IN A RHEUMATOLOGY CLINIC

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**Purpose:** Glucocorticoids (GC) are used as a long-term treatment option for an estimated 1% of the US population. Although valuable due to their anti-inflammatory properties, chronic high doses of GC have many deleterious long term effects, including bone mineral density (BMD) loss and increased fracture risk. BMD loss occurs at its highest rate within the first 3-6 months after the initiation of GC and persists at a slower decline if therapy is continued. The American College of Rheumatology has maintained guidelines to aid in the prevention and treatment of glucocorticoid-induced osteoporosis (GIOP). These recommendations include optimization of calcium and vitamin D intake and initiation of oral bisphosphonates based on age, fracture risk, and glucocorticoid dose. The purpose of this project is to evaluate whether patients at Froedtert & the Medical College of Wisconsin (MCW) Rheumatology Clinics who were prescribed chronic high-dose prednisone ( $> 7.5$ mg/day for  $\geq 3$  months) for a rheumatologic disease underwent a comprehensive assessment for GIOP.

**Methods:** Retrospective quality improvement study of patients aged 40 to 90 years, who were prescribed chronic high-dose prednisone by a Froedtert & MCW Rheumatology Clinics provider between January 1st, 2017 and December 31st, 2017. The primary outcome is the percentage of patients who had a comprehensive assessment for GIOP, defined as assessment of calcium, vitamin D, DXA, and FRAX. Secondary outcomes include number of patients with osteoporotic and non-osteoporotic fractures during the follow-up period; number of patients starting an osteoporosis medication during the follow-up period; new osteopenia or osteoporosis diagnosis during the follow-up period; assessment of calcium, vitamin D, FRAX, and DXA as individual measures; presence of calcium supplementation on the medication list; and appropriate vitamin D treatment.

**Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify risks of taking high-dose glucocorticoids and benefits to minimizing glucocorticoid dose and duration of therapy.

Define appropriate factors to be assessed prior to an initial high-dose glucocorticoid prescription.

### Self Assessment Questions:

After the initiation of a high-dose glucocorticoid, during which time period does the greatest bone mineral density loss occur?

- A 3-6 months
- B: 6-12 months
- C: 1-2 years
- D:  $>5$  years

Which factors should be assessed prior to the initiation of a high-dose glucocorticoid prescription?

- A Calcium and Vitamin D
- B Dxa
- C Frax
- D Answers A, B, and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ACUTE KIDNEY INJURY PREVENTION: IMPLEMENTATION OF AN ADULT TRIGGER TOOL

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Acute kidney injury (AKI) is common in hospitalized patients, leading to increased morbidity, mortality, and hospital length of stay. Risk factors for development of AKI have been identified, and care bundles for treatment of AKI have been established. However, identification of high-risk patients and prevention of AKI has not been standardized in adult patients. The purpose of this project is to implement an AKI guideline and electronic medical record (EMR) tool to identify adult patients at risk for AKI to reduce nephrotoxic medication exposure and incidence of hospital acquired AKI.

Development of an AKI guideline involved forming an internal workgroup with members from pharmacy, nephrology, cardiology, critical care, internal medicine, and surgery. The guideline defines high-risk patients and provides prevention and management recommendations. Additionally, an EMR scoring tool is being developed to flag patients exposed to nephrotoxins and at risk for AKI. Nephrotoxic medications were identified using Advera Health Analytics adverse event database and primary literature. Medications were considered nephrotoxins if they had a reporting odds ratio greater than one, at least one literature reference, at least 20 case reports where the medication was the primary AKI suspect, and AKI was not suspected to be disease-related.

To implement the EMR tool, pharmacists will use algorithms developed by the workgroup. For patients flagged as moderate- or high-risk, the pharmacist may recommend dosage adjustments or medication discontinuation, therapeutic drug monitoring, fluid administration, and/or consultation with nephrology. To evaluate the impact of the guideline and EMR tool, data to be collected includes: nephrotoxin exposure rate per 1000 patient-days, AKI rate per 1000 patient-days, AKI days per 100 exposure-days, length of stay, incidence of AKI requiring dialysis, and in-hospital mortality. Expected results include increased pharmacist interventions leading to reduction of nephrotoxic medication exposure and AKI incidence in hospitalized patients.

### Learning Objectives:

Describe the utility of trigger tools in detecting patients at risk for acute kidney injury (AKI)

Explain pharmacists' roles in reducing AKI incidence in hospitalized patients

### Self Assessment Questions:

Which of the following elements could be used to develop a risk model for an AKI trigger tool?

- A Post-market surveillance data
- B: Primary literature
- C: Mechanism of injury
- D: All of the above

Within our workflow, which of the following is an appropriate action for an at-risk patient?

- A RPH automatically discontinues nephrotoxic medications
- B RPH notifies the medical team and recommends alternative medication
- C RPH recommends fluid restriction
- D No action is necessary

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF THE HEPATITIS C CARE CONTINUUM FOR A TERTIARY CARE CENTER IN HUNTINGTON, WV

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Purpose: Hepatitis C viral (HCV) infections are becoming more prevalent throughout The United States. With the chronicity, co-infection possibilities, cost of treatment, and relation to the opioid epidemic, this disease state is a dangerous problem even with a cure readily available. However, the cost of treatment and the volume of new infections pose a serious threat to the healthcare continuum. In 2017, the Department of Health and Human Services (HHS) released an action plan outlining goals to "prevent new infections, improve the lives of people living with viral hepatitis, and to chart a course toward elimination of these public health threats". With these in mind, the goal of this research is to determine the impact that hepatitis C has on a tertiary medical center in Huntington, WV and to ascertain the alignment of the action plan, released by the HHS, with the current state of treatment and care. We will attempt to determine the "HCV Cure Cascade" for the population, which will be composed of the number of individuals that are diagnosed, their access to outpatient care, confirmatory testing, prescribed HCV treatment, and achieved sustained virologic response. We hope to use this data to determine areas for improvement and to expound on the strengths of this system. Methods: This is a retrospective chart review that will use ICD10 codes along with patient chart evaluation to determine the categories listed above for the years between 2014 and 2019.

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

### Learning Objectives:

Review the adverse outcomes of hepatitis C viral infections and their effect on healthcare.

Recognize the utility of epidemiological data for hepatitis C and the care continuum for patients with hepatitis C viral infections.

### Self Assessment Questions:

According to the Department of Health and Human Services, what percentage of patients are aware of their hepatitis C diagnosis when compared to the total estimated number of patients with a chronic hepatitis C?

- A 25%
- B: 38%
- C: 54%
- D: 73%

Which of the following defines the eradication of hepatitis C?

- A Fibrosis score of zero
- B Hepatitis C genotype 1a
- C Sustained virologic response
- D Completion of direct acting antiviral therapy

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## THIOTEPA RELATED TOXICITY IN OBESE VERSUS NON-OBESE ALLOGENEIC STEM CELL TRANSPLANT RECIPIENTS

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### Purpose

Thiotepa is an alkylating agent used for conditioning chemotherapy prior to allogeneic hematopoietic stem cell transplantation (HCT). Due to life-threatening toxicities associated with high-dose chemotherapy, accurate dosing is essential. However, the appropriate dosing weight is difficult to determine in obese patients and only a few studies have discerned clinical outcomes associated with various thiotepa dosing weights. This study examines whether thiotepa dosed using total body weight (TBW) is associated with greater toxicity in obese patients compared to non-obese patients.

### Methods

This single-center, IRB-exempted study utilized retrospective chart review of adult patients who received thiotepa/cyclophosphamide for allogeneic stem cell transplant between 2008 and 2018. Patients were assigned to the obese group versus non-obese group based on baseline BMI  $\geq 30$  kg/m<sup>2</sup>. The primary endpoint was incidence of grades 3 - 5 gastrointestinal toxicity within day -7 to day +28. Secondary endpoints included overall survival, treatment-related mortality, days to engraftment, length of stay, and incidence of acute graft versus host disease between day 28 and day 100. The primary endpoint was assessed using the Chi-square test with an alpha of 0.05.

### Results

The study included 140 patients; 58 (41%) were obese. The primary endpoint of grades 3-5 GI toxicity occurred in 74% of obese patients versus 52% of non-obese patients (NNH = 4, P = 0.009). There was no statistically significant difference in any secondary endpoint except for days to neutrophil engraftment (12 days obese versus 14 days non-obese, P = 0.002).

### Conclusions

Obese patients who received thiotepa dosed on TBW have a statistically and clinically significant increased risk of grades 3-5 toxicity compared to non-obese patients. Because this study was not powered for survival, further research is needed on the efficacy of lower dosing weights so toxicity can be weighed against efficacy when determining the appropriate thiotepa dose in obese patients.

### Learning Objectives:

Recall current guidelines and evidence on dosing thiotepa in obese patients

Identify toxicities associated with high dose thiotepa

### Self Assessment Questions:

What dosing weight does the American Society for Blood and Marrow Transplantation recommend for calculating BSA for thiotepa?

- A: Ideal Body Weight
- B: Nutrition Body Weight
- C: 40% Adjusted Body Weight
- D: Actual Body Weight

What is the most common toxicity associated with thiotepa?

- A: Sinusoidal Obstructive Syndrome
- B: Peripheral Neuropathy
- C: Nephrotoxicity
- D: Mucositis

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION AND EVALUATION OF CONTINUOUS INFUSION AUTOMATIC DISPENSING FOLLOWING INFUSION PUMP INTEGRATION

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Communication between pharmacy and nursing regarding medication orders primarily occurs through medication administration record (MAR) messages within the electronic health record (EHR). Nurses send MAR message requests for intravenous continuous infusion medication replacement. If a MAR message is sent late or is omitted, the patient may experience a break in therapy. With the integration of infusion pumps and the EHR, functionality exists to automatically print a label for continuous infusion medications prior to when a replacement bag is needed. Communication between the pump and EHR allows documentation of the rate and volume of continuous infusions on the MAR. An automatic calculation using rate and volume occurs to determine when the next medication bag will be due, initiating a label to print prior to this due time. With automatic dispensing enabled, nurses do not need to request a replacement bag, and pharmacy technicians do not need to manually print labels for continuous infusion medications.

A single-center pre-post study was completed to evaluate the impact on MAR messages and waste after implementation of a continuous infusion automatic dispensing workflow using infusion pump integration. The study site was the Ross Heart Hospital at The Ohio State University Wexner Medical Center, a 150-bed facility focused on cardiac and vascular care. The study included three phases: pre-implementation, training and implementation, and post-implementation. The training and implementation phase allowed pharmacy and nursing staff to adapt to the new process. The primary endpoint is the number of MAR messages for re-dispenses of continuous infusion medications per total dispensed doses. The secondary endpoint is the number of wasted continuous infusion medications returned to the pharmacy satellite. Anticipated results include a decrease in the number of MAR messages, allowing more time for pharmacists, technicians, and nurses to dedicate to other activities.

### Learning Objectives:

Describe the impact of continuous infusion automatic dispensing on MAR messages.

Select the time of when a continuous infusion medication will automatically dispense based upon the rate and volume at which the medication is being administered.

### Self Assessment Questions:

Which of the following medications was included in the automatic dispensing functionality at OSUWMC?

- A: cyclophosphamide 1,360 mg in sodium chloride 0.9% 250 mL
- B: norepinephrine 4 mg in sodium chloride 0.9% 250 mL
- C: total parenteral nutrition
- D: ceftriaxone 1 g in dextrose 5% 50 mL

A nurse in the Ross Heart Hospital starts a drip of furosemide 100 mg in sodium chloride 0.9% 100 mL IV for her patient at 1200. The continuous infusion is running at 10 mg per hour. Based on the rate

- A: 1900
- B: 2000
- C: 2100
- D: 2200

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PHARMACIST LED PENICILLIN AND CEPHALOSPORIN SKIN TESTING (PST/CST) IN THE ACUTE CARE SETTING

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**Purpose:** Approximately 10 percent of the United States population (32 million people) report having a penicillin allergy. Penicillin allergies pose significant barriers to antimicrobial stewardship, such as increasing antimicrobial resistance, increased cost of care, increased length of stay and ultimately an increased rate of mortality. The objective of this study is to determine the effect that a pharmacist led PST/CST program has on cost savings and the rate of allergy de-labeling in patients who participate in the program. **Method:** The study has been submitted and approved by the Institutional Review Board. The investigators appeared before the Indiana Board of Pharmacy to clarify that pharmacists are indeed permitted to administer medications and interpret lab tests under Indiana law. Patients who may benefit from PST/CST will be consulted to the program by their health care provider in the hospital. Those patients who are consulted to the program will be interviewed to assess the origin of their potential allergy and if they qualify for skin testing. If the patient meets study inclusion criteria and provides consent, he/she will undergo a pharmacist administered and interpreted two-step allergy skin test. At the end of the test, the results will be uploaded into the electronic medical record and the patient will be appropriately labeled or de-labeled regarding the resulted penicillin allergy status. The patient's community health care providers will be sent documentation regarding the results of the test. Education will also be provided to the patient regarding the results. Reviewers will assess the cost savings and true allergy rates. **Results:** Comprehensive results will be presented at the 2019 Great Lakes Pharmacy Residency Conference. **Conclusion:** Full data analysis and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify patients who are good candidates for PST/CST.  
Discuss the benefits that PST/CST has over traditional methods such as challenge dosing and temporary induction of drug tolerance.

### Self Assessment Questions:

A good candidate for PST, is a patient with an allergic reaction mediated by?

- A: IgE antibodies
- B: IgM antibodies
- C: IgG antibodies
- D: T-cells

What is one benefit that penicillin skin testing has over traditional drug allergy methods?

- A: Skin testing is much faster to administer
- B: Skin testing always reveal a true or erroneous allergy
- C: Skin testing can be used for allergies mediated by t-cells
- D: Skin testing has minimal risk for inducing anaphylaxis

Q1 Answer: A      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DEVELOPMENT AND IMPLEMENTATION OF PRESCRIBING ALGORITHMS FOR ANTIBIOTICS ON DISCHARGE FROM THE EMERGENCY DEPARTMENT

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**Background:** In the emergency department (ED), rapid decision-making, frequent distractions, and limited availability of diagnostic data are often challenges to implementing effective antimicrobial stewardship. The purpose of this project is to improve guideline adherence and promote optimal use of outpatient antibiotic therapy for community-acquired infections.

**Methodology:** Prescribing algorithms were developed to integrate clinical practice guideline recommendations with emergency department-specific antibiogram data. Algorithms for treating community-acquired pneumonia (CAP), skin and soft tissue infections (SSTI), and urinary tract infections (UTI) were made available throughout the ED. Outcomes were evaluated through chart review of patients prescribed outpatient antibiotics for CAP, SSTI, or UTI by ED providers. The primary outcome was rate of adherence to clinical practice guidelines, defined as the selection of an appropriate antibiotic agent, dose, and duration of therapy for each patient discharged. Secondary outcomes included the rate of fluoroquinolone use, as well as all-cause 30-day returns to the ED or urgent care.

**Results:** When compared to patients discharged from the ED prior to algorithm implementation (N = 325), the post-implementation group (N = 172) received more antibiotic prescriptions that were completely guideline adherent (57.0% vs. 11.7%, p < 0.01). Post-implementation discharge orders demonstrated improvement in the selection of an appropriate agent (86.6% vs. 45.5%, p < 0.01), dose (89.0% vs. 77.2%, p < 0.01), and duration of therapy (63.4% vs. 39.1%, p < 0.01). Additionally, fluoroquinolone prescribing rates in this population were reduced (2.9% vs. 12.3%, p < 0.01). In the post-implementation patients who presented at least 30 days prior to analysis (N = 124), a reduction in all-cause 30-day returns to the ED or urgent care was observed (12.9% vs. 21.5%, p < 0.05).

**Conclusion:** Pharmacist-driven implementation of antibiotic prescribing algorithms improved guideline adherence in the outpatient treatment of CAP, SSTI, and UTI.

### Learning Objectives:

Identify Identify methods for promoting antimicrobial stewardship in the emergency department  
Describe Describe the potential benefits of pharmacist-driven antimicrobial stewardship efforts in the emergency department

### Self Assessment Questions:

Which of the following is a potentially effective method for promoting antimicrobial stewardship in the emergency department?

- A: Assign the pharmacist to prescribe all discharge antibiotics in the ED
- B: Implement pharmacist-developed prescribing algorithms for providers
- C: Provide routine education to emergency department providers regarding antibiotic use
- D: B and C

Which of the following is a potential benefit of pharmacist-driven antimicrobial stewardship efforts in the emergency department?

- A: Reduction in fluoroquinolone prescribing rates
- B: Reduction in ED physician distractions
- C: Reduction in patient "bounce-backs" to the emergency department
- D: A and C

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## A QUASI-EXPERIMENTAL STUDY OF SHORT-COURSE PROPHYLACTIC ANTIBIOTIC VERSUS NONE IN PATIENTS STATUS POST-MANDIBULAR FRACTURE SURGICAL REPAIR

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**Purpose:** While the Centers for Disease Control and Prevention (CDC) recommends pre-operative antibiotics for mandibular and facial fracture repairs, there is not sufficient high-quality evidence published to provide recommendations for post-operative prophylaxis. As a result, providers often continue antibiotics post-operatively to prevent surgical site infections (SSIs) based largely on experience and tradition rather than evidence. Antibiotic overprescribing is often associated with increased rates of resistance and risk of *Clostridium difficile* infection (CDI). Due to variability in post-operative antibiotic prophylaxis duration and apparent lack of need for such treatment, trauma surgeons have requested the implementation of a system-wide guideline at Froedtert Hospital. Through the implementation of this guideline, pharmacists and providers have the opportunity to decrease the duration of antibiotics prescribed for post-operative prophylaxis in mandibular fracture surgical repair. The primary objective of this study is to determine the association between antibiotic prophylaxis therapy duration and incidence of SSIs when comparing pre-guideline implementation and post-guideline implementation. **Methods:** This quasi-experimental study will be conducted at Froedtert Hospital. A guideline for perioperative antibiotic prophylaxis in mandibular fracture repairs will be implemented by March 2019, with provider education completed prior to implementation. Data will be analyzed during the pre-implementation phase, January 2014 through February 2019, and compared to the post-implementation phase, March 2019 through March 2020. Patients aged 18 years or older with a diagnosis of mandibular fracture will be included. Patients with mandibular fractures secondary to punctures with a foreign body and with current infections requiring antibiotics prior to admission will be excluded. Primary outcomes include the occurrence of SSIs within 30 days following surgical repair of mandibular fracture and duration of post-operative antibiotic prophylaxis. Secondary outcomes include frequency and reasons for deviation from the guideline and rate of CDI within 30 days after surgical repair. **Results/Conclusion:** Data collection and analysis are ongoing.

### Learning Objectives:

Identify an appropriate duration of therapy for perioperative antibiotic prophylaxis in patients with mandibular fractures.  
Discuss the importance of minimizing perioperative antibiotic prophylaxis for mandibular fracture repair.

### Self Assessment Questions:

What is the recommended duration of post-operative antibiotic prophylaxis?

- A 24 hours
- B: 48 hours
- C: 7 days
- D: None of the above

Which of the following are complications associated with antibiotic overprescribing?

- A Methicillin-Resistant *Staphylococcus aureus* infections
- B *Clostridium difficile* infections
- C Decreased antibiotic resistance rates
- D Viral infections

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSMENT OF DIABETES EDUCATORS' NEEDS IN DIABETES APPLICATION FUNCTIONALITY

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**Purpose:** The number of people with diabetes in the United States has more than tripled in the last 20 years. More than 100 million Americans are estimated to have either diabetes or pre-diabetes. There is tremendous opportunity for diabetes educators and people with diabetes to use mobile applications in treatment. Over 130 diabetes applications have been identified between the iTunes and Google Play store and 58% of smartphone users had downloaded a health-related app. Due to the competitive nature of the mobile application market, there is a lack of detailed information in the literature regarding the developmental process of these applications. The primary purpose of this study is to characterize diabetes educators' perceptions of the utility of diabetes application functions for the improved treatment of people with diabetes. A secondary objective is to characterize the perceptions of pharmacist diabetes educators.

**Methods:** A 60-item, cross-sectional, nationwide electronic survey was designed using the eHealth literacy framework. The survey will include Likert-scale and open-ended response questions related to history of use and perceived benefits of diabetes application functionality. Additionally, demographics will be obtained to characterize the study population. Survey recruitment will occur on the American Association of Diabetes Educators' (AADE) Diabetes Advanced Network Access (DANA) discussion board for 6 weeks, targeting licensed health professionals that are members of AADE. Survey respondents will be asked to rank the importance of application functionalities in seven different categories: Communication, Patient Data Entry, Provider Data Entry, Application Interfacing, Patient Education, Goal Setting and Reminders, and Data Presentation. Data will be collected using a web-based survey software. Descriptive statistics will be computed to characterize the perceptions of the study population and of pharmacist diabetes educators.

**Results/Conclusion:** Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss Discuss current trends in smartphone and mobile application use for healthcare purposes  
Identify Identify the potential benefits of mobile applications in the treatment of diabetes

### Self Assessment Questions:

The percent of mobile phone users that have downloaded a health-related mobile app falls into what range?

- A 30 - 45%
- B: 46 - 60%
- C: 61 - 75%
- D: 76 - 90%

Which of the following is a potential benefit of the use of mobile applications in the treatment of diabetes?

- A Tracking and storing of self-monitoring data
- B Exporting/importing of disease-related data
- C Disease-related alerts and reminders
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING THE DRUG INTERACTION BETWEEN TACROLIMUS AND ISAVUCONAZOLE IN ADULT ALLOGENEIC STEM CELL TRANSPLANT PATIENTS

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### Background:

Patients undergoing allogeneic stem cell transplant require concomitant use of immunosuppressive agents to prevent graft versus host disease (GVHD) and triazole antifungals to prevent invasive fungal infections (IFI). Tacrolimus, a calcineurin inhibitor, is a substrate of cytochrome P450 (CYP) 3A4. Triazole antifungals are CYP3A4 inhibitors and when used in combination with tacrolimus have been shown to have a profound effect on its metabolism. Isavuconazonium sulfate, a pro-drug of isavuconazole that was granted FDA approval for the treatment of invasive aspergillosis and mucormycosis in 2015 is used at our institution as broad spectrum antifungal prophylaxis in patients undergoing stem cell transplantation. Isavuconazole is both a substrate and moderate inhibitor of CYP3A4. The approved packaging from the manufacturer acknowledges the drug interaction between tacrolimus and isavuconazole but does not give an empiric dose reduction. There is a lack of literature published on this drug interaction, specifically in the allogeneic stem cell transplant setting. At our institution, we have decided to empirically dose reduce continuous infusion intravenous tacrolimus to account for this drug interaction.

### Objective:

To validate our current empiric tacrolimus dose reduction strategy in allogeneic stem cell transplant patients on concomitant isavuconazole.

### Methods:

This single center, retrospective study will be conducted utilizing the electronic medical record to identify allogeneic stem cell transplant patients treated concomitantly with tacrolimus and isavuconazole between October 1, 2017 and October 1, 2018. Inclusion criteria will consist of allogeneic stem cell transplant patients who received both tacrolimus and isavuconazole. The primary endpoint will evaluate the frequency of dose modifications between both dosing groups. The secondary endpoints will evaluate the frequency of nephrotoxicity between both dosing groups and the frequency of supratherapeutic levels defined as greater than 15ng/mL.

Results and conclusions to be presented at the Great Lakes Pharmacy Residency Conference

### Learning Objectives:

Identify adverse effects associated with supratherapeutic levels of tacrolimus

Describe the drug interaction between isavuconazole and tacrolimus

### Self Assessment Questions:

Which of the following is a common adverse effect associated with supratherapeutic levels of tacrolimus?

- A Hypotension
- B: Nephrotoxicity
- C: Constipation
- D: Pneumonitis

Which of the following is correct regarding the drug interaction between isavuconazole and tacrolimus?

- A Isavuconazole is a strong inhibitor of CYP3A4, likely will require a
- B Isavuconazole is a strong inhibitor of CYP3A4, likely will require a
- C Isavuconazole is a moderate inhibitor of CYP3A4, likely will require
- D Isavuconazole is a moderate inhibitor of CYP3A4, likely will require

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ANALYSIS OF ANTIPLATELET REGIMEN SELECTION IN RECURRENT ISCHEMIC STROKE

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Purpose: Antiplatelet therapy is an important tenet of pharmacologic management for patients who have had or are at risk for ischemic events. Current guidelines recommend aspirin as the initial antiplatelet agent for patients who experience an ischemic event, with clopidogrel as an alternative. A gap in knowledge exists regarding modification of antiplatelet regimens for patients with breakthrough strokes while taking low-dose aspirin. The purpose of this study was to evaluate differences in recurrent ischemic stroke or transient ischemic attack (TIA) rates between patients who were treated with aspirin 325 mg daily vs. clopidogrel 75 mg daily, with or without a loading dose, after experiencing an ischemic stroke or TIA while taking aspirin 81 mg daily.

Methods: This was a single-center, retrospective cohort study at the University of Louisville Hospital, a comprehensive stroke center. Patients were included if they were diagnosed with an ischemic stroke between January 1, 2013 and February 28, 2018 while taking aspirin 81 mg. Patients were stratified based on prescribing of aspirin 325 mg daily or clopidogrel 75 mg daily after the index event. The primary outcome was hospitalization due to stroke or TIA. Secondary outcomes were all-cause mortality and bleeding events. Computed tomography and magnetic resonance imaging reports were reviewed to assess for hemorrhage or hemorrhagic transformation. Outcomes were evaluated using a Chi-Square test for independence. Exclusion criteria included contraindications to aspirin or clopidogrel, cardioembolic stroke etiology, a clear indication for or treatment with anticoagulants, dual antiplatelet therapy before or after index event, or life expectancy less than six months. In addition to the outcomes of the interest, data points such as stroke etiology, stroke severity, and platelet response test results were evaluated for potential effect on the outcome.

Results/Conclusion: Will be presented at Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Discuss guideline recommendations and recent literature regarding antiplatelet regimens in recurrent ischemic stroke patients.

Identify differences in efficacy or safety between aspirin and clopidogrel.

### Self Assessment Questions:

The 2018 American Heart Association/American Stroke Association Guidelines for acute ischemic stroke recommend aspirin to be started within what time frame after stroke onset?

- A 4-8 hours
- B: 8-12 hours
- C: 12-24 hours
- D: 24-48 hours

What gene plays the biggest role in a patient's response to clopidogrel?

- A Cyp1a2
- B Cyp2b6
- C Cyp2c19
- D Cyp3a4

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DIRECT ORAL ANTICOAGULANTS COMPARED TO WARFARIN IN PATIENTS WITH EXTREMES IN BODY WEIGHT

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**Purpose:** Guidelines state that warfarin is preferred and direct oral anticoagulants (DOACs) should be avoided in patients of extremes in body weight due to lack of evidence. The purpose of this study was to analyze compliance at our institution with this recommendation and to gather data on the occurrence of adverse events in patients taking warfarin versus a DOAC. **Methods:** This was a retrospective chart review including patients weighing <50 kg or >120 kg discharged with a prescription for warfarin or a DOAC between October 2016 and October 2017. Patients were included if they were 18 years of age or older with an approved indication for anticoagulation and a documented weight of <50 kg or > 120 kg during hospitalization. Pregnant patients were excluded. The primary outcome of this study was compliance with the recommendation to prescribe warfarin rather than DOACs in this population. The secondary outcome was the occurrence of adverse events during a one-year period. **Results:** Between October 2016 and October 2017, 21 patients <50 kg and 71 patients >120 kg were prescribed an anticoagulant. Overall 51% of patients were prescribed a DOAC and 49% were prescribed warfarin. Patients were evaluated for occurrence of adverse events between October 2017 and October 2018. In the <50 kg population two (15.4%) patients had events in the warfarin group whereas one (12.5%) patient had an event in the DOAC group. In the >120 kg population there were no events in the warfarin group and five (12.8%) in the DOAC group. **Conclusions:** Due to the small patient population of those <50 kg and the similarity in number of occurrences, a conclusion was not able to be reached on this weight class. This chart review supports warfarin as a safer option compared to DOACs in patients >120 kg.

### Learning Objectives:

Describe the patient population in which DOACs should be avoided  
Explain the influence extremes in body weight have on the safety and efficacy of DOACs.

### Self Assessment Questions:

According to The International Society of Thrombosis and Hemostasis (ISTH), at what weight should DOACs be avoided?

- A:  $\geq 80$  kg
- B:  $\geq 100$  kg
- C:  $\geq 120$  kg
- D:  $\geq 140$  kg

Which of the following statements is true?

- A: Overweight patients are at decreased risk of recurrent venous thrombosis
- B: Overweight patients tend to have increased risk of bleeding
- C: Underweight patients tend to have increased risk of bleeding
- D: Underweight patients are at increased risk of recurrent venous thrombosis

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMIZING MEANINGFUL MEDICATION-BASED ALERTS: IMPACT ON CLINICIANS' SATISFACTION WITH COMPUTERIZED PROVIDER ORDER ENTRY

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**Purpose:** The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 encouraged the implementation of an Electronic Health Records (EHR) system by granting incentive payments to eligible professionals and hospitals. EHRs must meet the "Meaningful Use" objectives and support processes including drug-drug interaction (DDI) checks and dose-warning alerts. Since the widespread EHR system adoption, a high frequency of low-value alerts generated from clinical decision support (CDS) has caused workflow disruptions and "alert fatigue" amongst clinicians. Thus, the goal of this study is to optimize medication alerts, improve workflow, and reduce alert fatigue at a community teaching hospital.

### Methods:

Using an in-house Structured Query Language (SQL) server reporting service, a retrospective review was performed to assess the top 10 most frequent DDI alerts and top 10 most frequent dose-warning alerts generated between April and June, 2018. Following baseline data analysis, modifications were made to the respective clinical modules of a third-party vendor web-based medication CDS. Using the same SQL server reporting service, post-optimization data collection was continued for three months from the launch date of the new alert changes. To measure clinician's satisfaction with the alert changes, hyperlinks to online surveys were emailed to physicians' email addresses and paper surveys were distributed at doctors' lounges. Pre-optimization surveys were collected over a two-week duration. The same allotted time will be provided to measure post-optimization satisfaction. The primary outcome of this study measures overall clinicians' satisfaction before and after modification of the most frequent alerts. The secondary outcomes measure alert dwell time and the time physicians spend on order entry.

### Conclusion:

Post-implementation data from October to January will be collected in the month of January. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the phenomenon of alert fatigue in the clinician decision support within a computerized provider order entry (CPOE).  
Discuss clinicians' override rates related to drug safety alerts.

### Self Assessment Questions:

Which of the following can contribute to alert fatigue?

- A: Meaningful and high-value alerts
- B: Overdependence on CDS
- C: Excessive and nonspecific warnings
- D: Generation of new types of errors

How often are drug safety alerts being overridden by clinicians?

- A: 30%
- B: 50%
- C: 70%
- D: 90% or more

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL IMPACT OF AN ANTIMICROBIAL TIME OUT INITIATIVE AT AN ACADEMIC MEDICAL CENTER

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The Infectious Diseases Society of America's (IDSA) 2016 guideline for implementing antibiotic stewardship suggests that prescribed antibiotics be routinely reviewed. In response, The Ohio State University Wexner Medical Center implemented an antibiotic time out (ATO) program in 2017 encouraging the use of a templated note within the electronic health record to document actions taken as a result of ATO. Several studies have demonstrated that ATO programs improve antibiotic de-escalation, but there is limited information about their impact on improving patient outcomes. The objective of the current study is to further evaluate the clinical impact of an ATO initiative at an academic medical center.

This retrospective study included patients who received antibiotics and had an intermediate/high-quality ATO documented between 7/1/2017 and 6/30/2018. Note quality was scored based on the presence of documented indication, selection, dose, and duration. Identified ATO patients were matched by infection type to antibiotic-treated patients lacking an ATO note. Protected populations were excluded as were patients in the ICU at time of ATO, those with ATO within 48 hours of discharge, cystic fibrosis, or febrile neutropenia. The primary objective was to evaluate antimicrobial optimization in patients with documented intermediate/high-quality ATO compared to those without ATO. Antibiotic optimization was defined as the selection of ideal antibiotics based on IDSA and internal guidelines, culture and susceptibility results, or expert opinion when undefined. Secondary outcomes included vancomycin-associated acute kidney injury, escalation to ICU care post-ATO, hospice and antibiotic cost, total and infection-related length of stay, antimicrobial days per 1,000 patient days, nosocomial *C. difficile* rates, all-cause and infection-related 30 day readmission from discharge, as well as all-cause and infection-related 30-day mortality from day of ATO documentation.

The results of this study will provide clinicians further insight into the impact of ATO on clinical outcomes. Data collection and analysis is ongoing.

### Learning Objectives:

Define Define Antibiotic Time Out (ATO) and the development of this intervention

Discuss Discuss ATO implementation strategies and the associated outcomes

### Self Assessment Questions:

Which of the following are considered strategies to accomplish ATO?

- A Daily physician-driven infection checklists
- B: Focused prompts at various duration of therapy time points within
- C: Multidisciplinary antimicrobial stewardship rounds
- D: All of the above

Which of the following are benefits of ATO based on existing literature?

- A Reduction in healthcare cost
- B Decreased hospital length of stay
- C Reduction in *C. difficile* infections
- D All of the above

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL OUTCOMES AND RISK FACTORS FOR DELAYED OR SLOW GRAFT FUNCTION IN AN ADULT, URBAN RENAL TRANSPLANT POPULATION

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Delayed graft function (DGF) and slow graft function (SGF) are shown to be associated with higher risk of rejection and suboptimal allograft function over time. DGF is an independent risk factor for the development of acute rejection. However, the clinical implications of SGF after renal transplant (RTx) are less defined. The purpose of this study is to evaluate differences in short- and long-term transplant outcomes post-RTx by DGF, SGF, or immediate graft function (IGF) in an adult, urban population.

Adult RTx recipients from 1/2015 – 10/2017 were assessed. DGF was defined as need for dialysis before post-operative day (POD) 7. SGF was defined by <50% decrease in serum creatinine (SCr) from pre-RTx SCr or SCr  $\geq$  3.00 mg/dL by POD7. The primary outcome was incidence of patients with an estimated glomerular filtration rate (eGFR)  $\geq$  45 mL/min/1.73 m<sup>2</sup> at 3 months post-RTx. Univariate and multivariate logistic regression was performed to identify risk factors for acute tubular necrosis (ATN) post-RTx.

Of the 140 patients analyzed, majority of patients were African American (49.3%), male (67.1%), and received living RTxs (57.9%). Mean eGFR was highest in IGF patients at 3 months ( $p < 0.001$ ); however, eGFR was similar at 12 months ( $p = 0.14$ ). Incidence of biopsy-proven rejection (BPAR) was not significant ( $p = 0.22$ ). Incidence of empirically treated rejection was significantly different (DGF 33.3% vs SGF 20.8% vs IGF 8.9%,  $p = 0.02$ ). Death-censored graft loss at 12 months was similar ( $p = 0.68$ ). In multivariate analysis, African American race (OR = 4.21,  $p = 0.009$ ), deceased donor RTx (DDRT) (OR = 5.70,  $p = 0.001$ ), and donor age (OR = 4.44,  $p = 0.23$ ) significantly increased the risk for immediate post-RTx ATN. Obesity did not impact ATN risk.

Immediate post-RTx ATN (i.e. DGF and SGF) was associated with longer LOS, poorer acute allograft function. However, at 12 months, BPAR, allograft function, and graft survival were similar. Race, DDRT, and donor age increased risk for ATN development.

### Learning Objectives:

Describe Describe the mechanism and impact of delayed graft function and slow graft function on renal outcomes

Identify Identify risk factors that may increase incidence of acute tubular necrosis

### Self Assessment Questions:

What process occurs during organ procurement that results in delayed graft function?

- A Ischemia-reperfusion injury
- B: Hyper-perfusion
- C: Hypo-perfusion injury
- D: Cold-ischemic injury

Which of the following is a risk factor that increases the risk of recipients experiencing delayed graft function?

- A Cold-ischemia time
- B Donor serologies
- C Recipient creatinine
- D Donor gender

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF ANTIRETROVIRAL THERAPY SELECTION ON IMMUNOLOGIC RESPONSE IN INDIVIDUALS INFECTED WITH HUMAN IMMUNODEFICIENCY VIRUS

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**Purpose:** There is conflicting data regarding immunologic response between protease inhibitor-based regimens and integrase inhibitor-based regimens in patients with human immunodeficiency virus (HIV). Several clinical trials have not found statistically significant differences in immunologic recovery, although none evaluated as the primary outcome. In a previous cohort study at University of Louisville, a subgroup analysis showed protease inhibitor-based regimens have a higher likelihood of reaching immunologic recovery. The objective of this study was to compare immunologic response with protease inhibitor-based regimens to integrase inhibitor-based regimens in individuals with HIV.

**Methods:** This was a retrospective, observational cohort study of treatment-naïve and treatment-experienced individuals infected with HIV who started antiretroviral therapy (ART) with a protease inhibitor- or integrase inhibitor-based regimen between January 1, 2010 and December 31, 2017. Adult patients with available viral load and CD4 counts before and one year after ART initiation were included in the study. Patients started on a regimen that is not protease inhibitor- or integrase inhibitor-based were excluded. The primary endpoint was immunologic recovery, defined as CD4 increase of at least 150 cells per millimeter cubed at one year. Key secondary endpoints include virologic success, defined as HIV-1 RNA less than 48 copies per milliliter, and CD4/CD8 ratio conversion, defined as CD4/CD8 ratio greater than one, at one year. Nominal variables were reported in number and percentages and analyzed using a chi-square test. Multivariate analyses were performed as logistic regressions with adjustments for other covariates. 278 patients were needed to detect a 15 percent difference in immunologic recovery with 80 percent power. P-value less than 0.05 was considered statistically significant.

**Results and Conclusions:** Will be presented at Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Recognize antiretroviral therapy regimens recommended for the treatment of HIV

Describe immunologic recovery and viral suppression seen with protease inhibitor-based regimens compared to integrase inhibitor-based regimen

### Self Assessment Questions:

Which single tablet regimen is recommended as initial therapy in most patients with HIV?

- A Efavirenz/emtricitabine/tenofovir disoproxil fumarate (Atripla®)
- B Bictegravir/emtricitabine/tenofovir alafenamide (Biktarvy®)
- C Darunavir/cobicistat/emtricitabine/tenofovir alafenamide (Symtuza®)
- D Rilpivirine/emtricitabine/tenofovir alafenamide (Odefsey®)

Which lab value is expected to increase when patients start antiretroviral therapy for the treatment of HIV?

- A HIV-1 viral load
- B White blood cell count
- C CD4 count
- D Hemoglobin

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CONTINUOUS FUROSEMIDE INFUSION FOLLOWING KIDNEY TRANSPLANTATION – A FRIEND OR FOE?

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**Purpose:** During renal transplantation, intraoperative use of intravenous fluids, mannitol, and loop diuretics to establish high renal flow immediately following vascular anastomosis is a common practice. Post operatively, furosemide has been used to promote diuresis, renal blood flow, and reduce the incidence of fluid overload. However, there remains a lack of robust clinical evidence on whether furosemide actually improves graft survival or decreases Delayed Graft Function (DGF). Clinical practice for fluid resuscitation, maintenance, and diuresis varies from institution to institution. In 2014, at the University of Illinois Hospital there was a shift from bolus dosing to continuous infusion dosing of furosemide in the recipients of renal transplant. The primary objective of this study is to characterize the safety and efficacy of furosemide in the early post-operative phase following renal transplant. With the data collected, we hope to standardize the use of fluids and diuretics by implementing a protocol for post-renal transplantation patients.

**Methods:** This study will be designed as a retrospective, observational, single-center cohort study. A list of approximately 700 patients who received a renal transplant at the University of Illinois Hospital & Health Sciences System between 2012 and 2018 will be examined. Patients meeting the inclusion criteria will be followed from the day of transplantation through postoperative day 7 (POD7). The primary outcome will compare allograft function, as measured by estimated glomerular filtration rate (eGFR), between patients receiving bolus-dosing versus continuous infusion furosemide. Secondary outcomes will include urine output, incidence of post-operative, new-onset atrial fibrillation and/or arrhythmias requiring intervention, incidence of electrolyte dyscrasias during post-operative diuresis, cumulative electrolyte replacement requirements, and transplant hospital length of stay. Statistical analysis of study endpoints will be assessed using descriptive, comparative, and regression statistics using STATA.

**Results:** Preliminary results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the current literature and evidence for diuresis in the post-operative setting for patients undergoing renal transplantation and its effect on graft function.

Report the adverse effects in patients receiving diuretics in the post-operative setting.

### Self Assessment Questions:

What is the starting rate for a furosemide drip following renal transplant?

- A 10mg/hr
- B 20mg/hr
- C 40mg/hr
- D 60mg/hr

Which of the following are adverse effects associated with loop diuretic use?

- A Hypokalemia
- B Tinnitus
- C Hypercalcemia
- D Both A & B

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## RETROSPECTIVE ANALYSIS OF THE VALUE OF PHARMACY-LED MEDICATION RECONCILIATION FOR PATIENTS RECEIVING MEDICATION ASSISTED THERAPY

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**Purpose:** Medication assisted therapy (MAT) is used in combination with behavioral therapies to provide treatment to patients with opioid use disorder (OUD). Obtaining an accurate medication history upon hospital admission has been acknowledged as a key step in identifying and avoiding potential medication errors during transitions of care. The purpose of this study was to report the number of discrepancies on medication lists of patients on medication assisted therapy, and identify current inpatient pain management practices for these patients.

**Methods:** The institutional review board approved this retrospective, single-center chart review study which included patients on medication assisted therapy prior to their hospital admission between June 1st, 2017 and August 31st, 2018. Patients were included in the study if they were 18 years or older, admitted to either an inpatient or observational unit, had a medication history collected by pharmacy medication reconciliation personnel, and had buprenorphine with or without naloxone, naltrexone, or methadone for opioid use disorder on their medication list. Patients were excluded if they were unable to participate in a medication history.

**Results:** A total of 50 patients were included in the study. Twenty-seven of the fifty patients had a MAT error identified during their medication reconciliation. Sixty-two percent of errors were commission. Patients who had errors on their medication reconciliation were statistically less likely to have their medication restarted in the hospital, and statistically more likely to have their dose altered while inpatient. Around 10% of patients on MAT who required pain management while inpatient had opioids prescribed on discharge, for an average duration of 4 days. **Conclusions:** There is significant need for accurate medication reconciliation for patients on medication assisted therapy as it identifies errors which could lead to patient relapse. Additional studies can further delve into inpatient pain management for patients on MAT.

### Learning Objectives:

Identify medications that can be used as medication assisted therapy for opioid use disorder.

Recall how errors in medication reconciliation regarding medication assisted therapy can lead to relapse.

### Self Assessment Questions:

Which of the below medications is NOT FDA approved as medication assisted therapy for opioid use disorder?

- A Buprenorphine
- B: Naltrexone
- C: Naloxone
- D: Methadone

Which of the following can increase the risk of relapse in patients with opioid use disorder when admitted to the hospital?

- A Error on medication list regarding MAT
- B Incorrect continuation of MAT
- C Inappropriate pain management while inpatient
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INCIDENCE IN QTC PROLONGATION WITH CONCOMITANT USE OF METHADONE AND ATYPICAL ANTIPSYCHOTICS

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### Background:

Admission to the pediatric intensive care unit (PICU) frequently requires multiple sedative and pain medications to achieve patient comfort during time of critical illness. Use of these medications, and disrupted sleep-wake cycle leads to risk for ICU delirium. There are limited data regarding the choice of antipsychotic for treatment of pediatric delirium, but currently an atypical antipsychotic (AAP) including risperidone or quetiapine are preferred over haloperidol.

Methadone, an opioid with a long half-life, is often used to prevent iatrogenic abstinence syndrome when patients are weaning off continuous opioid infusions. Both AAP's and methadone are associated with risk of corrected QT (QTc) interval prolongation. Prolongation increases the risk of seizure, syncope, or fatal arrhythmia. There are limited data assessing the safety of the combined use of an AAP and methadone.

The purpose of this study is to evaluate the safety of the combination of methadone and an AAP in PICU patients.

### Methods:

This retrospective review compared QTc interval on methadone monotherapy pre- and post-addition of an AAP from January 2015 until July 2018.

Patients were included if they were admitted to the PICU with concomitant methadone and an AAP during their encounter with an electrocardiogram (EKG) completed during methadone monotherapy and after AAP initiation. Patients were excluded if they received an AAP prior to initiation of methadone, had no EKG data available, or had chronic methadone or AAP use. Patient data collected included age, gender, weight, ethnicity, electrolyte deficiencies, number of additional QTc-prolonging medications, and number of additional drug-drug interactions. Primary outcome that will be evaluated is incidence of QTc prolongation, secondary outcomes will evaluate comparative incidence of QTc prolongation between quetiapine vs risperidone, and net change in EKG.

### Results & Conclusions:

Data collection and analysis are ongoing. Results and conclusions will be published.

### Learning Objectives:

Review the literature for PICU patients on methadone and atypical antipsychotics

Identify the need for EKG monitoring in PICU patients receiving methadone and AAP

### Self Assessment Questions:

What previous published information is known regarding the combination of methadone and an AAP in pediatric patients?

- A Pediatric data regarding the use of methadone in PICU patients is limited
- B: Data regarding both agents in the pediatric population is largely limited
- C: Clinical experience has discussed that utilizing these two agents is preferred
- D: Published adult data has shown minimal effects of QTc prolongation

Which is a correct conclusion regarding the findings of this study?

- A This site encompassed several sites; therefore, generalizability of findings is limited
- B Electrolyte abnormalities like hypomagnesaemia, hypokalemia and hypocalcaemia were common
- C There was no clinically significant difference in the incidence of QTc prolongation between quetiapine and risperidone
- D Most patients collected for the study were included in data analysis

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## INCORPORATING DISEASE-SPECIFIC PATIENT ASSESSMENT TOOLS WITHIN A SPECIALTY PHARMACY PROGRAM TO IMPROVE PATIENT OUTCOMES

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The purpose of this study is to ensure patients achieve the most cost-effective treatment goals of high-cost therapies by developing and incorporating validated clinical assessment tools into specialty pharmacy clinical management workflows. Initial disease states of focus are the inflammatory bowel diseases (IBD) of ulcerative colitis (UC) and Crohn's disease (CD).

Validated patient reported outcome measurement tools were identified and evaluated for project inclusion. These included the Harvey Bradshaw Index, Crohn's Disease Activity Index, Mayo Score, and Powell-Tuck Index. Patient, provider, and payer stakeholders were interviewed to build consensus on meaningful outcomes metrics for all areas. The assessment tool was developed to account for validity and meaningfulness to all stakeholders, while evaluating feasibility for workload associated with the assessment. Weighted scores were assigned to each patient response, which signified disease state progression or lack of response to therapeutic agents. When patients were identified, workflows between local collaborating payers and UW specialty pharmacists were developed to help align the most cost-effective drug recommendation to the provider during their assessment.

After implementation, a pre/post measurement will be performed. The primary outcome is patient utilization of symptom-related healthcare services. This includes all-cause clinic contacts, burst therapies, unscheduled appointments, urgent care or emergency visits, or hospitalization. Secondary outcomes include medication adherence, persistence, and turn-around time, hours missed at work or school from IBD related symptoms, and quality of life.

Expected results are decreased utilization of preventable symptom-related healthcare services, improved adherence, persistence, and turn-around time, improved work/school productivity, and improved quality of life.

Innovative specialty pharmacy workflows and collaboration between payers will drive optimal clinical treatment goals in a cost-effective manner.

### Learning Objectives:

Recognize the importance of utilizing assessment tools in specialty pharmacy patient therapy management.

Identify innovative workflows between health system specialty pharmacies and prescription benefit managers.

### Self Assessment Questions:

What benefit does utilizing a patient reported outcome assessment tool provide?

- A It allows the specialty pharmacist to change therapy without a coll:
- B: It allows the pharmacist to identify disease progression or lack of t
- C: The assessment tool is a list of questions that payers require spec
- D: Manufacturers will only include pharmacies in their distribution cha

How do patients benefit when health system specialty pharmacies collaborate with pharmacy benefit managers?

- A Prior authorizations are no longer required
- B Providers are unable to select therapy options without payer recon
- C Patients who have progressing disease or lack of therapy respons
- D Patients will not be responsible for co-pays or co-insurance when l

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST-DRIVEN WARFARIN MANAGEMENT IN A COMMUNITY HOSPITAL

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Purpose: Warfarin is a high alert anticoagulant commonly ordered for hospitalized patients. Proper management of warfarin includes monitoring a patient's International Normalized Ratio (INR) and making necessary dose adjustments based on this laboratory result. If warfarin is managed inappropriately, patients could experience thrombotic or bleeding events. Dosing warfarin can be a complex task due to narrow therapeutic window, interpatient variability, as well as drug-drug and drug-food interactions. At the study institution, either a provider or a pharmacist may dose warfarin for admitted patients. This study will evaluate provider- versus pharmacist-driven warfarin management in a community hospital.

Methods: A retrospective chart review of patients who are at least 18 years of age, received 4 or more doses of warfarin, and had at least 2 INRs drawn during admission will be included in this study. Patients will be excluded if warfarin was managed by both the provider and the pharmacist during their admission, as well as prisoners and patients who were pregnant, admitted with a bleed or admitted to the transitional care or rehabilitation units. Patients' charts will be reviewed until 100 patients meet inclusion criteria for each group. The primary outcome of this study is the difference in time within INR therapeutic range between provider and pharmacist warfarin management. Secondary outcomes will include evaluating the time to therapeutic INR, frequency of INR monitoring, occurrence of INR > 5, and the incidence of adverse events. Continuous data will be analyzed using the t-test while nominal data will be analyzed using the  $\chi^2$  test.

Results/Conclusions: Research project is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review the pharmacokinetic and pharmacodynamic principles of warfarin therapy

Discuss the factors that complicate warfarin management

### Self Assessment Questions:

Which of the following clotting factors does warfarin affect?

- A 2, 7, 9, and 10
- B: 3, 4, 7, and 8
- C: 1, 3, 9, and 12
- D: 5, 6, 11, and 12

Which of the following factors complicate warfarin management?

- A Lack of a laboratory monitoring test
- B Drug-food interactions
- C Wide therapeutic window
- D Renal dose adjustments

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING THE IMPACT OF PHARMACIST CONDUCTED PRE-VISIT CALLS FOR HIGH-RISK PATIENTS IDENTIFIED USING THE CAN SCORE: PART 2

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### Purpose:

The Care Assessment Need (CAN) score is a tool designed to assist primary care providers in identifying patients who would benefit most from clinical services available at the Veterans Administration (VA). This score was developed to support the VA's health care focus on personalized, proactive, and patient-driven care. Literature supports the positive impact of pre-visit interactions in both no-show rates and compliance measures. Based on current utilization and possibility of impact, a pharmacist-run intervention was developed and implemented in a primary care setting for patients identified as being high-risk. This study was conducted to pilot an efficient way to target high risk patients and assess need for specialized care.

### Methods:

This quality improvement study is a prospective chart review of patients seen by Purple Clinic Physicians in the primary care setting at the Richard L. Roudebush VA Medical Center between September 2018 and February 2019. Patients were contacted at least one day but up to 2 weeks prior to their appointment via phone by a clinical or resident pharmacist. To be included patients must be 18 years or older, have a CAN score of  $\geq 95$ ,  $\geq 10$  medications, and at least one ambulatory care sensitive condition. Exclusion criteria include living in a facility or having home-based care, current hospitalization, emergency room (ER) visit, or passing away before their scheduled appointment. The primary outcome is quantifying the type and number of pharmacy interventions including referral to pharmacy or other clinic services and medication reconciliation with discrepancies. Secondary outcomes include number of hospitalizations or ER visits 30 and 90 days after contact, number of deaths, satisfaction rate of providers with added service, cost savings, and no-show rate comparison.

### Results and Conclusions:

Results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify Identify four positive outcomes of pharmacists conducting a pre-appointment phone call visit

Outline Outline barriers to implementing this as a sustainable service and report possible solutions

### Self Assessment Questions:

Which of the following was a positive outcome of this research project?

- A Cost savings of discontinued medications
- B: Pharmacy denials
- C: Proper lab work ordered
- D: Provider recommendations

Which is a significant perceived barrier to permanent implementation of this service at the Richard L. Roudebush VA Medical Center?

- A Lack of provider buy-in to service
- B Implementation of open access scheduling
- C Ability to reach veterans via phone
- D Limited number of high-risk patients meeting criteria

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EARLY EVEROLIMUS CONVERSION FOR RENAL PROTECTION IN LIVER TRANSPLANTATION: THE SOONER THE BETTER?

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Purpose: Calcineurin inhibitors (CNI) are the mainstay of immunosuppressive therapy in transplantation; however, a major side effect limiting CNI use is nephrotoxicity. Mammalian target of rapamycin inhibitors (mTORi) are less likely to cause renal dysfunction and have demonstrated benefit in preserving renal function post-liver transplant (LT); however, few studies address the appropriate timing of mTORi conversion. The purpose of this study is to evaluate the potential renal protective benefit with initiation of an mTORi as early as 3 months in LT patients.

Methods: This is an observational retrospective cohort study comparing renal function at 3 months post conversion to everolimus (EVR) along with a CNI based immunosuppressive regimen. Early initiation (EI) (conversion between 30 and 90 days post LT) was compared to delayed initiation (DI) (conversion greater than 90 days post LT) between June 2013 and May 2018. The primary outcome assessed the difference in estimated glomerular filtration rate (eGFR) utilizing the Modification of Diet in Renal Disease (MDRD) equation after 3 months of EVR therapy. Secondary outcomes assessed included incidence of biopsy proven acute rejection (BPAR), mortality, graft survival (GS), discontinuation of EVR and malignancy recurrence.

Preliminary Results: The median (IQR) change in eGFR after 3 months post EVR initiation was 0 (-11 to 9) mL/min per 1.73 m<sup>2</sup> in the EI group and 0 (-15.5 to 17) mL/min per 1.73 m<sup>2</sup> in the DI group, (p=0.628). Other data is currently being collected, and full results will be presented at the Great Lakes Pharmacy Resident Conference. Conclusion: Switching patients to an EVR based immunosuppressive regimen early did not demonstrate a renal protective benefit at 3 months post conversion.

### Learning Objectives:

Describe the disadvantages of utilizing calcineurin inhibitors

List the potential benefits of mTOR inhibitors in liver transplant recipients

### Self Assessment Questions:

What are some limitations to the use of calcineurin inhibitors for maintenance immunosuppression?

- A Nephrotoxicity
- B: Hyperglycemia
- C: Mouth Ulcers
- D: A & b

As an alternative agent used for maintenance immunosuppression, what are the potential benefits for using everolimus in liver transplant recipients?

- A Anti-proliferative effects
- B Renal protective effects
- C Decreased recurrence of HCC
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF CONVENTIONAL VERSUS LIPOSOMAL IRINOTECAN IN COMBINATION WITH FLUOROURACIL FOR ADVANCED PANCREATIC CANCER

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**Purpose:** Pancreatic cancer is estimated to be the 4th-leading cause of cancer-related death, despite being only the 11th-most common cancer in terms of new diagnoses. Pancreatic cancer prognosis is very poor, with a 5-year relative survival rate of just eight percent. The majority of pancreatic cancers are diagnosed at an advanced stage, when surgical options are limited and treatment relies on systemic chemotherapy. In the NAPOLI-1 trial, liposomal irinotecan in combination with fluorouracil (nal-iri/5FU) was shown to improve overall survival when compared to fluorouracil alone for metastatic pancreatic cancer. Other retrospective studies have shown the combination of fluorouracil and conventional irinotecan (FOLFIRI) to be a viable option. Though effective, nal-iri cost more than 50 times its conventional counterpart. However, no randomized trials have compared nal-iri/5FU to FOLFIRI, so it is unknown whether one regimen is superior to the other. The purpose of this study is to determine if nal-iri/5FU and FOLFIRI are similarly effective for the treatment of advanced pancreatic cancer.

**Methods:** This was a single-center, retrospective, cohort study. Patients were required to have received at least one dose of nal-iri/5FU or FOLFIRI in the setting of advanced pancreatic cancer following a gemcitabine-based therapy, including neoadjuvant/adjuvant gemcitabine if within the preceding 6 months. The primary outcome is progression-free survival (PFS). Secondary outcomes include time to treatment failure (TTF), overall survival (OS), frequency of adverse effects, and frequency of dose reductions or treatment delays. Propensity scores were used to account for differences in patient characteristics between groups. Kaplan-Meier curves were generated for PFS, OS, and TTF outcomes. No formal statistical hypothesis tests were performed, since the limited sample size does not provide adequate power for formal tests of non-inferiority of FOLFIRI.

**Results/Conclusions:** Results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review incidence, prognosis, and treatment modalities of pancreatic cancer.  
Recognize an appropriate treatment for advanced pancreatic cancer.

### Self Assessment Questions:

What is the primary approach to the treatment of advanced pancreatic cancer?

- A Homeopathy
- B: Systemic chemotherapy
- C: Surgery
- D: Radiation

According to NCCN guidelines, which of the following chemotherapy regimens has a category 1 recommendation for the treatment of metastatic pancreatic cancer following a gemcitabine-based therapy?

- A Folfiri
- B Capecitabine
- C 5-FU, leucovorin, and liposomal irinotecan
- D Gemcitabine and cisplatin

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## BURNOUT AMONG PHARMACY TECHNICIANS: THE IMPACT OF STRATEGIC INITIATIVES

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**Purpose:** Burnout syndrome is characterized by simultaneous symptoms of exhaustion and disengagement in the workplace. There are several risk factors related to burnout described in literature that directly apply to healthcare. Burnout among healthcare workers correlates with serious risks including increased medical errors, job dissatisfaction, and turnover. High levels of self-perceived burnout among physicians, nurses, and pharmacists indicate that burnout should be identified and prevented in all healthcare careers. Inpatient pharmacy technicians have a stressful role that requires attention to detail, multi-tasking, and efficiency to ensure an accurate and timely medication use process in the hospital setting. Presently, literature identifying and addressing pharmacy technician burnout is lacking. The aim of this study is to assess inpatient pharmacy technician burnout and evaluate the impact of strategic initiatives to improve burnout.

**Methods:** Inpatient pharmacy technicians at five community hospitals within the same health system were surveyed using the Oldenburg Burnout Inventory to assess the degree of burnout. Following the initial survey, pre-defined strategic initiatives were implemented to target specific known predictors of burnout: community, control, and fairness. Surveys were again distributed after implementation of initiatives and scores were matched to data from the original results. The primary endpoint was the paired change in individual burnout scores. The secondary endpoints included paired change in burnout scores in the exhaustion and disengagement sub-dimensions, change in average burnout scores, and relationship between years worked, shift worked, and full time work with change in burnout scores.

Results and conclusions are to be presented at Great Lakes Pharmacy Resident Conference 2019.

### Learning Objectives:

Identify the impact of burnout in healthcare.

Recognize how the predictors of burnout are addressed with a given strategic initiative.

### Self Assessment Questions:

Burnout has been correlated with which of the following?

- A Increased medical errors
- B: Depression symptoms
- C: Higher healthcare costs
- D: All of the above

Incorporating team-building exercises into department meetings attempts to target which predictor of burnout?

- A Community
- B Workload
- C Fairness
- D Reward

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## LEVERAGING ELECTRONIC HEALTH RECORD (EHR) TO IMPROVE ACCURACY OF IV MEDICATION COMPOUNDING AND LABELING PRACTICES

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**Purpose:** Intravenous (IV) medication use is a complicated and error-prone process with high risk of causing patient harm. As part of a continuous quality improvement project, UW Health will be utilizing EHR functionalities to target reducing errors during the compounding and labeling of IV infusions. One identified gap is that current sterile compounding procedures are not clearly defined. Specifically, it's not always obvious when drug volume and/or manufacturer overfill should be withdrawn from base solution prior to admixture. Additionally, beyond-use dates (BUDs) are not printed on all medication labels. These issues force pharmacists and technicians to interpret the labels to determine preparation techniques and assign BUDs. This leads to potentially inaccurate total volume, concentration and/or BUD listed on labels.

This project is expected to increase patient safety by standardizing sterile preparation practices so that medications are prepared consistently and labeled accurately.

**Methods:** Phase 1 of this project involves reviewing beyond-use-dates, storage conditions (container type, temperature and light sensitivity), and preparation instructions for each patient-specific sterile preparation medication record. They were assessed against United States Pharmacopeia (USP) <797>, state law requirements, prescribing information, and published references for accuracy and updated where appropriate. References used to support decisions are stored within the EHR to allow for easy maintenance, QA purposes and for regulatory reviews. In phase 2 of the project, preparation techniques are being reviewed to determine if it is appropriate to remove manufacturer overfill and drug volume from the base solution prior to admixture. Medication labels will be updated to display calculated total volume and concentration. Labeling and preparation errors will be tracked via a review of IV preparation photos pre- and post-implementation. The number of medication records compliant with USP <797> regulations and other best practices will also be documented.

Results will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Identify the labeling requirements specified in United States Pharmacopeia (USP) <797>

Explain different IV preparation methods that can be used to manage manufacturer overfill

### Self Assessment Questions:

Per USP <797>, which of the following should be included in a compounded sterile preparation label, at a minimum?

- A Medication brand name
- B: Compounding risk level
- C: Inactive ingredients
- D: Beyond use date and time

Which of the following IV preparation methods should be used when drug concentration needs to be accurately known?

- A Add drug to a commercial container
- B Withdraw drug volume prior to admixture
- C Withdraw drug volume and overfill prior to admixture
- D Start with an empty container, then add drug and base solution

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARISON OF THE EFFICACY, SAFETY, AND COST OF ISOPROTERENOL AND DOBUTAMINE IN THE ELECTROPHYSIOLOGY LAB

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**Purpose:** Isoproterenol has been the drug of choice for electrophysiology studies due to its rapid onset, short half-life, potent effects on AV nodal conduction, and relative safety. Dobutamine similarly has a rapid onset, short half-life, and has been shown to facilitate AV nodal conduction. The cost of isoproterenol has been rising since 2015 as a result of multiple acquisitions, increasing the wholesale acquisition costs from \$26.20 to \$1,790.11 per milligram. As a result, many healthcare organizations have been limiting their use of isoproterenol. The purpose of this study is to determine the cost-effectiveness of replacing isoproterenol with dobutamine for electrophysiology procedures.

**Methods:** The Institutional Review Board at Community Hospital approved this study. This evaluation will be a prospective before-after observational trial that will compare outcomes (successful induction of arrhythmia) of patients who received dobutamine compared to those who received isoproterenol at Community Hospital. A champion physician will utilize dobutamine for their electrophysiology study for the induction of arrhythmias during the study period. The electrophysiology study results of dobutamine and isoproterenol groups will then be compared to one another.

**Preliminary Results:** Data collection and analysis are currently in progress.

**Conclusion:** Results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Identify the differences and similarities between isoproterenol and dobutamine.

Explain the reasoning behind the induction of arrhythmias and when this would be appropriate in patients.

### Self Assessment Questions:

Which of the following is correct regarding dobutamine's mechanism of action?

- A Primary stimulation of beta-1 receptors of the heart increases inotropy
- B: Primary stimulation of beta-2 receptors of the heart increases inotropy
- C: Primary stimulation of beta-1 receptors of the heart decreases inotropy
- D: Primary stimulation of beta-2 receptors of the heart decreases inotropy

Which of the following is correct regarding isoproterenol's mechanism of action?

- A Potent beta-1 and beta-2 receptor adrenergic antagonist
- B Potent alpha-1 receptor adrenergic agonist
- C Potent beta-1 and beta-2 receptor adrenergic agonist
- D Potent alpha-1 and alpha-2 receptor adrenergic agonist

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## CONTROLLED SUBSTANCE (CS) POLICY REVISION TO BEST PRACTICE AND DEVELOPMENT OF A CS DIVERSION PREVENTION PROGRAM INCLUDING TRACKING AND AUDITING AT A COMMUNITY HOSPITAL

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**Background:** Controlled substance (CS) diversion has been shown to cause patient harm through inadequate pain relief, inaccurate medication administration or charting, and increased risk of harm from impaired healthcare workers. Additionally, there is a significant legal and regulatory burden incurred by an organization when diversion occurs. For these reasons, implementation of a well-defined CS diversion prevention program is paramount for any organization in order to maximize patient care and mitigate risk.

**Purpose:** To create a CS diversion prevention program consisting of policy review and revision, creation of a dashboard for diversion tracking and surveillance, and development of a diversion auditing process.

**Methods:** This quality improvement project was approved by the Mercy Health Institutional review board. A gap analysis of Mercy Health Muskegon's CS policies was performed utilizing expert consensus guidelines published by the American Society of Health-System Pharmacists (ASHP). Gap analysis results were used to identify areas that warranted new policy implementation or change in practice. Deficient areas were addressed through policy revision and approved by the Mercy Health Pharmacy and Therapeutics Committee. After policies were approved, an electronic CS dashboard was created which utilized metrics from electronic diversion tracking software to monitor hospital-wide CS use. In addition to the dashboard, a standardized diversion auditing process was developed.

The primary endpoints included the compliance with best practice recommendations from gap analysis and identification of areas at risk for diversion. Secondary endpoints included a time study for dashboard management and individual user audit and a brief cost analysis.

**Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the core principles set forth by ASHP for the prevention of CS diversion.

Describe the steps necessary to implement a CS diversion dashboard and evaluate metrics that may be useful for an organization to measure.

### Self Assessment Questions:

Which of the following is NOT an area addressed in the ASHP Controlled Substance Guidelines?

- A: Organization Oversight and Accountability
- B: Automation and Technology
- C: Storage and Security
- D: Law Enforcement Contact

Which of the following activities is/are correlated with CS diversion and warrants an investigation of suspicious activity?

- A: Unreconciled discrepancies from automated dispensing device (ADD)
- B: Large lag time between when a CS was withdrawn and when it was administered
- C: High percentage of CS medications handled or administered when not indicated
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARATIVE EFFECTIVENESS OF DENTAL EXTRACTIONS ALONE VERSUS DENTAL EXTRACTIONS WITH ANTIBIOTIC THERAPY

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### Statement of the purpose

Dentists prescribe about 10% of outpatient antibiotics (24.5 million prescriptions) annually, primarily for the management of bacterial oral infections and distant site prophylaxis in certain patient populations. The Veterans Affairs Office of Dentistry provides 1.6 million dental encounters to 500,000 qualified Veterans at over 200 clinics annually. There is a paucity of data regarding dental prescription of antibiotics in patients undergoing tooth extractions. The purpose of this study is to determine the comparative effectiveness of treatment of oral infections with dental extractions alone and dental extractions combined with oral antibiotic therapy.

### Statement of methods used

A cross-sectional analysis of national VA dental clinic encounters from January 2017 to December 2017 will be conducted. Veterans with a tooth extraction(s) performed as defined by ADA procedure codes and in a VA dental clinic by a dental provider were included in the cohort. Veterans prescribed antibiotics for longer than 14 days after the extraction procedure or followed-up via telephone clinics were excluded. The sample of included Veterans will be randomly selected by the number of extractions completed, geographic location, and duration of antibiotic prescription. The duration of antibiotic prescription will be further stratified by long-course ( $\geq 5$  days), short-course ( $\leq 3$  days), and no antibiotics. For Veterans who received an antibiotic post-extraction, the antibiotic must be dispensed on or before the date of the procedure, defined as within 14 days of the extraction date. A sample size of 374 Veterans was estimated to achieve statistical power based on a 10% baseline risk of infection post-extraction. Variables to be evaluated as they relate to post-operative oral infection include antibiotic class, duration, and timing, along with extraction method. Antibiotic-associated adverse events will also be evaluated.

Summary of (preliminary) results to support conclusion/Conclusions reached

Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the current antibiotic prescribing patterns of dentists in patients undergoing tooth extractions.

Identify differences in patient outcomes when tooth extractions are combined with systemic oral antibiotics.

### Self Assessment Questions:

What is the most common antibiotic class prescribed by dentists for tooth extractions?

- A: Cephalosporins
- B: Penicillins
- C: Fluoroquinolones
- D: Macrolides

Which of the following is NOT a type of oral infection?

- A: Gingivitis
- B: Periapical abscess
- C: Periodontitis
- D: Dental eruption

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF ANTIMICROBIAL THERAPY DURATION FOR TREATMENT OF URINARY TRACT INFECTION AND PNEUMONIA IN A COMMUNITY HOSPITAL

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**Purpose:** Improper antimicrobial use is associated with adverse effects, antimicrobial resistance, and increased healthcare costs. Patients are often treated with inappropriate extended durations of antibiotics, thus illustrating the need for evidence-based therapy in the proper management of infections. The purpose of this study is to evaluate institution adherence to the Infectious Disease Society of America (IDSA) recommendations for duration of antimicrobial therapy in urinary tract infections (UTI) and pneumonia.

**Methods:** This retrospective cohort study has been approved by the Institutional Review Board. The 10th revision of International Classification of Diseases (ICD) codes will be used to query a database of patients treated for urinary tract infections, community-acquired pneumonia, and hospital-acquired pneumonia. Data will be extracted through electronic medical records of discharged patients and maintained confidential. All patients diagnosed between January 1, 2016 and June 30, 2018 with the stated infections will be included in the study. Patients who are discharged without antibiotic documentation, have multiple infections being treated with the same regimen, or expire while using antibiotics will be excluded. The primary outcome will be percent compliance to the Infectious Disease Society of America (IDSA) treatment guideline recommendations. Secondary outcomes will include primary diagnosis, antibiotic used, total days of antimicrobial therapy, isolated organism, susceptibility of cultures, and patient demographics.

**Results:** To be presented at the 2019 Great Lakes Pharmacy Resident Conference.

**Conclusions:** To be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define the appropriate duration of treatment for community-acquired pneumonia per IDSA guidelines

Identify proper pharmacologic treatment of uncomplicated cystitis per IDSA guidelines

### Self Assessment Questions:

What is the appropriate treatment duration for community-acquired pneumonia per IDSA guidelines?

- A: 3 days in patients with no signs of clinical instability and remain afebrile
- B: 4 days in patients with no signs of clinical instability and remain afebrile
- C: 5 days in patients with no signs of clinical instability and remain afebrile
- D: 6 days in patients with no signs of clinical instability and remain afebrile

Which medication is an appropriate choice for uncomplicated cystitis per IDSA guidelines?

- A: Azithromycin
- B: Nitrofurantoin
- C: Meropenem
- D: Cefepime

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## LEARNING ACROSS BORDERS: DEVELOPING A SECOND CONTINUING PROFESSIONAL DEVELOPMENT PROGRAM THROUGH THE BAYLOR COLLEGE OF MEDICINE INTERNATIONAL PEDIATRIC AIDS INITIATIVE PHARMACY NETWORK (BIPAI-PN)

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**Purpose:** As the leading provider of pediatric HIV care in the world, BIPAI operates eight Centers of Excellence (COEs) and five satellite COEs in Romania, Botswana, Lesotho, Swaziland, Malawi, Uganda, and Tanzania. The BIPAI-PN is a learning community enabling pharmacy staff to build capacity, improve operational and clinical practice, and resolve problems through collaboration. The first continuing professional development (CPD) program run by the BIPAI-PN focused on various areas of pharmacy management and clinical practice. This year's curriculum aims to grow the clinical knowledge and skills of COE health care team members as they serve their patients.

**Methods:** The second year of the CPD curriculum has expanded to include other health care team members in addition to pharmacists and technicians. The year-long program consists of 12 web-based learning modules with live teleconference sessions for facilitated discussion. The curriculum includes clinical practice topics which were not covered in the pilot, such as diabetes, depression, nutrition, and oncology. Additionally, the program expands upon topics covered in the previous year, including HIV, pediatrics, and infectious disease. Quantitative outcomes include activity tracking (i.e. number of participants for modules and live learning components), participant pre- and post-test scores, and curriculum completion rates. Qualitative outcomes are measured by surveying participants about the quality of modules and their professional development throughout the curriculum.

**Results:** For the diabetes module and depression module, there were 45 participants and 26 participants, respectively, who completed the pre- and post-module tests. 40 out of the 49 and 20 out of the 26 learners participated in the live discussion sessions. Thus far, there has been an average 19.9% increase in post-test scores after completing modules. Additional results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

**Conclusions:** Conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the impact of a continuing professional development program on health care workers in Sub-Saharan Africa.

Describe potential challenges of implementing an online education program for health care workers in resource-poor settings.

### Self Assessment Questions:

The BIPAI CPD program utilizes which of the following learning modalities?

- A: Group discussion
- B: Case studies
- C: Self-paced learning
- D: All of the above

Which of the following is a potential barrier to implementing an online education program with learners in resource-poor settings?

- A: Insufficient staff coverage
- B: Internet access
- C: Lack of time
- D: All of the above

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## INSULIN INFUSION PROTOCOL FOR ACUTE HYPERGLYCEMIC CRISIS: ASSESSING COMPLIANCE, SAFETY, AND EFFICACY IN AN ACADEMIC MEDICAL CENTER

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**Purpose:** The University of Louisville Hospital (ULH) utilizes a standardized electronic order set for management of acute hyperglycemic crisis. The protocol for initial insulin infusion rates and dose titration is derived from a validated equation. Efficacy, safety, and adherence to this protocol were evaluated for the treatment of acute hyperglycemic events.

**Methods:** A retrospective review was conducted on patients treated with the insulin infusion protocol for hyperosmolar hyperglycemic state (HHS) or diabetic ketoacidosis (DKA). Primary endpoints included the rate of hypoglycemia and the time to resolution of DKA and HHS. Secondary endpoints included intensive care unit (ICU) length of stay, hospital length of stay, in-hospital mortality, and rates of hypoglycemia. Primary outcomes were included in a subgroup analysis based on patient location.

**Results:** Mean time to resolution of DKA and HHS was 9.55 hours. Incidence of hypoglycemia (< 70 mg/dL) and severe hypoglycemia (< 40 mg/dL) was 9.5% and 1.9%, respectively. Mean ICU length of stay and total length of stay was 1.87 and 4.66 days. A subgroup analysis demonstrated a significant difference in protocol adherence with hourly blood glucose (BG) tests between non-ICU and ICU patients, with 55.6% adherence vs. 78.7%, respectively. A comparison of hypoglycemic events between the groups showed 8.2% in the ICU and 11.9% in non-ICU patients.

**Conclusion:** The protocol utilized at ULH for insulin infusion management represents a safe and effective method of treating acute hyperglycemic crisis. Time to resolution of DKA, incidence of hypoglycemia, and average total length of stay were not significantly different from a previously validated electronic protocol. A subgroup analysis of adherence outcomes dependent on location revealed higher adherence to hourly BG testing and lower incidence of hypoglycemia in the ICU. This research demonstrates the ability to safely and effectively protocolize insulin infusions with manual titrations for both ICU and non-ICU settings.

### Learning Objectives:

Identify deficits in the management of insulin infusions in the American Diabetic Association guidelines of acute hyperglycemic crisis.  
Describe common complications associated with insulin infusions and treatment of DKA

### Self Assessment Questions:

The American Diabetic Association (ADA) guidelines on management of DKA provides recommendations for insulin infusions based on which of the following factors?

- A Initial blood glucose
- B: Weight
- C: Hourly titrations
- D: Reintroduction after hypoglycemia

Which of the following is an example of complications associated with treatment of DKA?

- A Hypoglycemia
- B Hypokalemia
- C Cerebral edema
- D All the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## NALOXONE UTILIZATION FOR THE REVERSAL OF OPIOID INDUCED ADVERSE EFFECTS

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Opioid toxicity in the hospital environment has not received the same level of scrutiny as outpatient use of prescription opioids, despite reports of errors in prescribing and administration. The Institute for HealthCare Improvement illustrates that administration of naloxone to a patient could be used as a trigger to identify instances in a hospital where a harmful dose or frequency of an opioid was given. The objective of this study is to implement a sustainable process to monitor the use of naloxone to reverse opioid toxicity in order to facilitate improvements in the safe use of opioids.

A single center, retrospective analysis has been conducted on patients who received naloxone at Froedtert Hospital between August 1, 2017 and July 31, 2018 to assess opportunities for improvement. Patients were excluded if they did not receive opioids prior to naloxone, if opioid toxicity was related to illicit drug use or when opioids were administered outside the hospital. The following data was collected: comorbid conditions affecting susceptibility to opioid toxicity, and the opioid and naloxone regimen administered. The primary outcome is to compare the rate of opioid toxicity requiring reversal with naloxone pre and post intervention implementation.

A total of 147 patients were included in the retrospective analysis. Of all patients receiving naloxone that fit the inclusion criteria, 67% were opioid naïve, 52% were over the age of 65, 39% were obese, 29% had a diagnosis of asthma or chronic obstructive pulmonary disease, and 23% had a diagnosis of obstructive sleep apnea. Patient controlled analgesic accounted for over 13% of opioid forms, with hydromorphone the most used opioid. The quality metric tool to report opioid toxicity rate is currently in development.

Patients with comorbid conditions affecting ability to breathe is associated with developing opioid-induced toxicity, requiring administration of naloxone.

### Learning Objectives:

Identify risk factors for opioid toxicity requiring reversal with naloxone.  
Recognize the value of how using a metric can be utilized in institutions to assess and reduce adverse drug events.

### Self Assessment Questions:

According to the Institute for Healthcare Improvement, what is the single greatest risk of harm to patients in hospitals?

- A Adverse drug events
- B: Transitions of care
- C: Health literacy level of patients
- D: Unclear documentation

What are risk factors in developing opioid toxicity?

- A Age >65, history of obstructive sleep apnea, BMI <30 kg/m<sup>2</sup>
- B Male sex, hypertension, BMI <30 kg/m<sup>2</sup>
- C History of obstructive sleep apnea, age >65, BMI >30 kg/m<sup>2</sup>
- D Age <65, hypertension, BMI >30 kg/m<sup>2</sup>

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
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**Learning Objectives:**

**Self Assessment Questions:**

- A
- B:
- C:
- D:

- A
- B
- C
- D

Q1 Answer:            Q2 Answer:

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

**EVALUATING THE IMPACT OF GUIDELINE-DIRECTED VITAMIN K USE FOR WARFARIN REVERSAL ON TIME TO OBTAINING A THERAPEUTIC INR AFTER WARFARIN RE-INITIATION**

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**Purpose:** Phytonadione (vitamin K) remains an important first-line agent for warfarin reversal. However, studies have demonstrated a high prevalence of non-guideline-directed use of vitamin K in such situations. While inadequate vitamin K dosing may be ineffective for lowering the international normalized ratio (INR), excess use can potentially lead to warfarin resistance upon subsequent warfarin re-initiation. The aim of this study is to evaluate how guideline-directed versus non-guideline-directed use of vitamin K for warfarin reversal may impact various clinical outcomes in patients resuming warfarin therapy.

**Methods:** A retrospective chart review was conducted for patients who received vitamin K for warfarin reversal between January 1st, 2017 through October 31st, 2018. The primary outcome is the mean difference in time to achieving a therapeutic INR upon warfarin re-initiation between patients who received vitamin K for warfarin reversal per guidelines versus patients who received vitamin K in discordance with guidelines. The criteria for guideline-directed use of vitamin K was considered to be met if it was consistent with the American College of Chest Physicians 8th or 9th edition recommendations. Abidance to common literature recommendations for vitamin K use in the emergency/trauma or critical care settings was also considered to be guideline-directed use. Secondary endpoints include the proportion of patients receiving guideline-directed versus non-guideline-directed vitamin k therapy, time to goal reversal INR (i.e. desired INR after vitamin K administration), rate of adverse events, and the mean time to achieving a therapeutic INR in patients who received warfarin per pharmacist dosing versus physician dosing.

**Results and Conclusions:** Data collection is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

**Learning Objectives:**

Recognize clinical factors that distinguish a major bleed from a non-major bleed

Review common guideline recommendations for appropriate indications, doses, and routes of administration for vitamin K

**Self Assessment Questions:**

Which of the following would not be suggestive of a major bleed?

- A An acute bleed with a decrease in hemoglobin from 15 g/dL to 13 g/dL
- B: An acute bleed with a decrease in systolic blood pressure from 140 to 90 mmHg
- C: A patient with dark/tarry stools whose hemoglobin decreases by 1 g/dL
- D: An intracranial hemorrhage

JZ is a 49 yo male on chronic warfarin therapy secondary to recurrent DVTs. He presents to the ED with an intracranial hemorrhage, and so far has received two units of fresh frozen plasma (FFP). Which

- A Administer vitamin K 2.5 mg IV x 1 dose
- B Administer vitamin K 5 mg IV x 1 dose
- C Administer vitamin K 10 mg PO x 1 dose
- D Patient does not need vitamin K because he has already received FFP

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based    Contact Hours: 0.5  
(if ACPE number listed above)

## CLINICAL IMPLICATIONS OF BELATACEPT CONVERSION IN A HIGH-RISK URBAN RENAL TRANSPLANT POPULATION

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**Purpose:** Conversion to belatacept as a component of maintenance immunosuppression has gained traction to prevent calcineurin inhibitor (CNI) induced toxicities in renal transplant (RTx) recipients. However, limited knowledge exists regarding the clinical impact of this strategy on high-risk, obese, and racially diverse patients. The purpose of the study was to compare renal, cardiovascular, and metabolic health outcomes pre- and post-belatacept conversion in a high-risk urban RTx population. **Methods:** This was a retrospective cohort study of high-risk kidney transplant recipients who underwent RTx from 01/01/2012 to 12/31/2017 and were converted to belatacept. Patients who had multi-organ transplants were excluded. The primary outcome was to compare estimated glomerular filtration rate (eGFR) at time of belatacept conversion to 6 months post-conversion. Secondary outcomes included incidence of biopsy-proven acute rejection (BPAR) post-conversion and comparisons of cardiovascular, metabolic, and infectious outcomes. Data was assessed for normality using the Wilks-Shapiro test. Data were compared with McNemar's test, paired t-test, and Wilcoxon signed rank's test. Statistical analysis was completed using STATA. **Results:** Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

List common indications for belatacept conversion  
Identify potential benefits of belatacept conversion

### Self Assessment Questions:

The following are common indications for belatacept conversion except:

- A: Calcineurin inhibitor induced nephrotoxicity
- B: Calcineurin inhibitor induced neurotoxicity
- C: Thrombotic microangiopathy
- D: Acute cellular rejection

Which among the following adverse event is associated with belatacept?

- A: Hyperglycemia
- B: Hypertension
- C: Proteinuria
- D: Acute cellular rejection

Q1 Answer: D      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## CONTINUOUS INFUSION VASOPRESSIN FOR TREATMENT OF POST-TRAUMATIC CENTRAL DIABETES INSIPIDUS

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### Purpose:

Central diabetes insipidus has been described in patients who experienced neurological insult, including traumatic brain injury and intracranial hemorrhage. Post-traumatic central diabetes insipidus is believed to occur secondary to damage to the hypothalamus and pituitary structures, leading to decreased excretion of antidiuretic hormone.

Vasopressin and desmopressin represent available antidiuretic hormone analogues. Though desmopressin is utilized in long-term management of central diabetes insipidus, its use in the acute setting of post-traumatic central diabetes insipidus may be suboptimal. The consequences of underdosing include inadequate decrease in urine output, while overdosing can result in excessive fluid retention. Time to goal decrease in urine output may be extended secondary to the infrequent dosing strategy of desmopressin as compared to continuous infusion vasopressin.

There is minimal data demonstrating the efficacy and safety of continuous infusion vasopressin in post-traumatic central diabetes insipidus. However, the ability to quickly titrate dosing of a vasopressin infusion to urine output, serum sodium, urine osmolality, and serum osmolality makes vasopressin a desirable alternative in the acute setting.

Our primary objective is the efficacy of titratable continuous infusion vasopressin in achieving goal urine output. Secondary objectives include analysis of vasopressin dosing requirements, efficacy in achieving goal serum sodium, time to goal urine output, time to goal serum sodium, as well as safety of vasopressin infusion.

### Methods:

The study design is a retrospective chart review in adult patients admitted between January 1, 2013 and December 31, 2018, greater than eighteen years of age, diagnosed with traumatic brain injury or intracerebral hemorrhage, that received continuous infusion vasopressin for the treatment of diabetes insipidus. Patients will be excluded if were pregnant or a prisoner at the time of admission.

### Results and Conclusion:

Data collection is currently under way and final results will be presented

### Learning Objectives:

Describe the pathophysiology of post-traumatic central diabetes insipidus  
Explain the potential role of continuous infusion vasopressin post-traumatic central diabetes insipidus

### Self Assessment Questions:

Post-traumatic central diabetes insipidus is thought to be a result of traumatic injury to which of the following?

- A: Cerebellum
- B: Corpus callosum
- C: Hypothalamus and pituitary structures
- D: Midbrain

The activity of vasopressin at which of the following receptors may have utility in the treatment of post-traumatic central diabetes insipidus?

- A: V1a
- B: V1b
- C: V2
- D: V3

Q1 Answer: C      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF TURNAROUND TIME OF SPECIFIED EMERGENCY MEDICINES

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### Statement of purpose:

In emergent situations, timely administration of certain medications is critical. Studies have shown that prompt administration of these emergency medications can improve patient outcomes.<sup>2,3</sup> The pharmacy has a critical role in ensuring medications arrive at the bedside promptly. Cleveland Clinic uses a real-time, web-based medication tracking system that utilizes barcode scanning to track time points in the medication preparation and distribution process. This system can be used to track medication order turnaround times and provides an opportunity to evaluate the need for quality improvement. The purpose of this study is to determine the current turnaround time for emergency medications. Secondary objectives are to characterize standard duration of each component of the preparation and delivery process, to evaluate there are target areas in need of process improvement to optimize medication turnaround times, and to determine if there are significant differences in emergency medication turnaround time between shifts.

### Statement of methods:

This non-interventional, retrospective medical record review evaluates the turnaround time for six medications that were identified to be time-sensitive. These include alteplase for acute ischemic stroke and/or pulmonary embolism, hypertonic saline, midazolam infusions for seizures/status epilepticus, and the prothrombin complex concentrates KCentra and FEIBA. Data for the specified medications were evaluated for orders prescribed and administered from October 2017 to October 2018. Orders were excluded if the final delivery time point scan was missing. Orders were identified via the electronic health record (EHR) and PharmacyKeeper systems. Data collected includes the various scanned time points in the preparation and delivery processes, method of delivery, location to which the medication was delivered, and priority order (STAT versus routine).

Results: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review common reasons for delays in the medication preparation and distribution processes

Describe the benefits of using a real-time medication tracking system

### Self Assessment Questions:

1. All of the following are reasons that inpatient turnaround time of emergency medications may be prolonged EXCEPT:

- A a. The medication is a controlled substance and requires hand delivery
- B: b. The medication requires patient-specific compounding in the IV room
- C: c. The medication order needs to be clarified by the pharmacist before
- D: d. The medication is stocked and available in the automated dispensing cabinet

2. A real-time medication tracking system can be utilized for which of the following:

- A a. The tracking system can help compound medications more quickly
- B b. The tracking system can be used to help identify where current inventory is
- C c. The tracking system can be used to identify areas of improvement
- D d. B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## A COMPARISON OF INSULIN DOSES FOR THE TREATMENT OF HYPERKALEMIA IN PATIENTS WITH RENAL INSUFFICIENCY IN THE INTENSIVE CARE UNIT

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Purpose: Hyperkalemia is a common complication in patients with acute or chronic renal insufficiency due to decreased renal excretion of potassium and may cause life-threatening cardiac dysrhythmias. One treatment approach includes intravenous (IV) insulin to shift potassium intracellularly. However, treatment with insulin may result in adverse events, specifically hypoglycemia. We aimed to compare rates of hypoglycemia (blood glucose <70 mg/dL) between two insulin dosing regimens, 5 units and 10 units, for the treatment of hyperkalemia in the intensive care unit (ICU).

Methods: This was a single-center retrospective cohort study between March 1, 2008 and September 1, 2018. Adult patients with CKD stages III-V, ESRD on HD, and/or AKI who received IV insulin in the ICU for the treatment of hyperkalemia were assessed for inclusion. Patients were excluded if they received dialysis prior to rechecking a serum potassium level, there was an absence of serum potassium level documented before or after insulin therapy, the baseline blood glucose was less than 70 mg/dL, received any hyperkalemia treatment prior to ICU admission, failed to receive concurrent dextrose with insulin, received additional insulin products for diabetes management within 24 hours prior to (long and intermediate acting insulin products) or 6 hours prior to (short acting insulin products) or any insulin product within 6 hours after receiving regular insulin, and received continuous infusions of dextrose containing fluids within 6 hours of administration of insulin. A subject list was generated from the electronic health record (EHR) of patients that received IV insulin in the ICU. Within our institution, IV push insulin regular may be ordered only for hyperkalemia treatment. Patients were stratified into two groups, those receiving 5 units of IV insulin and those receiving 10 units.

Results & Conclusions: In progress

### Learning Objectives:

Indicate the frequency of hyperkalemia in chronic kidney disease patients  
Describe the mechanism of action of medications used in the treatment of hyperkalemia

### Self Assessment Questions:

What is the frequency of hyperkalemia in the chronic kidney disease population?

- A 10-20%
- B: 20-30%
- C: 40-50%
- D: 60-70%

By what mechanism does intravenous insulin cause a lowering of potassium?

- A Extracellular potassium shift
- B Intracellular potassium shift
- C Gastrointestinal excretion of potassium
- D Urinary excretion of potassium

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST DRIVEN INTERVENTIONS ON INAPPROPRIATE ANTIBIOTIC PRESCRIBING FOR UPPER RESPIRATORY TRACT INFECTIONS (URTIS) IN A FAMILY MEDICINE RESIDENCY CLINIC

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**Purpose:** Inappropriate antibiotic prescribing has led to an increased number of multi-drug resistant (MDR) infections, resulting in about 23,000 deaths annually in the U.S. Approximately 30 percent of antibiotics prescribed in the outpatient setting are unnecessary, which increases the number of MDR organisms, healthcare costs and unnecessary adverse events. A retrospective study performed at our clinic revealed over half of all prescriptions for URTIs were inappropriate. The primary objective is to determine if pharmacist driven interventions impact inappropriate antibiotic prescribing for URTIs. Secondary objectives include choice of antibiotic, duration of therapy, and prescribing by provider type. **Methods:** Pharmacist-driven interventions, including point of care guides, a live presentation, posters in patient exam rooms, and care kits will be implemented at a family medicine residency clinic in October 2018. Baseline antibiotic prescribing will be determined through a report from the electronic health record, identifying patients over the age of 18 with a diagnosis of one of the following: acute sinusitis, otitis media, streptococcal pharyngitis, pneumonia, acute bronchitis, or acute upper respiratory infection between October 1, 2017 to January 31, 2018. The time period from October 1, 2018 to November 30, 2018 and December 1, 2018 to January 31, 2019 will be used as 1 and 3 month comparisons, respectively, post-intervention. A data collection sheet will be used to review antibiotic prescribing for appropriateness. Antibiotic prescribing for nonsuppurative otitis media, pneumonia (unspecified), acute bronchitis, or acute upper respiratory infection (unspecified) will be considered "inappropriate." Appropriateness of antibiotic prescribing for the remaining diagnoses will be determined using the Infectious Diseases Society of America guidelines. Additionally, appropriateness of the regimen selected and duration will also be quantified using the "Recommended Therapeutic Range" versus "Prescribed Therapeutic Range" criteria. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the importance of antibiotic stewardship in the outpatient setting.

Recognize common prescribing errors that can lead to inappropriate antibiotic prescribing.

### Self Assessment Questions:

Which of the following statement regarding antibiotic prescribing in the outpatient setting is correct?

- A: The number of multi-drug resistant organisms has decreased significantly
- B: There have been very few reports of inappropriate antibiotic prescribing
- C: The majority of antibiotics prescribed are through the emergency department
- D: Antibiotics are in the top 3 medication classes that can lead to an allergic reaction

Which of the following reasons is a common prescribing error that can cause inappropriate antibiotic prescribing?

- A: The dose prescribed was too small
- B: The duration was not long enough
- C: Selecting the incorrect antibiotic
- D: A & C

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A NEONATAL ABSTINENCE SYNDROME (NAS) PROTOCOL IN A COMMUNITY HOSPITAL NICU

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**Purpose:** Current recommendations include either morphine or methadone as the primary treatment of NAS; however, there are no strict guidelines for the use of adjuvant treatments. There is no single treatment regimen approved for all neonates, making pharmacologic management difficult. Recent studies suggest adherence to a structured protocol reduces treatment duration and length of stay therefore improving patient outcomes. The primary objective is to evaluate the use of a non-weight-based morphine protocol for NAS treatment, along with the use of clonidine and/or phenobarbital for adjuvant treatment in regard to duration of therapy and length of stay. **Methods:** This study is a retrospective chart review that will use the electronic medical record to generate a list of patients who have a gestational age greater than or equal to 37 weeks with documented intrauterine opioid exposure requiring treatment with the NICU NAS protocol. The following data will be collected: infant/mother demographics, toxicology results, dose and duration of adjuvant medications, peak doses of medications received, duration of morphine treatment and length of stay. Corresponding modified Finnegan scores will be recorded for each of the following: initial morphine dose, initial clonidine and/or phenobarbital dose and the last 48 hours of the initial weaning period. All patient data will be maintained confidentially and available only to the research team. The primary outcome will be assessed for statistical significance between those that adhered to protocol versus those who did not for both chronic and acute treatment regimens. Secondary outcomes regarding adjuvant treatment practices will be evaluated for the effectiveness of reducing morphine treatment duration and length of stay. Primary and secondary outcomes will be used to help optimize current NAS treatment in the NICU. **Results/Conclusion:** Data collection is currently in progress. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review current pharmacotherapy recommendations for the management of NAS

Discuss the effects of a non-weight based morphine regimen with or without adjuvant therapy on length of stay and duration of therapy

### Self Assessment Questions:

Which of the following adjunct therapies may be most beneficial when treating non-opiate NAS?

- A: Phenobarbital
- B: Clonidine
- C: Methadone
- D: Buprenorphine

According to the American Academy of Pediatrics, morphine is the most commonly preferred medication for NAS management and is associated with which of the following:

- A: Increased diarrhea
- B: Decreased length of stay
- C: Increased length of stay
- D: Increased risk of seizures

Q1 Answer: A      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF RABBIT ANTITHYMOCYTE GLOBULIN (rATG) DOSING AND INCIDENCE OF OPPORTUNISTIC VIRAL INFECTIONS IN KIDNEY TRANSPLANT RECIPIENTS USING TACROLIMUS (TAC)/MYCOPHENOLATE (MPA) AND STEROID FREE MA

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**Objective:** This study evaluates rATG induction dosing and overall incidence of opportunistic viral infections in kidney transplant recipients.

**Methods:** Single-center, retrospective study of adult kidney transplantation patients from October 10, 2016-March 30, 2018. Patients were excluded if <18 years old, received induction therapy other than rATG, and maintenance immunosuppression other than tacrolimus (TAC) and mycophenolate (MPA). For CMV prophylaxis, valganciclovir was used in high risk (D+/R-) patients for three months and pre-emptive monitoring was used for intermediate (D- or +/-R+) risk patients. The primary outcome compared incidence of overall opportunistic viral infections (EBV, CMV, BK) in patients receiving high (> or = 4.5 mg/kg) vs low (<4.5 mg/kg) cumulative rATG dose for induction therapy. Secondary endpoints include: incidence of CMV, biopsy proven acute rejection (BPAR), kidney function (GFR), TAC levels, and graft survival at 6 months.

**Results:** Study sample included 73 high and 47 low dose rATG patients. No differences in demographics were seen between groups. Opportunistic viral infections occurred more frequently in the high dose rATG group (19.1% vs 36.9% p=0.037). CMV DNAemia incidence was numerically increased in the high rATG group (30.1% vs 17.0% p=0.105). A trend towards increased early CMV infection in the high rATG dosing group was seen (log rank p value=0.077). The majority of CMV cases occurred in intermediate risk patients receiving no prophylactic therapy (log rank p value=0.003). No differences in graft survival, BPAR, TAC levels, and GFR were seen.

**Conclusion:** High rATG induction dosing increased the overall rate of opportunistic viral infections at 6 months. Early CMV infection rates may increase, but additional patient recruitment is needed to confirm this trend. These data suggest CMV prophylaxis is warranted in intermediate risk (D- or +/-R+) patient population receiving > or = 4.5 mg/kg rATG in combination with TAC/MPA and early steroid withdrawal.

### Learning Objectives:

Discuss Discuss the dosing strategies of rabbit antithymocyte globulin (rATG) for induction therapy

Describe Describe the incidence of opportunistic viral infections when using high dose vs low dose rATG

### Self Assessment Questions:

Which of the following infections is an opportunistic viral infection?

- A E. coli
- B: Cytomegalovirus
- C: Enterococcus
- D: Klebsiella

What was classified as high cumulative dose rabbit antithymocyte globulin during this study?

- A > or = 4.5 mg/kg
- B <4.5 mg/kg
- C > or = 8 mg/kg
- D < 8 mg/kg

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARING PREDICTORS OF HOSPITAL READMISSION FOR HIGH AND HIGHEST RISK PATIENTS

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**Purpose:** To mitigate readmissions, post-discharge ambulatory transitions of care (TOC) interventions including a nurse navigator call, pharmacist telephone comprehensive medication review, and primary care provider (PCP) visit were implemented for patients at high risk for readmission. Patients were identified using the validated LACE risk score. Previous evaluations of this program have shown that highest risk patients (LACE score  $\geq 13$ ) are more likely to be readmitted than high risk patients (LACE score 10-12). The purpose of the study is to identify predictors of 30-day hospital readmissions in the highest risk group compared to the high risk group.

**Methods:** This study incorporates a secondary analysis of an existing research database. Data was collected by a retrospective chart review of TOC intervention eligible patients during 9/5/17-2/28/18. Eligibility criteria included a LACE score of 10 and above, established internal PCP, discharged to home from family or internal medicine units.

The Andersen Behavioral Model of Health Services Use informed included study variables. Predisposing characteristics were sex, gender, race, and ethnicity and enabling resources were insurance type. Need characteristics included LACE risk group, primary discharge diagnosis, Charlson comorbidity index score, number of medications used, total number of health conditions, completion of post-discharge ambulatory care components, and use of high-risk medications. The primary outcome is 30-day internal hospital readmission. Secondary outcome includes number of ED visits within 30 days post-discharge. Descriptive statistics were used. Bivariate and multivariable statistics were used to determine the predisposing, enabling, and need predictors of 30-day hospital readmissions by LACE risk group. Study results may be used to implement additional targeted interventions to prevent hospital readmissions in those who may benefit most from the transition of care service. This study was approved by the Institutional Review Board.

**Results and Conclusion:** Results and conclusion will be presented at Great Lakes Pharmacy Resident's Conference.

### Learning Objectives:

Define the LACE risk tool

Describe the factors that can lead to increased use of health services

### Self Assessment Questions:

What does the C in the LACE risk tool stand for?

- A Charlson comorbidity index
- B: Complexity of admission
- C: Completion of post-discharge components
- D: Currently married

Which of the following is NOT a need factor for hospital readmission?

- A Primary discharge diagnosis
- B Use of high-risk medications
- C Race/ethnicity
- D Total number of health conditions

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECTS OF PHARMACIST MONITORING AND INTERVENTION ON THE TIMING OF SUBSEQUENT DOSES OF BROAD SPECTRUM ANTIBIOTICS FOR SEPSIS OF UNKNOWN ORIGIN

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**Purpose:** A study was done to determine the impact of a pharmacist-led process to improve timing of subsequent antibiotic doses that were initiated in a community hospital emergency department (ED). Hospital protocol for piperacillin/tazobactam is to begin extended-infusion doses three hours after a loading dose. However, patients spend an average of four hours in the ED before admission causing a delay in subsequent doses. **Methods:** A retrospective chart review was conducted on patients 18 years of age or older who received a one-time dose of piperacillin/tazobactam, cefepime, or aztreonam with an indication of sepsis of unknown origin in the ED. The patients were divided into a pre-implementation group and a post-implementation group. The first aim of this study was to evaluate if pharmacist intervention resulted in improvement of subsequent antibiotic doses administered at the appropriate interval. The second aim was to evaluate the reduction in variance from optimal timing of subsequent doses of each antibiotic due to pharmacist intervention. **Results:** A total of 620 patients were screened and 336 met inclusion criteria. The pre-implementation and post-implementation groups included 177 and 159 patients, respectively. A greater portion of patients received subsequent antibiotic doses in the allowable administration range after implementation ( $p=0.06$ ). Time between due time and administration time for second doses was shorter after implementation ( $p=0.041$ ). Piperacillin/tazobactam showed a significant increase in the number of doses in the allowable administration range after implementation; time between due time and administration time for second doses was shorter. **Conclusion:** This study demonstrated that a pharmacist intervention positively impacted the timing of subsequent doses of antibiotics for sepsis of unknown origin. Opportunities were identified to improve the current process for antibiotic orders and prescribing guidelines.

### Learning Objectives:

Describe the challenges in the timing of subsequent doses of broad-spectrum antibiotics in patients presenting to the emergency department  
Review the Surviving Sepsis Campaign recommendations for the timing of antimicrobial therapy.

### Self Assessment Questions:

What is/are contributing factors to delays in subsequent doses of broad-spectrum antibiotics?

- A ED providers order initial antibiotic therapy as one-time doses
- B: It is the admitting provider's responsibility to continue antibiotic the
- C: Total time spent in the ED prior to admission
- D: All of the above

According to the Surviving Sepsis Campaign, within how many hours should antibiotic therapy be initiated after recognition of sepsis in a patient?

- A 1 hour
- B 2 hours
- C 3 hours
- D 4 hours

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING SAFETY AND OUTCOMES OF GLP-1 AGONISTS WITH BASAL AND BOLUS INSULIN REGIMEN: DEPARTMENT OF VETERANS AFFAIRS QUALITY IMPROVEMENT ANALYSIS

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### Purpose:

There is limited data on use of GLP-1 agonists with basal and bolus insulin regimens. The objective of this analysis is to help guide providers at VA Illiana on how to approach complex patients on basal-bolus insulin with regards to consideration of adding GLP-1 agonists.

### Methods:

A retrospective chart review performed on Veterans' electronic health records initiated on a GLP-1 agonist with basal and bolus insulin regime between 09/01/2015 and 10/30/2018. Veterans were excluded if: discontinued GLP-1 agonist or initiated another anti-diabetic medication during six month use, did not have a follow-up A1C after six-twelve months of therapy, or were discharged from Pharmacy PACT clinics due to no-show appointments. The primary endpoints were change in A1C and episodes of hypoglycemia. Secondary endpoints were change in total daily dose of insulin, in weight, and side effects experienced.

### Preliminary Results:

At VA Illiana, 113 patients have been on a GLP-1 agonist during the time frame selected and 28 met inclusion criteria. An interim analysis was conducted. The average A1C prior to GLP-1 agonist initiation was 9.4% and 8.4 % after six-twelve months. There were 24 episodes of hypoglycemia reported prior and 25 episodes after GLP-1 agonist therapy. The average total daily dose of insulin was 187 units prior and 171 units six months after GLP-1 agonist therapy. The average weight was 124 kg prior and 121 kg six months after GLP-1 agonist initiation. The two adverse reactions reported were nausea ( $n=4$ ) and injection site reaction ( $n=1$ ).

### Conclusions:

Interim analysis shows GLP-1 agonist addition to basal-bolus insulin therapy was observed with a decrease in average: A1C, weight, and total daily dose of insulin. GLP-1 agonist therapy with basal-bolus insulin may be a treatment option in patients with poor glycemic control who can benefit from weight loss and reduction of insulin burden.

### Learning Objectives:

Outline the role of GLP-1 agonist addition to a basal-bolus insulin regimen in glycemic control and reduction of insulin burden  
Recognize the safety profile of GLP-1 agonist addition to a basal-bolus insulin regimen

### Self Assessment Questions:

By how much was the average A1C reduced following addition of GLP-1 agonist?

- A 0.5%
- B: 1%
- C: 1.5%
- D: 2%

What was the most commonly reported adverse effect to GLP-1 agonist and basal-bolus insulin therapy?

- A Injection site reactions
- B Nausea
- C Diarrhea
- D Headache

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## DIRECT ORAL ANTICOAGULANTS COMPARED TO WARFARIN AFTER WATCHMAN™ DEVICE IMPLANTATION

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**Background:** Nonvalvular atrial fibrillation (NVAF) is a supraventricular tachyarrhythmia characterized by uncoordinated atrial activity, which affects approximately nine percent of people over 65 years old. Patients with NVAF are at a fivefold increased risk of stroke, with the left atrial appendage (LAA) being a common source of thrombus formation. Anticoagulation is indicated for stroke prevention in patients with NVAF; however, some patients are poor candidates for long-term anticoagulation. For these patients, closure of the LAA with the Watchman™ device is a nonpharmacologic treatment alternative. Warfarin, the only approved anticoagulant post-procedure, is recommended until device endothelialization. Due to its drug interactions, narrow therapeutic index, and INR monitoring, warfarin therapy can be challenging. As a result, direct oral anticoagulants (DOACs) may be a convenient alternative, though clinical study data is limited.

**Purpose:** To evaluate the efficacy and safety of DOACs compared to warfarin after Watchman™ device placement.

**Methods:** This is an IRB approved, single center, retrospective chart review from January 2016 through July 2018. Patients were eligible if they had NVAF and Watchman™ device implantation within the designated timeframe. The primary efficacy endpoint is a composite of stroke, systemic embolism, or device thrombus within 6 months of device implantation. The primary safety endpoint is incidence of major bleeding within 6 months of device implantation. Continuous data will be analyzed using either a two-sample unpaired t-test or Mann-Whitney-U, expressed as mean with standard deviation or median with interquartile range. Nominal data will be analyzed using Fisher's exact or chi square expressed as count or percentage.

**Results/Conclusions:** Data collection is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference 2019.

### Learning Objectives:

Recognize patients that may meet criteria for Watchman™ device implantation.

Discuss the use of anticoagulation after Watchman™ device implantation.

### Self Assessment Questions:

Which patient would be the best candidate for consideration of Watchman™ device implantation?

- A: History of valvular atrial fibrillation and consistently non-therapeutic
- B: History of nonvalvular atrial fibrillation and active LAA clot
- C: History of valvular atrial fibrillation and major bleed on blood thinner
- D: History of nonvalvular atrial fibrillation and major bleed on blood thinner

After Watchman™ device implantation, anticoagulation with warfarin is recommended for at least how many days?

- A 30
- B 45
- C 60
- D 90

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARATIVE THROMBOEMBOLIC RISK OF 3-FACTOR VERSUS 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE FOR EMERGENT WARFARIN REVERSAL

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Prothrombin complex concentrates (PCCs) are plasma-derived, concentrated mixtures of vitamin K-dependent clotting factors and are frequently utilized to rapidly reverse anticoagulant-associated coagulopathy. However, one major risk of rapid reversal is a thromboembolic complication (TEC). Studies designed to directly evaluate thromboembolic risk between 3-factor and 4-factor PCC have not been performed. Therefore, the purpose of this study is to evaluate the comparative risk of TEC between 3-factor and 4-factor PCC for warfarin reversal.

A single center, multi-campus, retrospective cohort study will be conducted including adult patients greater than or equal to 18 years on warfarin who received at least one dose of 3-factor or 4-factor PCC for emergent warfarin reversal from December 1, 2011 to September 30, 2018. Patients will be excluded if PCC was administered for reversal of Xa inhibitors, direct thrombin inhibitors, or a non-anticoagulant indication PCC was co-administered with recombinant FVIIa, hemophilia, pregnant and prisoners. The primary outcome is comparison of early TEC incidence between 3-factor versus 4-factor PCC when used for emergent reversal of warfarin. Early TEC is defined as an acute deep vein thrombosis, pulmonary embolism, myocardial infarction, transient ischemic attack, stroke, or other arterial/venous thrombus within 14 days of PCC administration. Secondary endpoints include evaluation of thromboembolic risk factors for early TEC after PCC, comparison of full versus partial INR reversal and association with TEC, assessment of 3-factor versus 4-factor PCC dosing in units/kg, and quantification of early versus late re-initiation of anticoagulation following reversal with PCC. Data collection and analysis is currently ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the risk of reversing warfarin with prothrombin complex concentrates.

Describe the differences in thromboembolic rates between 3-factor and 4-factor prothrombin complex concentrate.

### Self Assessment Questions:

What is the main difference between 3-factor and 4-factor prothrombin complex concentrate?

- A 3-factor PCC does not include any factor VII
- B: Protein C & S is only present in 3-factor PCC
- C: 3-factor PCC contains factor VII, but the amount is not therapeutic
- D: There is no factor II in 4-factor PCC

Which patients may be at higher risk for development of a thromboembolic complication following reversal of warfarin with prothrombin complex concentrate?

- A Active smokers
- B History of VTE within 30 days
- C Major trauma or surgery within 14 days
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## LEVETIRACETAM COMPARED TO PHENOBARBITAL FOR NEONATAL SEIZURES

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**Statement of purpose:** Neonatal seizures are one of the most frequent neurologic complications of the newborn period occurring in 1.5 to 5 of 1000 live births in term babies and more frequently in preterm babies. Phenobarbital is the recommended agent for neonatal seizures, but there are safety concerns, which should be considered. Levetiracetam has limited evidence supporting its use in the neonatal population but may be a more favorable antiepileptic based on its side effect and pharmacokinetic profile. In 2015, Kentucky Children's Hospital (KCH) at University of Kentucky HealthCare changed its clinical practice guideline from recommending phenobarbital to levetiracetam. The purpose of this study is to compare seizure response rates in neonates receiving phenobarbital or levetiracetam as the first line antiepileptic agent.

**Statement of methods used:** This was a retrospective chart review of patients aged 0-28 days from 2011 – 2018, 3 years before and 3 years after implementation of the Clinical Practice Guideline at KCH. This study includes any patient with clinical or electrographic seizures started on levetiracetam or phenobarbital. The primary outcome was response to therapy, defined as not requiring an additional agent for seizure control.

**Summary of preliminary results:** Thirty-seven patients were started on levetiracetam from 2015 – 2017. Nineteen of those patients (51.4%) did not require an additional antiepileptic agent for seizure control. Fifty-one patients who received phenobarbital have been included and patient screening is ongoing. Additional patients who received both levetiracetam and phenobarbital are expected to be included for final analysis.

**Conclusions:** Levetiracetam may be an effective antiepileptic to use first line for neonatal seizures and is associated with fewer neurologic outcomes compared to phenobarbital. When this study is complete, it will compare response rates for neonates started on phenobarbital versus levetiracetam at a single Level IV NICU within an academic medical center.

### Learning Objectives:

Discuss the current literature surrounding the optimal management of neonatal seizures  
Define the pharmacokinetic and safety profile of levetiracetam that make it an attractive option for neonatal seizures

### Self Assessment Questions:

Which agent is the first line recommended antiepileptic for neonatal seizure management per the World Health Organization guidelines?

- A: Phenytoin
- B: Levetiracetam
- C: Phenobarbital
- D: Lorazepam

Which of the following characteristics of levetiracetam make it an attractive option for neonatal seizures

- A: Fewer neurologic outcomes compared to phenobarbital
- B: Fewer drug interactions with other anti-epileptics
- C: Works through a novel method involving the SV2 receptor
- D: All of the above

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## CELLULITIS: HOME OR INPATIENT INTRAVENOUS (IV) THERAPY II A VETERAN POPULATION

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### Purpose:

This project will compare the treatment of cellulitis using IV antibiotics as outpatient therapy with the Hospital in Home (HIH) program and as inpatient therapy at the Cincinnati Veterans Affairs Medical Center (CVAMC). The primary objective of this study is to compare the rates of efficacy by comparing the number of patients requiring a change in IV antibiotics. Secondary objectives will evaluate reason(s) for treatment failure, duration of antibiotics, additional antibiotic therapy or medical visits, duration of therapy, and potential cost savings. Additional secondary objectives will include previous antibiotics, adverse reactions, and microbiology data with treatment failure.

### Methods:

This will be a retrospective chart review. Data for this project will be retrieved by determining all patients enrolled in the HIH program being treated for primary diagnosis cellulitis with IV antibiotics from January 1, 2014 through June 30, 2018. In addition, data for all patients receiving inpatient treatment for primary diagnosis cellulitis with IV antibiotics on admission to the Cincinnati VAMC for the same time frame will also be queried. A random number generator will be used to select n=111 random patients in each group with N=222 total. Exclusion criteria will include:

- Patients who received a first antibiotic dose at an outside facility
- Patients who received antibiotic treatment as an inpatient and subsequently admitted to HIH
- Patients who discontinue treatment or leave the facility against medical advice
- Patients on dialysis
- Patients who are homeless at time of admission
- Patients residing in or discharged to a nursing home
- Patients who report current IV drug use
- Patients who were started on IV antibiotics for a differential diagnosis of cellulitis, yet cellulitis was ruled out by discharge

Summary: Not applicable

Conclusion: Not applicable

### Learning Objectives:

Discuss risk factors for cellulitis infections requiring outpatient IV antibiotics  
Explain potential reasons for treatment failure for outpatient IV antibiotic: used for cellulitis

### Self Assessment Questions:

Why is considering the diagnosis of diabetes mellitus and evaluation of A1c an important issue to consider in this patient population?

- A: Patients with diabetes may need a different antibiotic choice based
- B: Patients with diabetes are at greater risk for extravasation increase
- C: Patients with diabetes are more likely to carry streptococcal organisms
- D: Patients with diabetes are more likely to carry staphylococcal organisms

Which antibiotic class is most likely to cause an adverse reaction when used as outpatient therapy in the Veteran population?

- A: Carbapenem
- B: Glycopeptide
- C: Cephalosporin
- D: Penicillin

Q1 Answer: D      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF USP CHAPTER <800> STANDARDS IN A VETERANS AFFAIRS MEDICAL CENTER

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### Purpose:

Health care workers, patients, the public, and the environment are all at risk of exposure and subsequent acute and chronic health effects when hazardous drugs (HDs) are not handled appropriately. The purpose of this project is to assess and revise current health system-wide practices regarding the handling of HDs in order to attain 100% compliance with USP Chapter <800> standards at the Indianapolis VA Medical Center before the December 1, 2019 official deadline.

### Methods:

This project is being completed as a LEAN process improvement initiative. A gap analysis was utilized to identify areas in current practice which are non-compliant with USP <800> quality standards and establish our baseline compliance, expressed as a percentage. A Rapid Process Improvement Workshop (RPIW) was conducted with focus placed on the creation of innovative solutions to bridge the recognized gaps and build sustainable, replicable processes for the future (employee training, documentation, etc.). RPIW participants were comprised of a multidisciplinary team of practice area experts representing service departments who are key stakeholders in ensuring compliance with USP <800>. Upon completion of the RPIW, individual tasks were distributed among various members of the team for execution. The status of individual projects and overall compliance with USP <800> has been continually assessed throughout the year to track progress and ensure project completion prior to the December 1, 2019 USP Chapter <800> official date.

### Results and Conclusions:

Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe how Lean process improvement methodology can be used to implement medical center-wide revisions to current practice or to establish new practices.

Recognize the unique interdepartmental challenges related to implementation of USP Chapter <800> standards across a medical center.

### Self Assessment Questions:

1. Which of the following activities related to hazardous drug handling in USP Chapter <800> were identified as having the largest direct impact on departmental practice for services outside of Pharma

- A: Receipt and Storage
- B: Compounding and Dispensing
- C: Administration and Disposal
- D: Storage and Compounding

2. What was consistently identified as the root cause of gaps in current practice preventing compliance with USP Chapter <800> recommendations on administration and disposal?

- A: USP <800> is a new regulation and there is a general lack of understanding
- B: The facility is exempt from certain USP <800> recommendations
- C: The facility's existing waste disposal bin contract was extended past its expiration date
- D: Appropriate PPE is not available in any area where it is currently required

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## OPTIMIZATION OF MEDICATION DISTRIBUTION THROUGH RECONCILIATION OF ELECTRONIC MEDICAL RECORD AND AUTOMATED DISPENSING CABINET DATA IN A DASHBOARD TOOL

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**Purpose:** Recently published literature have described how to optimize automated dispensing cabinet (ADC) technology through the use of vendor-provided data reports and inventory formulas. What remains largely unresolved is an efficient process for the identification of medications dispensed from pharmacy that could be better optimized to be dispensed from an ADC. Such optimization requires analysis and reconciliation of dispensing data from both the ADC and the Electronic Medical Record (EMR). The purpose of this study is to describe the development, implementation, and impact of a dashboard tool that reconciles EMR and ADC data for optimization of medication distribution through ADCs.

**Methods:** In a multi-center, pre-post implementation analysis study design, data from a 30-day pre-implementation period and 30-day post-implementation period will be used to determine the impact of the dashboard tool. Pre-implementation phase consists of data collection and dashboard development leading up to implementation. Post-implementation phase includes data collection and analysis. Collected data will be used to compare pre- and post-implementation ADC stock-out rates, ADC inventory, ADC carrying costs, first-dose pharmacy dispenses, and Medication Administration Record (MAR) messages for missing doses and re-dispenses. Descriptive statistics will be utilized to compare each group to determine the impact of the dashboard and for further refinement and roll out as warranted.

**Results:** Final results and conclusions will be presented at the Great Lakes Residency Conference.

### Learning Objectives:

Describe the key concepts of automated dispensing cabinet optimization  
Describe the development, implementation, and impact of a dashboard tool for optimization of medication distribution

### Self Assessment Questions:

Which of the following is NOT a key concept of optimization of automated dispensing cabinets?

- A: stocking frequently used medications
- B: removing stock of unused medications
- C: adjusting medication PAR levels (desired on-hand inventory levels)
- D: sorting medications stored in the ADC by name

Which of the following is NOT a key consideration in the determination of ADC par maximum inventory levels

- A: ADC refill lead time
- B: expiration date
- C: inventory cost
- D: medication and ADC pocket size

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## SUGAMMADEX UTILIZATION POST-PROTOCOL IMPLEMENTATION

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**Purpose:** Sugammadex is a modified gamma cyclodextrin used to reverse nondepolarizing aminosteroidal agents such as rocuronium. Sugammadex was added to the Northwestern Memorial Hospital (NMH) formulary as a restricted medication in February of 2016. In May of 2018 a protocol was created to guide utilization. The protocol includes a form obtained from the pharmacy where the provider is required to justify the indication for sugammadex use in addition to patient information and clinical parameters. To date, no assessment of the impact of sugammadex utilization post-protocol implementation on patient outcomes has been conducted. The primary endpoint of this study is surgical end time to ready to discharge from the post-anesthesia care unit (PACU). Secondary endpoints are surgical cost including drug expense and cost of time in PACU.

**Methods:** This will be a single center, retrospective, case review study. Surgical patients were included in the study if they received sugammadex appropriately according to the current NMH protocol. Patients who received sugammadex from May 2018-September 2018 will be compared in a one-to-one fashion to patients who underwent the same procedure but received glycopyrrolate and neostigmine from November 2015-February of 2016. Data collected include basic demographics, sugammadex dose, rocuronium dose, neostigmine dose, glycopyrrolate dose, procedure type, surgical end time, time ready to discharge from PACU, and time in PACU.

**Results/Conclusion:** To be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Review the role of sugammadex in the reversal of neuromuscular blockade

Discuss the impact of an updated protocol for sugammadex use at a large academic medical center

### Self Assessment Questions:

Which of the following is true regarding sugammadex's reversal of a neuromuscular blocking agent?

- A: Sugammadex and neostigmine have the same time to reversal
- B: Sugammadex has a slower time to reversal than neostigmine
- C: Sugammadex has a faster time to reversal than neostigmine
- D: Sugammadex does not reverse neuromuscular blocking agents

Which of the following is true regarding sugammadex's reversal properties?

- A: Sugammadex can reverse any neuromuscular blocking agent
- B: Sugammadex can reverse nondepolarizing benzylisoquinoliniums
- C: Sugammadex needs to be given with glycopyrrolate
- D: Sugammadex can reverse nondepolarizing aminosteroidal only

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## AMBULATORY CLINIC MEDICATION RECONCILIATION REDESIGN: IMPLEMENTATION OF STANDARD WORKFLOWS AND LEVERAGING PHARMACY TECHNICIANS TO EXTEND PRIMARY CARE PHARMACIST SERVICES

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### Purpose:

The purpose of this project was to understand the current state of ambulatory care clinic medication reconciliation (MR) practice nationally, quantify and increase the reach of primary care (PC) pharmacist clinical activities through utilizing pharmacy technicians, pilot a new interdisciplinary medication history (MH) and MR workflow in a PC clinic, and measure the outcome of clinic MR redesign on percent of MRs completed by a provider in a PC clinic.

### Methods:

In phase 1, data was obtained from Vizient-member electronic health records to identify the types of individuals who perform MHs in the ambulatory clinic setting, frequency of updates to medication lists, and frequency of providers performing MR during clinic encounters. De-identified and aggregated data from the study was analyzed to provide a background for the current state of clinic MH and MR practices. In phase 2, the percentage of clinical versus technical activities performed by PC pharmacists was defined and quantified through work sampling over four weeks. A pharmacy technician was trained and implemented to support the PC pharmacist workflows over a three-week period, when the work sampling process was repeated. In phase 3, personnel at five PC clinics were shadowed and current MH and MR processes were recorded. An interdisciplinary workgroup was formed to review current PC MH and MF workflows. Quality improvement tools and FOCUS-PDCA methodology was employed to identify root causes for incomplete in-clinic MR and strategies to increase the frequency of completed MR. The strategies were piloted in a PC clinic. The number of changes to a patient medication record and the rate of medication changes identified during the MH process that are acted on by a provider during the pilot were measured and compared to benchmarked standards from phase 1.

**Results and Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference

### Learning Objectives:

Identify Identify root causes for completing medication reconciliation in ambulatory clinics

Describe Describe an effective model of leveraging pharmacy technicians to extend pharmacist clinical services in primary care clinics

### Self Assessment Questions:

What are the common barriers to completing medication reconciliation in ambulatory clinics?

- A: Clinical staff and providers trained on workflows separately
- B: EHR documentation preferences vary by person and clinic
- C: Lack of patient understanding of and engagement in the medication process
- D: All of the above

At UW Health, which of the following tasks can be performed by a pharmacy technician?

- A: Processing and authorizing medication refill requests
- B: Completing in-clinic and over the phone medication reconciliation
- C: Performing in-clinic medication histories and measuring blood pressure
- D: None of the above

Q1 Answer: D      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## INITIATION OF INTRAVENOUS TISSUE PLASMINOGEN ACTIVATOR (TPA) FOR ISCHEMIC STROKE UPON HOSPITAL ARRIVAL: PHARMACIST IMPACT ON MINIMIZING DOOR-TO-NEEDLE TIME

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**Purpose:** The purpose of this study is to evaluate the impact of pharmacist intervention within the emergency department (ED) for patients presenting with acute ischemic stroke (AIS) who are candidates for fibrinolytic therapy. Currently, intravenous (IV) tPA is the only pharmaceutical intervention shown to improve patient outcomes in AIS, however, benefits are largely time-dependent with recommendations to administer treatment within three to 4.5 hours of symptom onset. Guidelines have supported a primary treatment goal of door-to-needle time within sixty minutes of ED arrival. New evidence, however, proposes a secondary goal door-to-needle time within forty-five minutes to further improve clinical outcomes. Pharmacists are ideally positioned to assist medical teams in managing AIS patients, and their involvement within the ED setting can greatly minimize treatment delays.

**Methods:** All patients treated with IV tPA for AIS in the OhioHealth Doctors Hospital (DH) ED before and after implementation of a pharmacist ED call protocol were retrospectively reviewed. The study population was as follows: January - October 2017 (pre-protocol), pharmacist ED call protocol implementation in November 2017, March - December 2018 (post-protocol). Previously at DH, pharmacists had minimal ED involvement with personnel primarily functioning from the centralized main pharmacy department. With the pharmacist ED call protocol, ED staff calls main pharmacy to relay whether the patient is believed to be a candidate for fibrinolytic therapy. If the patient qualifies for tPA, the pharmacist immediately begins mixing the medication and programming the Alaris® smart infusion pump at bedside. With the implementation of this new protocol, a primary outcome of shorter time-to-treatment is expected.

**Results/Conclusions:** Results and conclusions will be presented at Great Lakes Pharmacy Conference.

### Learning Objectives:

Discuss the current guideline recommendations for tPA administration in acute ischemic stroke (AIS) patients within the emergency department (ED).

Describe the pharmacist ED call protocol initiated at OhioHealth Doctors Hospital.

### Self Assessment Questions:

To provide the greatest impact, new guidelines published by the AHA/ASA recommend tPA to be initiated in appropriate patients within what timeframe?

- A: 90 minutes of arrival to ED; maximum of 3 hours from symptom
- B: 60 minutes of arrival to ED; maximum of 4.5 hours from symptom
- C: 45 minutes of arrival to ED; maximum of 4.5 hours from symptom
- D: 30 minutes of arrival to ED; maximum of 3 hours from symptom

The pharmacist ED call protocol at OhioHealth Doctors Hospital includes which of the following components?

- A: Pharmacist reports to the ED with a pre-packed stroke kit
- B: Pharmacist assists in the programming of the Alaris® smart infusion
- C: ED staff call main pharmacy when a stroke alert is activated to relay
- D: All of the above

Q1 Answer: C      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF A SURVEILLANCE AFTER PROPHYLAXIS APPROACH TO CYTOMEGALOVIRUS PREVENTION IN LIVER TRANSPLANT RECIPIENTS

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**Purpose:** Cytomegalovirus (CMV) infection remains a common complication that affects solid organ transplant recipients in the months immediately following transplantation. There are two strategies recommended by current guidelines for CMV prevention in solid organ transplant recipients: antiviral prophylaxis and preemptive therapy. Surveillance after prophylaxis is a hybrid prevention strategy using virologic surveillance after completion of antiviral prophylaxis. This is becoming more commonly used by transplant centers to prevent late-onset disease that can occur after the discontinuation of prophylaxis but is not supported by current guidelines due to limited research to support its use. High and intermediate-risk liver transplant recipients at UC Health receive 3-6 months of antiviral prophylaxis followed by viral loads performed biweekly for six weeks. Preemptive antiviral therapy is initiated at a predefined threshold. The objective of this study is to investigate the efficacy of a surveillance after prophylaxis approach in preventing CMV disease in liver transplant recipients. This data will be utilized to improve institution's guidelines for prevention of CMV in liver transplant recipients.

**Methods:** This single-center retrospective chart review includes all liver transplant recipients who were transplanted between July 2013 and December 2017 at UC Health and were at intermediate or high-risk for cytomegalovirus. Patients who were deceased, developed graft failure, or received treatment for CMV prior to the completion of prophylaxis were excluded. The primary outcome is to determine the incidence of late-onset CMV disease in the first year post-transplantation during surveillance and post-surveillance periods to evaluate the current protocol. The utility as well as the timing of the surveillance period will be analyzed. A multivariate logistic regression analysis will be employed to evaluate baseline characteristics and the development of CMV disease.

**Results:** Data collection and analysis are currently ongoing.

### Learning Objectives:

Describe the pathophysiology and risk factors of cytomegalovirus in solid organ transplant recipients

Review available literature on the use of a hybrid approach for prevention of cytomegalovirus after transplant

### Self Assessment Questions:

Which of the following patients would be at highest risk for developing cytomegalovirus disease after transplantation?

- A: A 32 year old patient receiving a liver transplant for acute hepatitis
- B: An 18 year old patient receiving a lung transplant for cystic fibrosis
- C: A 42 year old patient receiving a kidney transplant for type 2 diabetes
- D: A 60 year old patient receiving a heart transplant for end stage heart failure

Which of the following is a benefit of a hybrid approach to CMV prevention?

- A: Relies on 100% adherence to monitoring protocol post-prophylaxis
- B: Works well to catch CMV disease with a rapid doubling time
- C: There is a specific viral load threshold recommended by guidelines
- D: Can detect CMV viremia before the development of CMV disease

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF ANTIPSYCHOTIC CONTINUATION FOR INTENSIVE CARE UNIT (ICU) DELIRIUM MANAGEMENT THROUGH TRANSITIONS OF CARE

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**Purpose:** To evaluate the rate of inappropriate continuation of antipsychotics initiated in the ICU during hospital transitions of care and identify factors that may have influenced these rates.

**Methods:** A single center, retrospective study was conducted at Indiana University Health Arnett Hospital. Patients 18 years of age or older who were initiated on an antipsychotic for ICU delirium treatment between August 1, 2014 and July 31, 2018 were included. Patients using antipsychotics prior to admission or initiated on an antipsychotic for an unrelated indication were excluded. The primary outcome was the rate of inappropriately continued antipsychotics for ICU delirium treatment upon transition to the medical floor. Inappropriate continuation was defined as a negative confusion assessment method ICU score (CAM-ICU) for  $\geq 24$  hours and/or no indication for the antipsychotic documented in the medical chart. Secondary endpoints included the rate of inappropriate continued antipsychotics at discharge, ICU and hospital length of stay (LOS), and the identification of risk factors that may have influenced the decision to continue or discontinue the antipsychotic.

**Results/conclusion:** 98 patients were screened, and 35 were included in our study that did not meet exclusion criteria. Primary objective results show the rate of inappropriate continuation of antipsychotics onto the medical floor at our site was 20% (n=7). For secondary objective results, 17% (n=6) of patients were inappropriately continued at discharged with an antipsychotic started for ICU delirium treatment. Average hospital LOS was 16.1 days and average ICU LOS was 9.7 days. It does not appear that presence of an ICU trained pharmacist compared to a non-ICU pharmacist or timing of transfer out of the ICU impacts the rate of inappropriate continued antipsychotics. Final conclusion and discussion will be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Review guideline recommendations for treatment of acute delirium in the ICU

Identify factors that may influence inappropriate antipsychotic continuation started for acute delirium in the ICU

### Self Assessment Questions:

What do the 2018 pain, agitation/sedation, delirium, immobility, and sleep disruption (PADIS) guidelines recommend for treatment of ICU delirium?

- A Haloperidol is the preferred agent
- B: Atypical antipsychotics are the preferred treatment agents
- C: Lorazepam is the preferred agent
- D: No pharmacologic agent is recommended

Which of the following are potential risk factors for inappropriate antipsychotic continuation that were started to treat acute delirium in the ICU?

- A Timing of transfer out of the ICU
- B Type of antipsychotic utilized
- C Initial diagnosis of sepsis
- D A and B only

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A VINCRIStINE DOSE CAP ON THE INCIDENCE OF NEUROPATHY WITH DA-R-EPOCH FOR TREATMENT OF AGGRESSIVE LYMPHOMAS

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**Purpose:** DA-R-EPOCH (dose-adjusted etoposide, doxorubicin, cyclophosphamide, vincristine, prednisone, and rituximab) is increasingly utilized for the treatment of aggressive lymphomas. In CALGB/Alliance 50303, DA-R-EPOCH was compared to R-CHOP with an alarming finding of 7-8 fold increased rate of severe sensory (14% versus 2%;  $p < 0.001$ ) and severe motor (8% versus 1%;  $p < 0.001$ ) neuropathy. A possible cause is a higher, non-capped dose of vincristine in the DA-R-EPOCH regimen, therefore we subsequently changed practice at our institution to cap vincristine at 2 mg/cycle. Our study purpose is to evaluate the impact of our intervention on the development of neuropathies and overall efficacy of the regimen. **Methods:** This retrospective study obtained Institutional Review Board (IRB) approval at Michigan Medicine. Patients with Non-Hodgkin's Lymphoma (NHL) who have undergone treatment with DA-R-EPOCH at Michigan Medicine from August 31, 2008 through August 31, 2018 will be screened. Patients will be divided into two cohorts based on if they received  $> 2$  mg or  $\leq 2$  mg of vincristine per DA-R-EPOCH treatment cycle. Patients at least 18 years old and diagnosed with an aggressive lymphoma subtype (e.g. double-hit, Burkitt's, HIV-associated, primary mediastinal, other) will be included. Patients with prior vincristine exposure, receipt of bortezomib in combination with DA-R-EPOCH, or extensive loss of extremity sensorium or paralysis at baseline will be excluded. The primary outcome is the time to onset of grade 3 or higher neuropathy. A propensity score match will be performed based on characteristics including duration of vincristine, age, race, body surface area, smoking history, diabetes, baseline neuropathy, and baseline hepatic function. Secondary outcomes include the proportion of patients with vincristine dose reductions or omissions, initiation of pharmacotherapy for treatment of neuropathy, progression free survival (PFS), and overall survival (OS). Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe differences between DA-R-EPOCH versus R-CHOP for the treatment of aggressive lymphomas

Identify key side effects associated with vincristine exposure

### Self Assessment Questions:

Which of the following factors distinguish the DA-R-EPOCH regimen from R-CHOP?

- A Addition of etoposide
- B: Administration of doxorubicin, vincristine, and etoposide as a continuation
- C: Omission of a 2 mg vincristine dose cap per treatment cycle
- D: All of the above

Which of the following is a significant side effect of vincristine?

- A Hyperglycemia
- B Peripheral neuropathy
- C Hemorrhagic cystitis
- D Pulmonary toxicity

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

**TEST**

Tim

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&gt; 2mg or &lt;= 2 mg of

**Learning Objectives:**

Review le1

Recall le2

**Self Assessment Questions:**

q1

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

q2

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

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
 (if ACPE number listed above)

**MIDODRINE FOR ADJUNCTIVE SUPPORT IN THE WEANING OF VASOPRESSOR INFUSIONS IN THE INTENSIVE CARE UNIT**

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**PURPOSE:** Dependence on vasopressors is often the primary obstacle for discharge from the intensive care unit (ICU) to a step down unit in patients who are otherwise clinically stable. Recent data suggests that addition of midodrine to vasopressor agents decreases their maximum dose and duration, leading to quicker return of hemodynamic stability. The purpose of this study is to explore the place in therapy of midodrine as a vasopressor sparing agent, and to determine if there is a dose response benefit for decreasing the duration of vasopressor requirement.

**METHODS:** A retrospective chart review was conducted to review data from patients admitted to the ICU requiring norepinephrine support for more than 24 hours. Patients were separated into two groups, those who received norepinephrine alone versus midodrine in addition to norepinephrine. Inclusion criteria included patients at least 18 years old, and only required norepinephrine as an IV vasopressor for at least 24 hours. The primary outcomes are the duration of vasopressor dependence, measured in hours from initiation to discontinuation of norepinephrine and ICU length of stay (LOS) in days. The secondary outcome is hospital LOS (days). Other data collected and analyzed for discussion is the dose of midodrine and the patient's primary ICU diagnosis.

**RESULTS/CONCLUSIONS:** Of the 387 charts reviewed, 124 met inclusion criteria. Preliminary results demonstrate a similar ICU length of stay between the two arms of the study. No significant difference was found in the ICU LOS between the norepinephrine alone versus midodrine group (5.77 vs. 7.45 days,  $p=0.077$ ). Mean duration of norepinephrine infusion in the norepinephrine group versus the midodrine group (59.5 vs. 100.4 hours,  $p=0.001$ ). This study denotes that there may not be a place in therapy for midodrine when added to norepinephrine at any unspecified time of ICU LOS.

**Learning Objectives:**

Recall the mechanism of action of midodrine.

Recognize the typical dose and frequency of midodrine when used off label as a vasopressor sparing agent.

**Self Assessment Questions:**

What is the correct mechanism of action of midodrine?

- A Alpha 2 receptor agonist
- B: Alpha 2 receptor antagonist
- C: Alpha 1 receptor agonist
- D: Alpha 1 receptor antagonist

Select the most appropriate dose of midodrine that can be used as a vasopressor sparing agent to reduce the maximum required dose of norepinephrine (mcg/kg/min)

- A 2.5mg tid
- B 5mg prn
- C 10mg tid
- D 20mg qid

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
 (if ACPE number listed above)

## IMPLEMENTATION AND ASSESSMENT OF A POST-DISCHARGE COPD CARE SERVICE

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### Purpose:

Early discharge follow-up (<30 days) has been shown to reduce chronic obstructive pulmonary disease (COPD) exacerbation-related readmissions and therefore, is recommended by the Global Initiative for Chronic Obstructive Lung Disease guidelines. The purpose of this study is to evaluate if close follow-up by a pharmacist in the pulmonary clinic after hospital discharge or emergency department visit reduces the number of 30-day readmissions and repeat emergency department visits for COPD exacerbation.

### Methods:

A retrospective control group from December 1, 2017 to April 30, 2018 is being compared with a prospective study group from December 1, 2018 to April 30, 2019. Patients in the study group are receiving pharmacist driven care during a post-discharge follow-up appointment within 14 days. Patients eligible for the study group include Froedtert & the Medical College of Wisconsin (F&MCW) pulmonary clinic patients with a COPD exacerbation resulting in either a hospital admission or an emergency department visit at any F&MCW location. Exclusion criteria include age less than 18 years, pulmonary provider appointment within 14 days of discharge, enrollment in F&MCW Hospital Discharge or Enhanced Care Programs, or comorbid conditions of congestive heart failure, cystic fibrosis, or pulmonary hypertension. The primary outcome is a composite rate of 30-day readmissions and repeat emergency department visits for COPD exacerbation. Secondary outcomes include a 30-day readmission rate for COPD exacerbation, rate of repeat emergency department visits within 30 days, percent of patients seen by a pharmacist within two weeks of discharge, type of medication change as a result of appointment with pharmacist, reason for COPD medication change, and referrals and enrollment to F&MCW Medication Management Program.

Summary of (preliminary) results to support conclusion:  
Data collection and analysis are ongoing.

### Conclusions reached:

Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss GOLD guideline recommendations for follow-up after COPD exacerbation

Review GOLD guideline recommendations for therapy escalation following COPD exacerbation

### Self Assessment Questions:

Per GOLD guidelines, which of the following is true regarding follow-up after discharge for COPD exacerbation?

- A Early follow-up is defined as follow-up within 30 days of hospital discharge
- B: Patients not attending early follow-up have increased exacerbation
- C: Inhaler technique should be assessed at each appointment follow-up
- D: All of the above

Patient is currently on long-acting beta agonist therapy. Patient recently experienced a COPD exacerbation on current therapy so therapy escalation is warranted. Patient's peripheral blood level is  $\geq 3$

- A Change to inhaled corticosteroid
- B Change to long-acting muscarinic antagonist
- C Add inhaled corticosteroid
- D Add long-acting muscarinic antagonist

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ANALYSIS OF AN ANTIMICROBIAL STEWARDSHIP INTERVENTION IN COMMUNITY-ACQUIRED PNEUMONIA TREATMENT AT A TERTIARY HOSPITAL

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The Infectious Diseases Society of America (IDSA) guidelines for community-acquired pneumonia (CAP) recommend antibiotic treatment for a minimum of 5 days in patients who defervesce within 48-72 hours and have no signs of clinical instability. Previous research has found there is low compliance to the IDSA CAP guidelines, and treatment is often extended despite no difference in outcomes when compared to shorter durations of therapy. The purpose of this study was to evaluate the impact of pharmacist-driven stewardship education on appropriate use of antibiotics in CAP in an effort to reduce the exposure to antibiotic.

This was a single-center, IRB approved, retrospective pre & post-intervention study that included patients 18 years or older who were admitted to Indiana University Health Bloomington Hospital with the diagnosis of CAP. Patient charts were identified from October 2017-February 2018. Data collected included demographics, allergies, comorbidities, antibiotic(s) used, length of therapy, and 30-day mortality and readmission rates. Based on preliminary results, a targeted stewardship intervention was provided to staff. A post-intervention cohort was collected from October 2018-February 2019. The primary endpoint was days of therapy and total exposure to antibiotics. Secondary endpoints were to evaluate the impact on hospital length of stay, 30-day mortality, readmission, acute kidney injury, and Clostridium difficile rates

In the pre-intervention cohort, the average duration of therapy was 9 days. Of the 26 patients included in the cohort, 77% received an antibiotic at discharge with an average duration of 5.5 days. The 30-day mortality rate in this group was 19% while the 30-day readmission rate was 12%; none of whom were readmitted for infectious causes. Post-intervention results are to follow.

Preliminary results indicate that a targeted stewardship intervention may reduce total antibiotic exposure in CAP treatment without effecting mortality rates, but further results need to be collected to assess final conclusions.

### Learning Objectives:

Identify the patient population where it is appropriate to treat community-acquired pneumonia for 5 days

Explain the rationale for the antibiotics of choice in inpatient treatment of community-acquired pneumonia

### Self Assessment Questions:

In which of the following scenarios would you recommend treating CAP with 5 days of antibiotics?

- A Patient is afebrile for 12 hours with an arterial oxygen saturation of 92%
- B: Patient is afebrile for 72 hours with normal vital signs and is maintained on oxygen
- C: Patient is clinically stable for 96 hours but acutely fevers at 39.5 degrees Celsius
- D: Patient decompensates to a level which requires ICU admission

What is the primary reason for the addition of azithromycin to a beta-lactam agent for inpatient treatment of CAP?

- A Streptococcus pneumoniae has increasing resistance rates to clindamycin
- B Gram-negative organisms require double antibiotic coverage while Gram-positive organisms do not
- C Beta-lactams have poor atypical coverage for organisms such as Legionella pneumophila
- D Azithromycin helps to increase the ability of the beta-lactam to penetrate the lung

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF BETA BLOCKER THERAPY ON MAJOR CARDIOVASCULAR OUTCOMES IN COCAINE USERS: A SINGLE-CENTER RETROSPECTIVE COHORT ANALYSIS

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**Purpose:** Cardiovascular disease is the leading cause of death in the United States and the number one cause of hospitalization within the Veterans Health Administration. Beta blockers are indicated for many cardiovascular conditions but are often avoided in veterans with documented history of cocaine use due to theorized harmful effects resulting from unopposed alpha stimulation. This project will examine the clinical significance of unopposed alpha stimulation secondary to beta blocker therapy in veterans who use cocaine to evaluate the best practice for these patients.

**Methods:** This retrospective cohort analysis will include patients from the Lexington VA Health Care System with a urine drug screen positive for cocaine from 2000-2012. The study will examine the clinical significance of unopposed alpha stimulation by comparing cardiovascular outcomes between patients prescribed and compliant with an outpatient beta blocker for a total of five years and patients who were not prescribed an outpatient beta blocker. The primary objective of this study is a composite endpoint which will include acute coronary syndromes, stroke hypertensive emergency or urgency, congestive heart failure, and atrial or ventricular arrhythmias. Secondary objectives will determine if there is a significant difference between groups in each individual component of the primary objective described above as well as all-cause mortality. A subgroup analysis will examine if a difference in cardiovascular outcomes is present based on the differing adrenergic receptor activity between beta blockers. Relative risk and 95% confidence intervals will be calculated to compare probabilities of the composite endpoint between the two groups (cocaine users with beta blocker therapy and cocaine users without beta blocker therapy). Chi-square and student's t-test will be used to calculate differences in baseline characteristics. For all objectives,  $\alpha$  of  $<0.05$  will be considered significant.

Results & Conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the proposed mechanism of unopposed alpha stimulation related to simultaneous use of cocaine and beta blockers.

Recognize the potential clinical consequences associated with concomitant cocaine and beta blocker use.

### Self Assessment Questions:

Based on the adrenergic receptor activity, which of the following beta blockers is thought to be less harmful in patients with cocaine use disorder?

- A: Atenolol
- B: Carvedilol
- C: Metoprolol
- D: Bisoprolol

Concomitant use of beta blockers with cocaine is thought to increase the risk of which of the following?

- A: Atherosclerosis
- B: Hypotension
- C: Cardiac tamponade
- D: Acute coronary syndromes

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECTIVENESS OF ADJUNCTIVE MIDODRINE THERAPY FOR DECREASING DURATION OF NOREPINEPHRINE USE IN PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT

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### Purpose

Persistent hypotension in otherwise resuscitated patients is a common barrier to discharge. Literature indicates midodrine is being used with increasing frequency to spare vasopressor requirements. Its addition to patient's regimen may hasten vasopressor discontinuation. This study aims to assess the effectiveness of midodrine for weaning norepinephrine in a community hospital setting.

### Methods

This study involved a retrospective chart review of patients admitted to the intensive care unit who received norepinephrine versus the combination of norepinephrine and midodrine for at least 24 hours. After data collection, two cohorts were separated and matched for statistical analysis based on demographics. Inclusion criteria required patients to be at least 18 years of age or older and admitted to the intensive care unit, treated with norepinephrine for at least 24 hours duration, unable to completely wean from norepinephrine for greater than 24 hours, and treated with midodrine for at least three doses while receiving vasopressors. The primary outcome will examine the efficacy of adjunctive midodrine therapy as a means to shorten the duration of norepinephrine therapy in patients at our community hospital. The secondary outcome will compare the length of stay between each population.

### Results

In the combination group, patients received norepinephrine for a mean duration of  $3.5 \pm 3.4$  days. In the norepinephrine only group, patients received therapy for a mean duration of  $2.6 \pm 1.6$  days. In evaluating secondary outcomes, ICU length of stay in the combination group resulted in  $12.9 \pm 9.3$  days versus  $8.4 \pm 7.5$  days in the norepinephrine only group. Overall hospital length of stay was found to be  $17.7 \pm 9.3$  and  $12.6 \pm 8.1$  days respectively.

### Conclusion

Patients receiving midodrine and norepinephrine were not weaned from norepinephrine quicker than their counterparts. Length of stay was also found to be prolonged.

### Learning Objectives:

Describe literature surrounding the use of midodrine for liberation from vasopressor therapy.

Outline the use of midodrine for liberation of norepinephrine in a community hospital setting.

### Self Assessment Questions:

What is the name of the randomized and placebo-controlled trial evaluating midodrine for treatment of refractory hypotension in the intensive care unit?

- A: Apex
- B: Midas
- C: Epcat ii
- D: Annexa

Which of the following was part of this study's inclusion criteria?

- A: Must be hemodynamically stable
- B: Treated with epinephrine for at least 24 hours duration
- C: Treated with norepinephrine for at least 24 hours duration
- D: Required only one vasopressor at the time of midodrine initiation

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## DOES RENAL FUNCTION AFFECT THE SAFETY OF DIRECT ORAL ANTICOAGULANTS FOR STROKE PREVENTION IN PATIENTS WITH ATRIAL FIBRILLATION?

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**Purpose:** The safety of direct oral anticoagulants (DOAC) in patients with severe chronic kidney disease has not been well established. The primary objective of this study is to evaluate the association between renal function and major and clinically relevant non-major bleeding events in patients with non-valvular atrial fibrillation (NVAF) or atrial flutter prescribed a DOAC for the prevention of stroke. The secondary objective is to assess the association of renal function and ischemic stroke. **Methods:** This retrospective cohort study will use the electronic medical record to identify patients diagnosed with NVAF and prescribed either dabigatran, rivaroxaban, apixaban, or edoxaban. Patients prescribed one of these DOAC for at least 12 months between October 10, 2010 through October 1, 2017 will be an eligible subject. Demographic data, past medical, surgical, and social history will be collected at baseline. Additionally, the DOAC agent prescribed and dose initial prescriber, baseline antiplatelet use, nonsteroidal anti-inflammatory drug use, hemoglobin, international normalized ratio, serum creatinine, creatinine clearance, and liver function tests will be collected. From date of initiation through 12 months of treatment with a DOAC, major and clinically relevant non-major bleeding events, as defined by the International Society on Thrombosis and Hemostasis, as well as ischemic strokes will be identified by chart review. If available, the following data at time of event will be collected: blood pressure, hemoglobin, hematocrit, serum creatinine, creatinine clearance, and weight. If a patient changes to another DOAC agent, the new agent, dose, and reason for change will be collected. Descriptive, comparative, and regression analyses will be performed to assess the association between variables and events. **Results/Conclusions:** The study is approved by the IRB at our institution and data collection is ongoing. Results, data analyses, and conclusions are pending and will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Describe the risks and benefits of starting a DOAC in patients with atrial fibrillation and chronic kidney disease.

Review current guideline recommendations regarding the use of DOACs in patients with atrial fibrillation and chronic kidney disease.

### Self Assessment Questions:

Which of the following is a consideration when starting a DOAC in a patient with atrial fibrillation and chronic kidney disease?

- A: In the landmark DOAC trials patients with Stage 3-5 chronic kidney disease
- B: Increased risk of stroke with DOACs compared to warfarin
- C: DOACs have negligible renal elimination
- D: Anti-Xa levels are routinely monitored

According to the 2019 AHA/ACC/HRS Focused Update of the 2014 guidelines for the management of patients with atrial fibrillation, which of the following oral anticoagulants might be reasonable to start

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

Q1 Answer: A      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## THE IMPACT OF BARRIERS TO CARE ON ACCESS TO HIV PREVENTION SERVICES

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**Purpose:** Persons at ongoing risk for contracting human immunodeficiency virus (HIV), through intravenous drug use and sexual contact, may be eligible for pre-exposure prophylaxis (PrEP). According to data from the Centers for Disease Control and Prevention (CDC), approximately 38,000 new cases of HIV are diagnosed annually in the United States. Due to the morbidity and mortality associated with HIV, it is important that at-risk individuals have access to PrEP services. PrEP has been offered at Eskenazi Health since 2015, with implementation of a formal PrEP clinic in 2017. The goal of this clinic is to make PrEP more accessible to the residents of Marion County, Indiana. The primary objectives of this study are to describe the patient population that seeks access to PrEP services and to identify the factors that either limited or aided their access to these services.

**Methods:** Individuals with a referral to Eskenazi Health for PrEP services during the period of September to November 2018 were surveyed regarding their linkage experience. In order to better understand this population's access to PrEP services, this survey included those successfully linked to care and those who were not. The survey evaluated how participants became aware of PrEP, level of interaction with the healthcare system outside of PrEP services, perceived ease of linkage to care, preferred methods of communication, barriers experienced during this process, and basic demographic information to help further identify disparities in this patient population. The primary outcome is the frequency of barriers that influenced access to PrEP services. The secondary outcomes include specific demographic characteristics associated with difficulty in linkage to care and the differences in barriers between linked and non-linked individuals.

**Preliminary Results/Conclusions:** Data collection is currently ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe individuals at high risk for contracting HIV that may benefit from using PrEP.

Identify common barriers faced by individuals trying to gain access to PrEP.

### Self Assessment Questions:

Which of the following characteristics describes an individual who may benefit from using PrEP?

- A: In a monogamous relationship with HIV-negative partner
- B: HIV-positive sexual partner
- C: Consistent condom use
- D: Positive HIV test

Which of the following is a common barrier faced by individuals trying to gain access to PrEP?

- A: Having an open, trusting relationship with a healthcare provider
- B: Low cost of medication
- C: Complex PrEP provision model
- D: High perceived efficacy of PrEP

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PREDICTORS ASSOCIATED WITH DISCONTINUATION OF VASOPRESSORS USING MIDODRINE IN THE INTENSIVE CARE SETTING

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**Purpose:** Vasoactive agents are commonly used for the treatment of shock syndromes in ICU patients. Agents are utilized to obtain optimal hemodynamic stability in the most critically ill patient populations. Midodrine has been reported to be of potential benefit in reducing the duration of vasopressor use and ICU length of stay. There is no clear definition as to what patient population or characteristics have shown the most benefit with midodrine therapy. The purpose of this study is to determine the ideal patient population that the addition of midodrine to vasopressor therapy would benefit.

**Methods:** This study was a retrospective chart review. Adult patients admitted to intensive care units on vasopressor therapy at the time of midodrine initiation, with distributive or cardiogenic shock states were included. Exclusion criteria included patients that are pregnant, patients on midodrine prior to the initiation of vasopressor therapy, and unclear diagnosed shock states. The primary endpoint of this study is to identify characteristics that predict response to midodrine therapy. Response was defined as the ability to discontinue vasopressors at 24 hours post start of midodrine therapy. Variables were collected at the point of midodrine initiation. Characteristics assessed included mean arterial pressure, renal function, SOFA score, ICU length of stay, number of days on vasopressor therapy, actively on steroids, number of vasopressors being utilized, norepinephrine equivalent dosage, and total 24-hour dose of midodrine. Descriptive statistics will be used for baseline characteristics. Chi square test will be performed for nominal data. T-test analysis will be used for continuous data variables. Univariate analysis will be used to determine significance between variables. Multivariate analysis will be used to analyze significant differences determined by univariate analysis.

**Results:** Data collection for this presentation is currently ongoing. Final results and analysis will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Define types of shock and differentiate vasopressors utilized for the treatment of hemodynamic instability related to shock

Describe current data supportive of the use of midodrine in the ICU setting

### Self Assessment Questions:

Which of the following is an FDA approved use of midodrine?

- A: Ascites
- B: Orthostatic Hypotension
- C: Septic Shock
- D: Vasovagal Syncope

Studies have shown the following associated with the use of midodrine:

- A: Increase ICU length of stay
- B: Increased infusion rates of vasopressor therapy
- C: Decreased use of steroids
- D: Decreased days on vasopressor therapy

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## COMPARING CLINICAL CURE AND PATIENT OUTCOMES BETWEEN INTRAVENOUS (IV) THERAPY AND IV-TO-ORAL (PO) STEP-DOWN THERAPY FOR TREATMENT OF GRAM-NEGATIVE BLOODSTREAM INFECTIONS

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**Purpose:** There is a paucity of evidence surrounding optimal prescribing practices for Gram-negative bloodstream infections, contributing to wide variability in prescribing patterns among practitioners. One antimicrobial stewardship initiative is to transition patients from intravenous (IV) to high-bioavailability oral (PO) antibiotic therapy, however, there is no consensus in supporting this practice in the treatment of Gram-negative bloodstream infections. The current study aims to assess the appropriateness of IV-to-PO step-down therapy in the treatment of Gram-negative bloodstream infections. The primary objective of this study is to compare the clinical cure rates between IV and IV-to-PO step-down therapy for definitive treatment of Gram-negative bloodstream infections. Additionally, this study will assess if a difference exists amongst PO antibiotic therapies of differing bioavailability (e.g., high vs. low bioavailability) in the treatment of Gram-negative bloodstream infections. Secondary outcomes include identifying risk factors associated with treatment failure, rates of re-infection, adverse effects reported, and mortality at 30, 60, and 90 days. **Methods:** All adult patients  $\geq 18$  years of age with a Gram-negative bacteremia due to Enterobacteriaceae species or *Pseudomonas aeruginosa* who received their first dose of IV antibiotic therapy at UC Health University of Cincinnati Medical Center or UC Health West Chester Hospital were identified and analyzed for inclusion. Patients were stratified by whether treatment was IV versus IV to-PO step-down therapy. The IV-to-PO step-down group was further stratified based on the bioavailability of the PO agent used for definitive therapy. Pre-specified antibiotic groups include: high (>95%), moderate (75-94%), and low (<75%) bioavailability antibiotics. A multivariate logistic regression will be performed to determine baseline characteristics, co-morbid conditions, and treatment methods, predictive of treatment failure in Gram-negative bloodstream infections. **Results/Conclusion:** Data collection and analysis are currently on-going. Results will be presented at the 2019 Great Lakes Pharmacy Resident

### Learning Objectives:

Discuss epidemiology and the clinical impact of Gram-negative bacteremia worldwide.

Identify the clinical cure rates between intravenous and intravenous-to-oral stepdown therapy for definitive treatment of gram-negative bloodstream infections.

### Self Assessment Questions:

Where is the most common site of primary infection for Gram-negative bacteremia?

- A: Respiratory
- B: Central venous catheter
- C: Urinary
- D: Gastrointestinal

According to the Infectious Diseases Society of America (IDSA) Management of Intravascular Catheter-Related Infections, which of the following is true concerning treatment for Gram-negative bloodstream

- A: Intravenous therapy is indicated for a 7 to 10 day course.
- B: Intravenous therapy is indicated until adequate source control is achieved
- C: Intravenous therapy is indicated for 3 days, then transition to oral
- D: Intravenous therapy is indicated for 14 days

Q1 Answer: C      Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF OUTCOMES ASSOCIATED WITH ASPIRIN 81 MG TWICE DAILY FOR VTE PROPHYLAXIS IN PATIENTS FOLLOWING TOTAL-KNEE OR TOTAL-HIP ARTHROPLASTY

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### Purpose:

Venous thromboembolism (VTE) is a major post-operative complication in patients undergoing total-knee and total-hip arthroplasties. Aspirin has been previously studied for VTE prophylaxis and has shown benefit over placebo. However, surgical techniques and post-operative care have improved over time, and there are no present-day, robust studies comparing aspirin to current standard anticoagulants. Major societal guidelines recommend aspirin as a therapeutic option, but published literature has primarily utilized 325 mg dosing. The purpose of this study is to evaluate the risk of VTE and major bleeding in patients who receive aspirin 81 mg twice daily for VTE prophylaxis in major orthopedic procedures.

### Methods:

This retrospective cohort study includes adult patients who underwent a total-knee arthroplasty (TKA) or total-hip arthroplasty (THA) at Carle Foundation Hospital who received either aspirin 81 mg twice daily, aspirin 325 mg twice daily, enoxaparin or rivaroxaban following the procedure for VTE prophylaxis. Data was extracted from the electronic medical record and includes procedures occurring from February 1, 2017 to May 30, 2018. The incidence of VTE and major bleeding complications will be evaluated and compared across therapies up to 36 days post-operatively.

### Results and Conclusions:

To be presented at the Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the efficacy and safety of aspirin 81 mg twice daily in this patient population, including rates of venous thromboembolism and major bleeding.

Recognize aspirin as a possible alternative agent to contemporary anticoagulants for VTE prophylaxis in major orthopedic procedures.

### Self Assessment Questions:

The results of this study conclude that in major orthopedic procedures:

- A Aspirin is a good alternative to contemporary anticoagulants for VTE
- B: Aspirin of any dose was found not to be a safe alternative to contemporary anticoagulants
- C: Aspirin was found to have lower major bleeding rates than contemporary anticoagulants
- D: Aspirin 81 mg twice daily was not inferior to contemporary anticoagulants

Which of the following statements is true?

- A Major orthopedic guidelines have a recommendation for aspirin as an alternative to contemporary anticoagulants
- B Aspirin 81 mg twice daily has been compared to aspirin 325 mg twice daily
- C Previous studies did not find a difference in rates of major bleeding between aspirin and contemporary anticoagulants
- D Previous studies have found a definite mortality benefit when comparing aspirin to contemporary anticoagulants

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## FLUID RESUSCITATION IN SEPTIC SHOCK PATIENTS WITH CONGESTIVE HEART FAILURE

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Purpose: In the United States, sepsis accounts for nearly 10% of hospitalizations and is associated with significant mortality. Guidelines emphasize early recognition, aggressive fluid resuscitation, and timely antimicrobials. Administration of 30 mL/kg of crystalloid is recommended in the first three hours of sepsis-related hypoperfusion. Over-resuscitation, however, may lead to adverse sequelae including volume overload, pulmonary edema, and organ dysfunction, especially in patients with myocardial dysfunction. Limited data exists guiding resuscitation in those with existing reduced left ventricular ejection fraction (LVEF). The purpose of this study was to compare the efficacy and safety of initial fluid resuscitation in septic shock patients with a history of congestive heart failure (CHF).

Methods: A multicenter, retrospective case-control study was conducted. Patients admitted to the medical intensive care unit (ICU) between October 1, 2011 and August 31, 2018, who were 18 to 89 years old with septic shock and a history of CHF with an LVEF  $\leq$ 50% were eligible for inclusion. The following patients were excluded: pregnant, incarcerated, end-stage renal disease, pulmonary arterial hypertension, transfer from an outside hospital, admission from the operating room or following traumatic injury, comfort care within six hours, and evidence of acute myocardial ischemia. Patients were divided into two groups based on the volume of fluids received in the first six hours of shock onset,  $\geq$ 30 mL/kg and  $<$ 30 mL/kg. The primary endpoint was a composite of in-hospital mortality or receipt of renal replacement therapy within seven days of shock onset. Secondary outcomes included time to hemodynamic stability, lactate clearance, organ support, fluid balance at three and seven days, acute kidney injury, hyperchloremia, and hospital and ICU length of stay. Multivariable logistic regression was performed to determine the association between the volume of initial fluid resuscitation and the primary outcome.

Results/Conclusions: Data analysis is ongoing and results will be presented.

### Learning Objectives:

Recall guideline recommendations for the initial fluid resuscitation of a patient with septic shock.

Discuss potential adverse consequences of over-resuscitation in septic shock.

### Self Assessment Questions:

Which of the following represents the Surviving Sepsis Campaign's initial recommendation for resuscitation in patients with sepsis?

- A Initiate norepinephrine to increase mean arterial pressure
- B: Administer a 30 mL/kg intravenous fluid bolus
- C: Give high dose vitamin C, hydrocortisone, and thiamine
- D: All of the above

Which of the following may be a consequence of over-resuscitation in a septic shock patient with a history of heart failure?

- A Decompensated heart failure
- B Pulmonary edema
- C Acute kidney injury
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF AN EXPANDED PHARMACIST-DIRECTED ORAL ONCOLYTIC EDUCATION AND MONITORING PROGRAM AT A COMMUNITY CANCER CENTER.

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As the growing body of oral oncolytic medications continues to give patients hope for maintaining or treating various malignancies, new challenges exist with these agents. These medications require counseling on side effects and adherence, due to the variety of adverse drug reactions and efficacy with uninterrupted use. At Cowell Family Cancer Center, a pharmacist-led education and monitoring program, expanded from five to eleven oral oncolytic agents. The purpose of this study is to determine the value of pharmacist-directed care on number of patient hospitalizations and medication adherence. This study has been approved by the Institutional Review Board. Criteria for included oral oncolytic agents was determined by oncology-trained pharmacists employed in the outpatient infusion clinic. Pharmacists were consulted by nursing staff of oncologists when prescribed one of the oral oncolytic agents. These include abiraterone, alectinib, capecitabine, dasatinib, enzalutamide, erlotinib, ibrutinib, olaparib, palbociclib, temozolomide, and venetoclax. Pharmacists conducted a medication reconciliation and drug interaction check prior to counseling the patient. Patients met with a pharmacist for education and assessment. Surveys created by the Michigan Oncology Quality Consortium and Cowell Family Cancer Center pharmacists were presented to these patients to assess baseline conditions. Two follow-up calls 1 to 2 weeks after the start of treatment were then conducted by a pharmacist, to determine change in baseline assessment and adherence. The primary outcome is number of interventions identified by a pharmacist. The secondary outcomes include number of interventions accepted by provider, number of hospitalizations, and type of intervention. Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Recognize the goals of a pharmacist-directed education and monitoring program in patients prescribed with one of eleven oral chemotherapy medications

Discuss the hospitalization rate in ambulatory patients prescribed oral oncologic medications, included in a pharmacist-directed education and monitoring program.

### Self Assessment Questions:

What is the goal of education/counseling in patients with therapeutic plans containing oral oncolytic medications?

- A Reduce patient anxiety
- B: Increase patient adherence of these medications
- C: Assess patient quality of life
- D: Review medication interactions with oral oncolytic medications

What is the proposed effect of a pharmacist-directed oral chemotherapy education and monitoring program on rates of hospitalization?

- A No difference in hospitalization rate
- B Increased hospitalization rate
- C Decreased hospitalization rate
- D Unable to determine

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## MEDS TO BEDS FOR ENHANCED RECOVERY AFTER SURGERY PROGRAMS

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### Purpose

Pancreatic cancer patients who undergo the high-risk Whipple procedure often experience serious post-operative complications. Enhanced recovery after surgery (ERAS) protocols have demonstrated the ability to standardize and improve patient care, as well as reducing hospital stay in sets of surgical patients. Delivering medications directly to discharging patients (meds to beds) and incorporating clinical pharmacist direct involvement in early and expanded medication teaching are proposed to further enhance this protocol. These pharmacy interventions are expected to increase adherence, potentially leading to decreased post-operative complications and readmission rates. The purpose of this project is to develop and implement a multidisciplinary meds to beds workflow in Whipple procedure and other surgical oncology patients that will include early targeted discharge education and mobile prescription payment.

### Methods

Planned steps to implement this project include obtaining pre-implementation data of patient prescription fill rates in the surgical oncology (including Whipple procedure) patients within University of Wisconsin (UW) Health; developing role-specific workflows for meds to beds implementation; creating medication education booklets for patients; and training pharmacists and inpatient Medication Access Specialist (iMAS) technicians on this new workflow. Upon pilot workflow completion with the surgical oncology patients, the process will be re-evaluated and areas of improvement will be identified for future expansion.

### Results

Metrics for the successful implementation of meds to beds are an increase in prescription discharge capture rate and no observable change in discharge wait time, as this is a surrogate for the patient experience measure. A final benefit of the meds to beds program will be an increase in revenue to the health system, as patients would be filling their prescriptions at UW's outpatient pharmacy. Additional results and conclusion will be presented at the time of the presentation.

### Learning Objectives:

Identify how implementation of a Meds to Beds procedure will help to improve patient outcomes and increase patient medication knowledge.

Describe the services that will be provided to patients as part of the Meds to Beds program.

### Self Assessment Questions:

Which of the following is a benefit of implementing a Meds to Beds program?

- A Prescription co-pays are added to the patient's hospital bill, no longer
- B: Improved patient adherence, potentially leading to decreased post
- C: Patients receive a discount on their medications
- D: Patients will get less face to face time with pharmacist, resulting in

Which of the following is a service provided as part of the Meds to Beds program?

- A Early and expanded medication education tailored to patients utilizing
- B Referrals to health insurance advisors for uninsured patients
- C Medications are packaged as individual daily doses for ease of administration
- D Medications prescribed prior to admission are refilled automatically

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EFFECT OF SUBLINGUAL OPIOID ADMINISTRATION ON TOTAL OPIOID ADMINISTRATION FOLLOWING TOTAL KNEE ARTHROPLASTY

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**Purpose:** In response to a recent national drug shortage involving intravenous (IV) opioids, a protocol was implemented that utilized sublingual (SL) opioids as an alternative to IV opioids for post-operative breakthrough pain. Compared to IV administration, SL administration has a delayed onset, which may decrease euphoric effects and decrease magnitude of opioid-related adverse effects (ORAEs). Though the shortage has resolved, SL opioids are still being used in post-operative patients. This study aims to determine whether SL opioids are an adequate replacement for IV opioids and whether SL opioids should be considered for continued use after shortage resolution.

**Methods:** A single-center, retrospective chart review involving patients who underwent total knee arthroplasty was conducted at OhioHealth Grant Medical Center. Patients who underwent the procedure during one of two study periods, prior to the IV opioid shortage and during the IV opioid shortage, were identified via the electronic medical record. The control group consisted of patients who received IV opioids but did not receive SL opioids prior to the IV opioid shortage. The treatment group consisted of patients who received at least one dose of SL opioids during the IV opioid shortage. Data recorded included demographic information pre-operative analgesia, procedure details, post-operative analgesia, post-procedure pain scores, hospital length of stay, and incidence of pre-specified ORAEs. All opioid doses were converted to oral morphine equivalents (OME) using standard conversions. The primary endpoint was the difference in total OME administered following surgery. Secondary endpoints included hospital length of stay, incidence of ORAEs, and post-procedure pain scores.

**Results and Conclusions:** Study results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Discuss the pharmacokinetic and pharmacodynamic profiles of different routes of opioid administration.

Identify the effects of post-operative pain control on patient recovery after total knee arthroplasty.

### Self Assessment Questions:

Which of the following statements is true?

- A: Oral opioid administration leads to increased bioavailability compared to intravenous administration.
- B: Maximum plasma concentrations are reached faster with sublingual administration.
- C: Maximum plasma concentrations are reached faster with sublingual administration than with intravenous administration.
- D: Sublingual opioid administration leads to increased bioavailability compared to intravenous administration.

Which of the following may result from appropriate pain control following total knee arthroplasty?

- A: Ability to work with physical therapy sooner
- B: Decreased risk of over-sedation from pain medication
- C: Decreased risk of post-operative ileus
- D: All of the above

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## A SYSTEMATIC APPROACH TO OPTIMIZING OPIOID PRESCRIBING BY STANDARDIZING ORDER SETS

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### Purpose:

In October of 2017, the U.S. Government declared the opioid epidemic a public health emergency. The Centers for Disease Control and Prevention, American Society of Health-System Pharmacists, American Pharmacists Association, and Centers for Medicare and Medicaid Services are supporting initiatives and projects that ensure appropriate opioid prescribing in order to decrease inappropriate opioid utilization and to decrease adverse effects. The Joint Commission recently updated pain assessment and management standards for survey implementation in January 2018. These standards require that hospitals ensure safe opioid prescribing and implement improvement activities. Within this health system, order sets were targeted for optimization due to frequent utilization allowing for high impact change. The intent of this project is to standardize pain management strategies in order sets as a means to optimize the prescribing of opioid medications within a health system.

### Methods:

This process improvement project uses the Define, Measure, Analyze, Improve and Control (DMAIC) model to optimize pain management strategies in order sets by reducing variability and standardizing prescribing options. All opioid-containing order sets were reviewed to measure the scope of variability. An algorithm was developed to analyze and separate order sets with similar pain management needs into manageable groups. Within each group of order sets, strategies to improve pain management were developed that aligned with guideline recommendations and best practices. The developed strategies will be incorporated into order set creation and review to sustain improvement and control the process.

### Results and Conclusions:

Results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Identify guidelines and resources for appropriate prescribing of opioids for pain management.

Describe areas for improvement within order sets based on current evidence.

### Self Assessment Questions:

Which of the following organizations offer recommendations regarding the optimization of opioid prescribing?

- A: The Joint Commission Standards
- B: Society of Hospital Medicine Consensus Statement on Opioids Use
- C: Institute for Safe Medication Practices Guidelines for Standard Opioid Prescribing
- D: All of the above

Which of the following is a proposed strategy for opioid prescribing optimization?

- A: Fentanyl patches will not be used for the treatment of acute pain
- B: Order sets containing opioids will contain concomitant benzodiazepines
- C: IV opioid therapy will be offered as first line treatment of moderate to severe pain
- D: Opioids will be used in the initial treatment of mild pain

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## A RETROSPECTIVE COMPARISON OF EFFICACY OF SUPERVISED AND UNSUPERVISED ADMINISTRATION OF BUPRENORPHINE-NALOXONE IN THE TREATMENT OF OPIOID USE DISORDER

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**Purpose:** Medication-assisted treatment (MAT) is the use of medications with behavioral therapies and counseling to treat substance use disorders and prevent opioid overdose. With increased opioid prescribing, opioid overdose-related deaths have reached epidemic proportions since the 1990's. Poor access to MAT exacerbates the opioid overdose crisis. Buprenorphine-naloxone currently presents the greatest opportunity for expanding access to MAT. Unlike methadone opioid treatment programs (OTPs), which require supervised administration, office-based opioid agonist treatment (OBOT) allows for unsupervised administration of buprenorphine, thus expanding access to MAT. However, despite research demonstrating efficacy of OBOT with buprenorphine, the implementation of buprenorphine OBOT has been slow and variable among Veterans Health Administration facilities. The purpose of this study is to compare the effectiveness of supervised administration of buprenorphine-naloxone in a Drug Dependence Treatment Center (DDTC) versus unsupervised administration combined with participation in an addiction treatment program (ATP).

**Methods:** This is a retrospective, electronic chart review of patients at JBVAMC with an established diagnosis of opioid use disorder (OUD) who were newly started on buprenorphine-naloxone therapy between January 1, 2012 and October 1, 2017 and receiving supervised administration in DDTC or unsupervised administration in conjunction with an ATP. The primary endpoint is percentage of opiate-negative urine drug tests during treatment. The secondary endpoints include treatment retention, inpatient admissions related to opioid use, emergency department visits related to opioid use, death related to opioid use disorder, and residential treatment related to opioid use disorder. Descriptive statistics will be used to analyze the primary and secondary endpoints.

**Results:** Results and conclusion will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the mechanism of action of buprenorphine-naloxone in the treatment of opioid use disorder.

Identify which Food and Drug Administration (FDA)-approved medication for the treatment of opioid use disorder can be prescribed as office-based opioid agonist treatment.

### Self Assessment Questions:

Which of the following best describes the mechanism of action of buprenorphine-naloxone in the treatment of opioid use disorder?

- A: Mu-opioid receptor antagonist that leads to a reduction of dopamine
- B: Partial mu-opioid receptor agonist that suppresses withdrawal symptoms
- C: Mu-opioid receptor agonist that induces opioid tolerance to suppress withdrawal symptoms
- D: Opioid antagonist that displaces opioids at opioid receptor sites

Which of the following medications is FDA-approved for the treatment of opioid use disorder and can be prescribed as office-based opioid agonist treatment?

- A: Buprenorphine-naloxone
- B: Methadone
- C: Both buprenorphine-naloxone and methadone
- D: Naltrexone

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## ENGAGING HIGH RISK PATIENTS IN FALL PREVENTION: INTERDISCIPLINARY EFFORTS IN FALL MANAGEMENT IN ACUTE CARE SETTINGS

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### Purpose

Patient falls in hospitals are a significant safety issue. Patient falls are classified into attended and unattended. Compared to attended falls, unattended falls result in more severe injuries and higher cost of care. Patient engagement in fall management has been reported to reduce falls, fall injuries and related costs in oncology patients by enhancing patients' awareness of fall prevention measures and encouraging them to seek assistance when getting out of bed. Highpoint Health has implemented universal measures in fall management. To further reduce patient falls, new interventions involving interdisciplinary efforts from nursing staff and pharmacists were initiated to engage patients into fall management. Retrospective review of data from fall incidents at Highpoint Health showed that patients with Morse fall score  $\geq 45$  have higher fall rates than those with lower scores. The purpose of this study is to evaluate the effectiveness of these interventions in reducing falls at Highpoint Health.

### Methods

Patients with a Morse fall score  $\geq 45$  are included. Within 8 hours of admission, the patient is given education by a nurse on the fall prevention guidelines for the patient to follow when in hospital. The patient then teaches back to acknowledge understanding. Nurses enhance the education every 8 hours by reviewing the guideline sheet with the patient. All fall risk education encounters are documented. A list of patients with a Morse fall score  $\geq 45$  is provided to the pharmacists daily. Pharmacists will then review these patients' medications and make interventions to reduce patients' exposure to benzodiazepines and narcotics, thus reducing patients' risk of confusion and maximizing the patients' engagement. Data of hospital inpatient falls will be compared to those collected prior to the intervention.

### Results

Data is being collected and will be analyzed.

### Conclusion

Results and conclusion will be presented at Great Lakes Pharmacy Residents Conference.

### Learning Objectives:

Outline risk factors for patient falls in hospitals.

Describe common interventions to prevent/reduce falls in hospitals.

### Self Assessment Questions:

Which patient from below has the highest risk of fall?

- A: Intubated ICU patient
- B: Patient with Morse fall score 75
- C: Patient with Morse fall score 20
- D: Can't tell from given description.

2. Which of the following can be used as intervention(s) to prevent patient falls?

- A: Providing non-skid socks for patient to walk in
- B: Moving patients with high fall risk to the rooms by nurse station
- C: Limiting fluid intake of patients with high fall risk to reduce toilet trips
- D: A and B

Q1 Answer: B      Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTING AND SUSTAINING A STAFF EDUCATION PROCESS IN A SPECIALTY PHARMACY

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**Background:** Specialty pharmacies often seek accreditation from one or more of three primary organizations focused on specialty pharmacy services: Utilization Review Accreditation Commission (URAC), Accreditation Commission for Health Care (ACHC), and the Center for Pharmacy Practice Accreditation (CPPA). These organizations require standardization of services and optimization of patient care to achieve and maintain accreditation. Some of the standards require adequate education for specialty pharmacy staff members though there is a degree of latitude on how to achieve the standard. This project aims to deliver a standardized process for staff education in order to optimize patient care, improve Norton Specialty Pharmacy (NSP) workflow, and sustain specialty pharmacy accreditation.

**Methods:** This process improvement project uses the Define, Measure, Analyze, Improve and Control (DMAIC) model to standardize the process for creating, delivering, and maintaining staff education for NSP. The project organizes the process into two distinct components. The first component involves educational content, method and measurement. The second component focuses on educational documentation and storage. Integration of these standardized components controls for variation over time and results in a comprehensive and sustainable education process.

**Results/Conclusions:** Results will be presented at the 2019 Great Lakes

### Learning Objectives:

List the benefits of developing a standardized process for staff education in a specialty pharmacy

Describe the components of a successful pharmacy staff education plan in a specialty pharmacy

### Self Assessment Questions:

What are the benefits of a standardized process for staff education?

- A: Optimize patient care
- B: Improve the specialty pharmacy workflow
- C: Sustain accreditation
- D: All of the above

Which of the following are components of a successful pharmacy staff education plan?

- A: Documentation
- B: Patient outcomes
- C: Avoidance of staff burnout
- D: Utilization of pharmacy residents

Q1 Answer: D      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF CLINICAL OUTCOMES FOLLOWING IMPLEMENTATION OF REAL-TIME STEWARDSHIP TEAM INTERVENTIONS FOR MULTI-DRUG RESISTANT ORGANISMS

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**Purpose:** Infections due to multi-drug resistant organisms (MDRO) are associated with an increased risk of mortality. Accurate assessment of culture results and prompt initiation of effective antibiotic therapy have the potential to improve patient outcomes. The purpose of this study is to assess the time to effective therapy and associated clinical outcomes following the implementation of real-time stewardship alerts for infection due to MDROs.

**Methods:** This pre-post quasi-experimental study will identify patients  $\geq 18$  years of age admitted October 2017 – March 2019 with a positive culture for one of 14 pre-defined MDROs. In the pre-intervention period (October 2017– March 2018), no structured alerting of assessment was performed. In the intervention period (October 2018 – March 2019), the antibiotic stewardship team will receive an automated real-time page, review the patient's chart and recommend appropriate antibiotic modifications if necessary. The stewardship pager will be monitored 24 hours a day, 7 days a week by a clinical pharmacy specialist. The primary outcome of time to effective therapy, defined as an agent to which the MDRO is susceptible, will be determined for each positive culture. Secondary outcome measures to be evaluated include: all-cause mortality, (infection-related) length of stay, intensive care unit admission and 30-day readmission. A multivariate logistic regression will be utilized to control for any confounding variables when evaluating the impact of stewardship intervention on secondary outcomes.

**Results and Conclusions:** To be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Discuss the emergence and prevalence of multi-drug resistant organism  
Recognize the impact antimicrobial stewardship real-time interventions have on time to effective therapy and clinical outcomes

### Self Assessment Questions:

For epidemiological purposes, a multi-drug resistant organism is defined as an organism which has developed resistance to:

- A: An antimicrobial agent
- B: One or more classes of antimicrobial agents
- C: One agent in two or more antimicrobial classes
- D: One agent in three or more antimicrobial classes

The majority of studies assessing the impact of real-time alerts coupled with stewardship intervention have focused on which source of infection?

- A: Blood
- B: Bone
- C: Intra-abdominal
- D: Ssti

Q1 Answer: B      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## SWITCHING BETWEEN BASAL INSULINS IN THE HOSPITAL SETTING: REAL-WORLD RECOMMENDATIONS FOR PROVIDERS

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**Purpose:** Managing hyperglycemia in an acute care setting presents itself with many challenges. There are currently six basal insulin products on the market; however, very few studies focusing on conversion between basal insulins in the acute care setting exist. In the hospital setting, the choice of basal insulin may be limited by formulary restrictions. Thus, patients often have to be switched between two different insulin products. In order for clinicians to appropriately prescribe basal insulin, the patient's preadmission insulin regimen, level of glycemic control, and comorbidities must be considered. In June 2018, St. Joseph Mercy Oakland (SJMO) made a formulary change from insulin detemir to insulin glargine U-100. Following this change, guidelines were implemented at SJMO to assist practitioners in transitioning patients from home basal insulin to glargine U-100. The primary aim of this study is to validate the current pharmacist-driven basal insulin conversion guideline.

**Methods:** This is a historical and post-intervention study comprised of patients >18 years of age with diabetes mellitus receiving basal insulin at home. The historical group consists of patients initiated on glargine from July to September 2018. The interventional phase, conducted from December 2018 to January 2019, includes a pharmacist reviewing and adjusting glargine based on the SJMO basal insulin guideline. An analysis of both groups will be completed to assess glycemic control for up to 5 days of inpatient visit. Patients who are critically ill, receiving a continuous insulin infusion, pregnant women, and those admitted with a diagnosis of hypoglycemia will be excluded.

**Results/Conclusion:** Data collection and analysis remain ongoing. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe Describe the importance of adequate glucose control in the acute care setting  
Recognize Recognize differences among basal insulin types and formulations while considering other factors that affect safe and effective glycemic management

### Self Assessment Questions:

What acute complication in the inpatient setting is more likely to occur if diabetes is poorly controlled?

- A: Greater risk of infections
- B: Retinopathy
- C: Amputations
- D: Cardiovascular disease

Which of the following formulations is considered a basal insulin?

- A: Lispro
- B: Aspart
- C: Glargine
- D: Glulisine

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## VACCINE COMPLIANCE RATES IN POST-SPLENECTOMY PATIENTS AT AN ACADEMIC MEDICAL CENTER

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Overwhelming post-splenectomy infections (OPSI) are fulminant infections that occur in asplenic patients and carry a mortality rate of 38-69%. The most common causative organisms for OPSI include the encapsulated bacteria *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Neisseria meningitidis*, with *S. pneumoniae* representing the majority of OPSI. While there are vaccines available, there is a scarcity of literature in the United States to describe compliance with the recommended vaccine series in post-splenectomy patients.

This project aims to determine the vaccine compliance rates for patients who have undergone splenectomy at UW Health and develop and implement interventions to improve compliance with the recommended vaccine series. Vaccine compliance rates were determined by identifying patients who have undergone splenectomy at UW Health and comparing vaccine records available in the electronic medical record and Wisconsin Immunization Registry with Centers for Disease Control and Prevention recommendations. To improve compliance rates, a registry of patients will be created to allow pharmacists to follow post-splenectomy patients. The registry will be used to alert pharmacists to contact patients and/or their providers when vaccines are needed. Additionally, inpatient providers and pharmacists will be educated on best practices of post-splenectomy care.

The average overall compliance rate for patients at UW Health who received a splenectomy from 2009-2012 was 38% (n=127). No patient was fully compliant, and 80% of patients (n=102) had vaccine compliance rates below 50%. The first PPSV23 and Hib vaccine had the highest compliance rates, whereas the second PPSV23, meningococcal ACWY, and meningococcal B vaccines had compliance rates below 5%.

Although the rates are consistent with other studies from around the United States, post-splenectomy vaccination rates fall short of expectations at UW Health. A pharmacist-led intervention could improve compliance with guideline-recommended vaccine series. Development of a pharmacist-led intervention to improve vaccine compliance is in progress at UW Health.

### Learning Objectives:

Report the vaccine compliance rates for post-splenectomy patients at UW Health and more broadly across the US

Review the recommended vaccines and their timing for post-splenectomy patients

### Self Assessment Questions:

From the literature and UW's internal data, the average compliance rate with booster vaccines in post-splenectomy patients is which of the following:

- A: <33%
- B: 33-66%
- C: >66%
- D: 100%

The pathogen that has a vaccine available for prevention and most commonly causes sepsis in patients who have undergone splenectomy is:

- A: *Neisseria meningitidis*
- B: *Haemophilus Influenzae*
- C: *Streptococcus pneumoniae*
- D: *Staphylococcus aureus*

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## PREVENTION OF INPATIENT HYPOGLYCEMIA AT A COMMUNITY TEACHING HOSPITAL

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**Purpose:** Hypoglycemia remains a frequent adverse drug event despite implementation of hospital wide protocols involving nursing, practitioners and pharmacy. Current literature and guidelines aimed at preventing hypoglycemia are vague causing different approaches between institutions. The primary objective of this study is to identify risk factors for hypoglycemia at our institution and implement strategies to prevent level 2 hypoglycemia. [55 words]

**Methods:** This study is a single-center retrospective chart review conducted on patients who experienced level 2 hypoglycemia, blood glucose levels less than 54 milligrams per deciliter, from January 1, 2018 through November 30, 2018. A manual chart review of these patients was performed collecting the following data: blood glucose level before and after the critical event, latest glycosylated hemoglobin value, home blood glucose medications, inpatient blood glucose medications, oral food intake, change in therapy after the hypoglycemic event, ordered hypoglycemic precautions, admission diagnosis, concomitant medications, renal function, age, gender, diabetes diagnosis, and the hospital unit the event occurred in. The data collected was de-identified on a data collection form in order to be analyzed by the study investigators. The analyzed data will be used to develop hospital wide policies and procedures to minimize hypoglycemic events. [94 words]

**Results and Conclusion:** Data collection and analysis are currently in progress. Results will be presented at the Great Lakes Pharmacy Resident Conference. [19 words] [167/300 words total]

### Learning Objectives:

Identify patients that are at an increased risk of experiencing clinically significant hypoglycemic events

List potential barriers involved with implementing and designing procedures to prevent hypoglycemia in your own institutions

### Self Assessment Questions:

What blood glucose value does the 2019 American Diabetes Association define as level 2 hypoglycemia?

- A <40 mg/dL
- B: <50 mg/dL
- C: <54 mg/dL
- D: <70 mg/dL

Which variable plays an important role in impaired glucose homeostasis

- A Poor quality cafeteria food
- B Impaired renal function
- C Poor sleep quality
- D Impaired liver function

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPLEMENTATION OF A MEDICATION HOTLINE TO REDUCE POST-DISCHARGE MEDICATION EVENTS

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Many patients can feel confused and overwhelmed upon discharge from the hospital or the emergency room. Transitions of care have become a recurrent topic in healthcare, which has generated various initiatives to improve patient care and reduce readmissions. The organization has created a Medication Hotline as a free service to patients to help clarify questions from their after visit summary once they have returned home. A Medication Hotline was created as a free service to patients to help clarify questions from their after visit summary following discharge. This hotline, which is managed by the inpatient pharmacists, allows patients to call a direct phone number with questions at any time. If possible, phone calls are answered in real time; otherwise, a voicemail for the hotline is checked frequently. After the phone call is completed, the pharmacist documents each phone call within the electronic medical record and on a standardized form, which includes the date, time, patient identifiers, question/issue, steps taken, and resolution.

Since the implementation of the Medication Hotline, Riverview Health inpatient pharmacists have been able to help over forty patients post-discharge with a variety of issues. Many of these phone calls were concerning dosing, directions, or when to take next doses. We have also resolved several issues concerning lost or missing prescriptions post-discharge. Nearly all issues were able to be resolved by the pharmacist. Issues that could not be resolved by the pharmacist were referred to the proper healthcare professional. Medication Hotline calls are resolved in an average of twelve minutes.

Giving patients direct access to an inpatient pharmacist allows them to obtain vital information in a timely manner. This process did not add a significant amount of work for the inpatient pharmacists. Implementation of a Medication Hotline is a cost-effective and efficient way to improve transitions of care.

### Learning Objectives:

Recognize the potential benefits that implementing a medication hotline may have on transitions of care.

List services that are outlined in current literature that are aimed at improving transitions of care.

### Self Assessment Questions:

Which of the following is a potential result of the implementation of a medication hotline?

- A A significant increase in patients returning to the emergency department
- B: A significant increase in medication errors after discharge.
- C: Ability to answer patient, caregiver, or community pharmacist's questions
- D: A significant increase in workload for the inpatient pharmacists

Which of the following include strategies found in current literature that are being used to improve transitions of care?

- A Home visits, email follow-up, and nurse-initiated text messaging.
- B Patient hotlines, nurse-initiated follow-up calls, and medication reconciliation
- C Skype services and follow-up surveys.
- D Pharmacist home visits, email follow-up, and electronic surveys.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF PHARMACIST PRESENCE AT THE BEDSIDE IN ACUTE ISCHEMIC STROKE ON DOOR-TO-NEEDLE TIME TO RECOMBINANT TISSUE PLASMINOGEN ACTIVATOR

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**Purpose:** Shorter time to Intravenous (IV) alteplase in acute ischemic stroke (AIS) is associated with improved functional outcome and reduce morbidity. Delays in recognizing the symptoms of stroke, neuroimaging, inefficient in-hospital acute stroke care, and treatment preparation and delivery have been identified as barriers to achievement of recommended door to needle times (DTN) of less than 60 minutes. Finding interventions that improve outcomes in stroke patients is a primary concern. The purpose of this study is to determine the impact of a pharmacist on DTN time to IV alteplase during AIS.

**Methods:** The study was a retrospective chart review of patients with AIS admitted to Loyola University Medical Center from January 1, 2016 to December 31, 2018. Patients were included if they were > 18 years of age and received alteplase within 4.5 hours of stroke symptom onset. The following exclusion criteria were applied: transfer from an outside hospital, intra-arterial alteplase without systemic alteplase, or missing or incomplete documentation of arrival time, time last known well, DTN time or alteplase administration time. Patients were identified through the stroke quality improvement committee registry. The primary outcome of this study was to assess the impact of pharmacist presence on reduction in DTN time. We hypothesized that pharmacist presence in AIS would shorten DTN time. Secondary outcomes included DTN goal < 60 minutes, DTN goal < 45 minutes, door to arterial puncture time, needle to arterial puncture time in patients who underwent mechanical thrombectomy, hemorrhagic conversion, in-hospital mortality, 90-day mortality, 90-day National Institutes of Health Stroke Scale (NIHSS), discharge NIHSS, 90 day modified Rankin score (mRS), discharge mRS ICU LOS, and hospital LOS. Statistical analysis was performed using SPSS software.

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

### Learning Objectives:

Discuss barriers to improving door to needle times in acute ischemic stroke

Describe the time-sensitive nature of stroke management

### Self Assessment Questions:

Which of the following has been identified as a barrier to achieving DTN time < 60 minutes in AIS?

- A: Body weight >100kg
- B: Treatment preparation
- C: Cost of alteplase
- D: Delayed consent procedure

According to ECASS III trial, IV alteplase administered between \_\_\_ and \_\_\_ hours after the onset of symptoms significantly improved clinical outcomes in patients with acute ischemic stroke

- A: 1; 1.5
- B: 0; 3
- C: 3; 4.5
- D: 4; 5

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## PATTERNS AND OUTCOMES FOR PATIENTS ON EXTENDED ORAL VANCOMYCIN TREATMENT FOR CLOSTRIDIUM DIFFICILE INFECTION AND CONCOMITANT ANTIBIOTICS

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**Purpose:** In 2018, the Infectious Disease Society of America updated the guidelines for the treatment of Clostridium difficile infection (CDI). These guidelines provide new treatment recommendations for medication options and treatment durations. However, it fails to address the treatment and duration of choice for patients requiring concomitant antibiotics for an infection not caused by C. difficile. The purpose of this study is to characterize prescribing patterns and outcomes of patients receiving extended oral vancomycin treatment with concomitant use of non-CDI antibiotics. **Methods:** This is a case series that reviews patients who receive extended oral vancomycin treatment while on concomitant antibiotics for an infection not caused by C. difficile and the rate of recurrent CDI. Patients included are 18 years of age or older, admitted to a Henry Ford Health System from January 1, 2014 to January 31, 2019, diagnosed with an initial case of CDI, and have at least 4 days of overlap with oral vancomycin and the concomitant non-CDI antibiotics. Extended oral vancomycin treatment is defined as greater than 10 days of therapy. Recurrence of CDI will be assessed 30 days after the completion of oral vancomycin treatment. Data will be reported using descriptive statistics and will not require comparison between different outcome groups. **Summary/Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize risk factors for developing an initial case of Clostridium difficile infection.

Identify the recommended treatment of choice for patients diagnosed with an initial, non-severe or severe Clostridium difficile infection.

### Self Assessment Questions:

JJ is a 40 year old male that presented to the ED with an initial case of non-severe C. difficile. He has a past medical history of hypercholesterolemia. JJ is currently on moxifloxacin 400mg PO daily

- A: Age
- B: Moxifloxacin
- C: Gender
- D: Hypercholestermia

According to the updated IDSA guidelines, what is the treatment of choice for a patient that is diagnosed with an initial, non-severe case of Clostridium difficile?

- A: Metronidazole 500mg IV every 8 hours x 10 days
- B: Metronidazole 500mg PO every 8 hours x 10 days
- C: Vancomycin PO 125mg every 6 hours x 10 days
- D: Vancomycin PO 250mg every 6 hours x 10 days

Q1 Answer: B      Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)

## INCIDENCE AND PREDICTORS OF HYPOGLYCEMIA FOLLOWING INSULIN AND DEXTROSE ADMINISTRATION FOR HYPERKALEMIA

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**Purpose:** Hyperkalemia is a common electrolyte abnormality often requiring admission to emergency departments (ED). Timely management is essential to avoid mortality due to ventricular dysrhythmias, heart block, and cardiac arrest. The reported incidence of hypoglycemia in patients following acute treatment of hyperkalemia with insulin ranges widely from 4% to 79%, which, coupled with limited knowledge about predictors for developing hypoglycemia post insulin-based treatment regimen, warrants further investigation. According to American Heart Association guidelines for hyperkalemia treatment, the use of insulin is one of the standard therapies. Options for treatment include: shifting potassium intracellular via IV administration of regular insulin given with dextrose to counteract hypoglycemia or via a nebulized beta2 agonist such as albuterol and sodium bicarbonate to aid in mitigating severe metabolic acidosis. Additionally, to protect the heart and stabilize the myocardial cell membrane, IV calcium chloride can be utilized. Finally, to promote potassium excretion, furosemide or kayexalate can be administered. Ultimately, dialysis may be initiated to rid excess potassium. This study aims to assess incidence of hypoglycemia in ED patients following administration of insulin/dextrose regimen and to identify predictors.

**Methods:** This was a retrospective, observational, single-center cohort study of patients who presented to the Loyola University Medical Center ED with hyperkalemia between January 2016 to July 2018, and subsequently developed hypoglycemia after treatment with regular insulin. The primary outcome was development of hypoglycemia (blood glucose <70mg/dL). The secondary outcomes were: predictors of hyperkalemia, incidence of severe hypoglycemia (blood glucose <50mg/dL), intensive care unit (ICU) and hospital length of stay, and appropriate use of other agents for hyperkalemia. Patients were grouped by blood glucose <70mg/dL and blood glucose >70mg/dL. Multivariable logistic regression was used to identify potential predictors of hypoglycemia following treatment with insulin.

**Results & Conclusions:** Results will be presented at the 2019 Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the clinical role of insulin in treating hyperkalemia  
Recognize predictive factors for hypoglycemia in the setting of insulin based treatment for hyperkalemia

### Self Assessment Questions:

All of the following might lead to increased serum K+ concentration EXCEPT?

- A B-blocker
- B: Corticosteroid
- C: Spironolactone
- D: Angiotensin receptor blocker

If a patient presents with hyperkalemia and has EKG changes, which medication should be administered first?

- A Sodium Bicarbonate
- B Sodium Chloride
- C Calcium
- D Kayexalate (sodium polystyrene sulfate)

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## IMPACT OF A MANDATORY SPECIALTY PHARMACY BENEFIT ON RHEUMATOID ARTHRITIS MEDICATION ADHERENCE AMONG MEMBERS OF A COMMERCIAL CLIENT

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**Purpose:** To determine the impact of a mandatory specialty pharmacy benefit on rheumatoid arthritis (RA) medication adherence eight months after transitioning members of a commercial client to specialty pharmacy.

**Methods:** A retrospective analysis was conducted using an internal pharmacoadherence application. Members with claims for adalimumab, etanercept, certolizumab pegol, or golimumab were included, provided they received at least two fills within the study time periods of May 2017 through December 2017 and January 2018 through August 2018 (time period 1), and June 2017 through January 2018 and February 2018 through September 2018 (time period 2). Pharmacy claims were analyzed to calculate proportion of days covered (PDC), medication possession ratio (MPR), and gap in therapy (GIT) in each time period. Members with a baseline Health Assessment Questionnaire II (HAQ-II) score after the transition were compared to subsequent HAQ-II scores for a correlation with adherence.

**Results:** 137 members with RA were included for both time periods. Prior to transition, 34% of members were filling at non-specialty pharmacies and 66% of members were filling at specialty pharmacies. In time period 1, there were no statistically significant differences in MPR or GIT pre- and post-transition, however there was a statistically significant improvement in PDC for members who were filling at a non-specialty pharmacy before transition (0.836 vs 0.893, p=0.030). In time period 2, there were no statistically significant differences in MPR pre- and post-transition, however there was a statistically significant improvement in GIT (36.500 vs 26.457, p=0.035) and PDC (0.823 vs 0.873, p=0.017). HAQ-II scores did not significantly improve after six months post-transition compared to baseline.

**Conclusions:** PDC significantly improved after transitioning the RA members who were previously filling at non-specialty pharmacies. Patient-reported outcomes regarding disability and physical function did not show significant improvement. Future studies with more robust HAQ II data is warranted.

### Learning Objectives:

Review the various methods available to estimate medication adherence  
Describe how validated assessments are utilized in specialty pharmacy to measure patient-reported outcomes.

### Self Assessment Questions:

Which of the following is a common method used to estimate a patient's medication adherence based on prescription claims data?

- A Health Assessment Questionnaire II (HAQ-II)
- B: Morisky Medication Adherence Scale (MMAS)
- C: Patient Health Questionnaire 9 (PHQ-9)
- D: Proportion of Days Covered (PDC)

Which of the following chronic disease states would HAQ-II scores be useful to measure the impact of disease on a patient's ability to function and quality of life?

- A Asthma
- B Diabetes
- C Heart failure
- D Rheumatoid arthritis

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF ACID SUPPRESSIVE THERAPY (AST) APPROPRIATENESS IN ADULT NON-CRITICALLY ILL PATIENTS

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**Purpose:** Acid suppression therapy (AST) has an established role in gastrointestinal protection in patients who are taking antiplatelet, anticoagulant or non-steroid anti-inflammatory drugs. While in the hospital, AST use has only been validated within the intensive care unit setting for stress ulcer prophylaxis. Several studies have associated the use of AST with an increased risk of complications such as hospital-acquired pneumonia and C. difficile infections. In addition, inappropriate AST started in the hospital is often continued in the outpatient setting. The objective of this study is to evaluate the appropriateness of AST practices and identify opportunities for de-prescribing within a 451-bed regional, medical center. **Methods:** The study is a retrospective, single-center evaluation including adult patients who had active orders for predefined AST agents and were admitted between June 2018 to September 2018. Exclusion criteria include active pregnancy, active cancer, prisoners, surgical/ observational status, intensive care unit admission, and death before hospital discharge. Therapy indications are categorized as appropriate, inappropriate or unknown according to their documented AST indications. Appropriate therapy was defined by the Food and Drug Administration approved indications, the 2008 American College of Cardiology Foundation/American College of Gastroenterology/American Heart Association guideline and the 1998 American Society of Health-Systems Pharmacists guideline. The primary outcome to be examined is the number of inappropriate AST use days per 100 patient days. Secondary outcomes that will be evaluated include: patients discharged on inappropriate AST therapy, specific AST therapy used, patients who report taking AST before hospitalization, and number of pharmacist interventions made to discontinue inappropriate AST. **Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Recognize opportunities to de-escalate AST in patients outside of intensive care

List possible long-term adverse effects of AST use

### Self Assessment Questions:

In which of the following situations would you recommend to deescalate AST?

- A: A patient reports taking 80 mg propranolol daily by mouth and 1 g
- B: A patient reports not taking any AST prior to admission, and was h
- C: A patient reports taking AST at the nursing home for 2 months pri
- D: A patient reports not taking AST prior to admission, admitted with l

Which of the following is a long-term adverse effect of AST use?

- A: Stroke
- B: Myocardial infarction
- C: Pneumonia
- D: Hypomagnesemia

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATING PALLIATIVE ANTINEOPLASTIC THERAPY ADMINISTERED AND MEDICATION DE-ESCALATION IN VETERAN CANCER PATIENTS TOWARD THE END-OF-LIFE

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**Purpose:** Cancer patients near end-of-life often receive aggressive treatments and non-essential medications. The focus should instead be on improving quality of life and simplification of regimen. Recent antineoplastic therapies have shifted and there are more options for cancer treatment. The objective of this study is to evaluate the quality of care services within the Veterans Affairs Medical Center.

**Methods:** This is a multi-centered, retrospective, chart review of deceased patients with metastatic melanoma, lung, prostate, colon, and pancreatic cancer between July 1, 2016 to June 30th, 2018. The primary outcome will evaluate the incidence of antineoplastic therapy, immunotherapy, hormonal therapy, or cytotoxic chemotherapy, administration within 30 and 14 days of life and incidence of patients with at least one non-essential chronic medication dispensed within 30 and 14 days of life. Non-essential medications include lipid-lowering agents, oral bisphosphonates, vitamins, anti-platelet, anti-dementia, gastric protectors, oral anti-diabetic agents with most recent A1c  $\geq 8\%$  and therapeutic duplications. Secondary outcomes include determining line of therapy, emergency room visits, length of time between diagnosis and death, hospice/palliative care referrals, total non-essential medications, and if any non-essential medications were discontinued. The following data will be collected: age at death, sex, presence of palliative care team services, cancer diagnosis at time of death, antineoplastic therapy administered within 30 and or 14 days of death, total number of different antineoplastic regimens, any emergency visit related to cancer within 30 days of death, hospital admissions within 30 days of death, time between diagnosis and death, if hospice referral was placed, non-essential medication dispensed, medication de-escalation, and who made the recommendation. All data will be recorded without patient identifiers and maintain confidentiality. This study will be submitted to the Institutional Review Board for approval. Results & Conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

### Learning Objectives:

Describe the use of non-essential medications in the metastatic cancer patients near end of life

Recognize incidence of palliative chemotherapy use in metastatic cancer patients near end of life

### Self Assessment Questions:

Non-essential medications are defined as:

- A: Omeprazole for GERD symptoms
- B: Furosemide for fluid management
- C: Atorvastatin for CVD prevention
- D: Oxycodone for pain control

Chemotherapy use near end of life in solid tumor patients with poor performance status:

- A: Improve ECOG Score
- B: Improve quality of life
- C: Improve survival outcome
- D: None of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## EVALUATION OF SYSTEMIC ANTICOAGULATION VERSUS CONSERVATIVE ANTICOAGULATION IN VENOVENOUS EXTRACORPOREAL MEMBRANE OXYGENATION

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Up to 35% of patients undergoing extracorporeal membrane oxygenation (ECMO) develop acute thromboses while cannulated. The 2014 Extracorporeal Life Support Organization Anticoagulation Guidelines recommend therapeutic anticoagulation for patients on ECMO. Hemorrhagic complications are reported in a similar proportion of patients undergoing ECMO. Recent studies suggest that the use of prophylactic anticoagulation, no anticoagulation, or lower target ranges for therapeutic anticoagulation is feasible in venovenous (VV) ECMO and may decrease hemorrhagic complications without increasing the risk of thrombosis. The optimal anticoagulation strategy in patients undergoing VV ECMO remains unknown.

The primary objective of this study is to compare the incidence of oxygenator exchange between systemic and conservative anticoagulation strategies in patients undergoing VV ECMO. Secondary objectives are to compare the time to first oxygenator exchange, incidence of thrombotic events, and incidence of hemorrhagic events between patients receiving systemic and conservative anticoagulation strategies in patients undergoing VV ECMO.

This study will be a single-center retrospective cohort study conducted at Cleveland Clinic Main Campus from January 1st, 2015 through December 31st, 2018. Adult patients initiated on VV ECMO during the study period will be included if they were supported on VV ECMO for at least 48 hours. Patients will be excluded if they were cannulated to VV ECMO at an outside hospital or if they had a history of heparin-induced thrombocytopenia. Patients will be characterized as receiving systemic anticoagulation if they received a heparin infusion for at least 50% of their ECMO duration or a heparin infusion for at least 50% of their ECMO duration prior to oxygenator exchange. All other patients will be characterized as receiving conservative anticoagulation. The primary outcome of this study will be the incidence of oxygenator exchange. Secondary outcomes include time to first oxygenator exchange, incidence of thrombotic events, and incidence of hemorrhagic events.

Results pending.

### Learning Objectives:

Discuss the risks and benefits of anticoagulation in patients undergoing VV ECMO

Describe the incidence of thrombotic and hemorrhagic complications in patients receiving systemic versus conservative anticoagulation strategies while undergoing VV ECMO

### Self Assessment Questions:

Which of the following are common complications of patients undergoing extracorporeal membrane oxygenation?

- A Hemorrhage
- B: Thrombosis
- C: Diabetes
- D: Both A and B

What type of anticoagulation do the extracorporeal membrane oxygenation anticoagulation guidelines recommend?

- A Therapeutic anticoagulation
- B Prophylactic heparin only
- C No anticoagulation
- D Therapeutic anticoagulation with lower target ranges

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## ASSESSING RELIABILITY AND VALIDITY OF ADVANCED PHARMACY PRACTICE EXPERIENCE (APPE) EVALUATIONS FROM ONE COLLEGE OF PHARMACY IN THE UNITED STATES

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Purpose: PharmD curricula contain didactic and experiential component per Accreditation Council for Pharmacy Education (ACPE) standards. Preceptors must complete evaluations about students after the completion of an Advanced Pharmacy Practice Experience (APPE). These evaluations are often not assessed for reliability and validity, however results are used to make curricular changes and student progression decisions. Our college requires all student pharmacists to complete seven APPEs, including one inpatient acute care/general medicine experience, one ambulatory patient care experience, one hospital or health-system pharmacy experience, and one community pharmacy experience. In addition, a fifth "selective" direct patient care experience (ambulatory patient care or inpatient acute care/general medicine patient care) is also required. The remaining two elective experiences may be taken at any level of patient care. The same evaluation is used for all experiences. A new evaluation was created in September 2016. This study conducted reliability and validity testing on APPE evaluations to determine if changes were needed. Methods: After Institutional Review Board (IRB) approval was obtained, Cronbach alpha and exploratory factor analysis were conducted on the data using the Statistical Package for the Social Sciences (SPSS) software to determine reliability and validity. Evaluations were analyzed as a whole and by APPE type and data was de-identified. All student evaluations from blocks 3-8 of the Class of 2017 (October 2016-May 2017) and blocks 1-8 of the Class of 2018 (July 2017-May 2018) were included, as these blocks utilized the updated evaluation forms. Results: Preliminary results include evaluations from October 2016 to May 2017. The number of factors identified to be covered by the evaluation in each APPE type were as follows: community (6), acute care (15), ambulatory care (9), advanced hospital (7), electives (11), and all rotations (10). Conclusions: Additional results and conclusions will be presented at the 2019 Great Lakes Pharmacy Resident Conference.

### Learning Objectives:

Explain the importance of reliability and validity when evaluating and changing a college of pharmacy's curriculum.

Describe the different categories of advanced pharmacy practice experiences (APPE) a college of pharmacy offers.

### Self Assessment Questions:

Which of the following may not be considered as a patient care experience at Sullivan University College of Pharmacy and Health Sciences (SUCOPHS)?

- A Advanced Hospital
- B: Elective
- C: Acute Care
- D: Community

Which of the following is defined as how precise a test measures what it is thought to measure?

- A Consistency
- B Reliability
- C Validity
- D Trustworthiness

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number

Activity Type: Knowledge-based Contact Hours: 0.5  
(if ACPE number listed above)

## **IMPACT OF NURSING EDUCATION ON PERCENTAGE OF THERAPEUTIC ACTIVATED PARTIAL THROMBOPLASTIN TIMES AT TWENTY-FOUR HOURS**

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Unfractionated heparin (UFH) is used for treatment and prevention of thrombosis and anticoagulation after acute cardiac events. Accurate titration of UFH based on activated partial thromboplastin time (aPTT) is important for promoting patient safety by ensuring adequate anticoagulation and reducing risk of adverse events. Protocol-driven titration has been shown to be efficacious and promote patient safety through standardized dosing and close monitoring. The purpose of this study was to implement targeted nursing education to increase the percentage of therapeutic aPTTs twenty-four hours after heparin initiation.

Previously, a retrospective medication use evaluation (MUE) of UFH management was conducted to determine how often aPTTs were therapeutic. Based on the results of this evaluation, it was determined that there was potential to improve execution of the titration protocol. A single-center quality improvement study was conducted to evaluate the impact of nursing education on protocol execution. Nurses were surveyed in order to identify which aspects of UFH titration were unclear as well as what could be done to improve the management of heparin titration. Based on the results of these surveys, education was provided. The percentage of aPTTs in the therapeutic range at twenty-four hours will be examined for patients on titratable UFH infusions during the six-week time period following targeted nursing education. This percentage will be compared to the previous results to determine the impact of nursing education on therapeutic aPTTs.

Results and conclusions will be presented at the Great Lakes Residency Conference.

### **Learning Objectives:**

Explain the process of nurse-driven protocols for heparin titration.

Identify the indications for titratable heparin infusions.

### **Self Assessment Questions:**

A patient is receiving UFH for treatment of deep vein thrombosis in the left lower extremity. An aPTT value has just resulted and the nurse is asking for your help with titration based on the dosing p

- A Give 3300 unit bolus and increase rate to 2000 units/hour
- B: Do not change anything and continue current rate of 1800 units/hour
- C: Do not give a bolus, stop the infusion for 60 minutes, and then res
- D: Do not give a bolus and decrease the rate to 1600 units/hour

Which of the following patients meet the indication requirements for a heparin infusion?

- A A 67 y/o male who presents to the hospital with an NSTEMI
- B A 45 y/o female with a history of HIT who presents with bilateral de
- C An 84 y/o female who presents with an acute hemorrhagic stroke
- D A 33 y/o male who presents with massive hematemesis

Q1 Answer: C      Q2 Answer: A

ACPE Universal Activity Number

Activity Type: Knowledge-based      Contact Hours: 0.5  
(if ACPE number listed above)