

IMPLEMENTATION OF A PHARMACIST DIRECTED ASPLENIA IMMUNIZATION COLLABORATIVE PRACTICE AGREEMENT IN AN AMBULATORY CANCER CENTER

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Purpose: Patients with anatomical and functional asplenia are at increased risk of post splenectomy sepsis caused by encapsulated bacteria such as *Streptococcus pneumoniae*, *Haemophilus influenzae* type b, and *Neisseria meningitidis*. Studies have demonstrated patients with malignancy may be at an increased risk of post splenectomy sepsis, especially in the first two years post splenectomy. The Centers for Disease Control and Prevention (CDC) and Infectious Diseases Society of America (IDSA) recommend vaccination in patients with asplenia at specified time intervals. Currently, these guidelines are not met at Froedtert Hospital. There is limited data demonstrating the impact of clinical pharmacist intervention on vaccine selection and adherence in this patient population. The primary objective of this study is to analyze the impact of clinical pharmacy services on vaccination rates in patients with anatomical or functional asplenia within the Clinica Cancer Center at Froedtert Hospital. **Methods:** A pharmacist collaborative practice agreement (CPA) has been developed and implemented in November 2017 to improve adherence to CDC and IDSA guidelines for recommended vaccination schedules. Pre-implementation data will be collected from September 2016 to September 2017, and post-implementation data will be collected from January to June 2018. Impact of the implementation of the CPA will be measured by the percentage of patients compliant to vaccination schedules as indicated per recommended guidelines before and after the CPA implementation. Additional outcomes will include percentages of patients with missed, inappropriately timed, and incorrectly selected vaccinations. A survey of pharmacist and nursing satisfaction rates with the new CPA will be collected. **Results/Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the recommended immunizations in patients with functional or anatomical asplenia to prevent post splenectomy sepsis.

Describe the impact of a pharmacist directed asplenic immunization collaborative practice agreement in an ambulatory cancer center.

Self Assessment Questions:

AL is a 58 year old female recently diagnosed with pancreatic cancer. As part of her treatment, she will undergo a distal pancreatectomy and splenectomy next month. When is the best time to administer

- A: One month after her procedure
- B: One week prior to her procedure
- C: The day of her procedure
- D: Two weeks before her scheduled procedure

A pharmacist directed asplenia immunization collaborative practice agreement may result in

- A: Increased accuracy of immunization administration
- B: Missed opportunities to vaccinate
- C: Increased time spent identifying patients with asplenia
- D: Increased number of clinic appointments for vaccine administration

Q1 Answer: D Q2 Answer: A

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(if ACPE number listed above)

OPTIMIZATION OF PNEUMONIA WITH UTILIZATION OF A PHARMACY-DRIVEN PROTOCOL: A RETROSPECTIVE REVIEW

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Purpose: Pneumonia is a common reason for admission to a hospital and is associated with considerable morbidity and mortality. Though treatment is often extended further than the IDSA recommended duration of 5-7 days, there has been no difference in outcomes when compared to shorter durations of therapy. The ability to order labs and initiate or discontinue therapy per protocol by pharmacists may help reduce total duration and exposure to antibiotics to ultimately discharge patients sooner while maintaining good outcomes. This is a retrospective study designed to evaluate the current pneumonia optimization protocol which is a multifaceted pneumonia treatment protocol driven by pharmacists. **Methods:** This is a retrospective, single-center cohort of patient's ≥ 18 years of age who were diagnosed with pneumonia and required admission to the intensive care unit or cardiac care unit between January 1st, 2016 and October 31st, 2017. Two cohorts of patients were evaluated, those receiving care under the pharmacy driven pneumonia optimization protocol and those with routine standard of care. The electronic medical record was used to collect patient demographics, methicillin resistant *Staphylococcus aureus* risk factors, *Pseudomonas aeruginosa* risk factors, labs ordered, antibiotics initiated, duration of therapy, adverse reactions, length of stay, and clinical failure, improvement, or success.

Learning Objectives:

Review specific parameters that guide pneumonia treatment

Discuss the impact a pharmacy-driven protocol can have on length of stay and clinical outcomes

Self Assessment Questions:

Standard antibiotic duration for treatment of pneumonia should typically not exceed a total of:

- A: 5 days
- B: 7 days
- C: 10 days
- D: 14 days

Which of the following interventions can be made by a pharmacist to optimize treatment of pneumonia

- A: De-escalate antibiotics
- B: Add stop dates to antibiotic therapy
- C: Ensure recommended labs and cultures are ordered
- D: All of the above

Q1 Answer: B Q2 Answer: D

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EVALUATION OF LITHIUM MONITORING IMPROVEMENT MEASURES AS IMPLEMENTED WITHIN THE ALEDA E. LUTZ MEDICAL CENTER

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Lithium is a mainstay pharmacotherapeutic option for mood stabilization in bipolar disorder. VA/DoD guidelines recommend baseline and annual monitoring of thyroid function, serum creatinine, estimated creatinine clearance, electrolyte status, and complete blood count. As a narrow therapeutic index drug, lithium serum levels are to be monitored every six months during maintenance phase, with more frequent monitoring during introductory phase and any dose adjustment periods. The objective of this Continuous Quality Improvement (CQI) project is to assess if pharmacy intervention through a standardized Special Medication Request note is effective at increasing compliance with lithium monitoring standards as set by VA/DoD guidelines. This is a prospective, single-center, quality improvement study. A list of patients with active lithium prescriptions was generated from the VA Office of Mental Health Operations Lithium Lab Monitoring Dashboard. A chart review of patients with an active lithium prescription was performed prior to implementation of the Special Medication Request note for baseline compliance reference. In accordance with facility protocol, a note was designed and approved for use in the facility's VA Computerized Patient Record System (CPRS). Ordering a lithium prescription, both new and renewed, requires completion of the note specifically designed to provide relevant lab histories and quick order sets. For the purpose of data collection, the active intervention period will span 180 days. Data gathered will consist of date of most recent lithium serum level, basic metabolic panel (BMP), thyroid panel, CBC, duration of therapy, and patient characteristics to include weight, height, age, and gender. A second chart review will be performed at the conclusion of the intervention period. Effectiveness of implementing the lithium note will be assessed by comparing compliance rates at time of note implementation as compared to 180 days post implementation. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the risks and potential consequences of suboptimal laboratory monitoring in patients treated with lithium.
Discuss the impact pharmacist interventions may have on risk reduction of lithium side effects and lithium toxicity.

Self Assessment Questions:

Which side effect may be mitigated by switching from extended-release lithium to the immediate-release version?

- A Nausea
- B: Diarrhea
- C: Tremor
- D: Erectile dysfunction

The introduction of which of the following medications may result in lithium side effects or toxicity due to increased lithium serum concentration?

- A Verapamil
- B Sodium bicarbonate antacids
- C Lisinopril
- D Ethinyl estradiol and norethindrone (oral contraceptive)

Q1 Answer: B Q2 Answer: C

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INPATIENT TO COMMUNITY PHARMACIST HANDOFF: OPTIMIZATION AND EVALUATION OF A PHARMACIST DISCHARGE SUMMARY

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Community pharmacists are often the initial healthcare professional contacted after a patient's discharge from the hospital, but are rarely provided information related to inpatient medication changes. To address this gap in communication, UW Health electronic health record generates a letter that is faxed to the community pharmacy upon a patient's discharge from the hospital. This handoff fax includes the admission diagnosis and a complete medication list with new medications, discontinuations and dose adjustments. The primary objective is to optimize this communication at discharge between inpatient pharmacists and community pharmacists and evaluate its impact on patient safety. An inpatient pharmacist workgroup developed a policy and flowchart that identifies the optimal patient population for the pharmacist to pharmacist handoff. This group is tracking the percentage of discharges accompanied by a pharmacist discharge handoff through an electronic medical record report. Also, a workgroup of highly-engaged partner community pharmacies was selected from the Wisconsin Pharmacy Quality Collaborative. This workgroup will reconcile medications following a UW Health hospitalization. Through a training toolkit developed with the insight of partner pharmacies, pharmacists will follow best practices to conduct comprehensive medication reviews, enroll patients in medication synchronization programs, medication packaging, medication delivery, and other patient care initiatives by utilizing the pharmacist to pharmacist handoff. The expected results will include the number of medication discrepancies identified by the community pharmacy during medication reconciliation, the medications with discrepancies, discrepancy type, and the number of patients enrolled in medication synchronization, medication packaging, medication delivery or comprehensive medication review programs at partner community pharmacies. The inpatient workgroup will be expecting a progressive increase of the percentage of discharges with an accompanying pharmacy discharge summary faxed to the community pharmacy.

Learning Objectives:

Identify ideal patient populations for expanded communication between inpatient and community pharmacists
Discuss strategies to achieve effective handoff from inpatient pharmacists to community pharmacists

Self Assessment Questions:

1. Benefits of communication between inpatient pharmacist and community pharmacist at time of patient discharge include which of the following:

- A Improved HCAHPS scores
- B: Increased community pharmacist confidence in filling discharge pr
- C: Decreased time spent on discharge by inpatient pharmacist
- D: Higher reimbursement rate for discharge prescriptions

Which of the following conditions would most benefit from pharmacist to pharmacist handoff?

- A Newly diagnosed congestive heart failure
- B Post-total knee replacement with no medication changes
- C Cellulitis with cephalexin prescription
- D Post-operative small bowel obstruction with OTC bowel regimen

Q1 Answer: B Q2 Answer: A

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REAL-WORLD INCIDENCE OF ADVERSE EVENTS FOR SACUBITRIL/VALSARTAN COMPARED TO ACE INHIBITORS OR ARBS IN HEART FAILURE

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Purpose: Sacubitril/valsartan is a novel medication that acts as a neprilysin and angiotensin receptor blocker. It is recommended by the American College of Cardiology (ACC)/American Heart Association (AHA)/Heart Failure Society of America (HFSA) to reduce morbidity and mortality in patients with reduced ejection fraction (HFrEF and NYHA class II or III symptoms). The main clinical trial for sacubitril/valsartan, PARADIGM-HF, employed a run-in phase which likely underestimated the side effects. The objective of this study is to compare the incidence of adverse events, medication discontinuation, or medication dose reduction in patients with heart failure initiated on therapy with an ACE inhibitor, ARB, or sacubitril/valsartan. **Methods:** A retrospective cohort study will be conducted from July 7, 2015 to December 31, 2017. Patients 18 years of age and older with a diagnosis of HFrEF (<40%) initiated on therapy with sacubitril/valsartan, ACE inhibitor, or ARB will be included. The primary adverse events endpoint will be analyzed as a composite which includes: symptomatic hypotension; hypotension; worsening renal function; hyperkalemia; and angioedema. Patient demographic, primary endpoint, and secondary endpoint data will be retrieved through review of study subjects' charts within the electronic medical record. Based on estimation of adverse event incidence from past trials with the assumption of $\alpha=0.05$ and $\beta=0.80$, a total of 440 patients are necessary to meet power. The primary endpoint will be analyzed with the Chi-square test. Continuous data will be analyzed with the paired t-test or Wilcoxon signed-rank test, as appropriate. Nominal data will be analyzed with the Chi-square test or Fisher's exact test, as appropriate. Patients will be propensity matched based on likelihood of sacubitril/valsartan receipt. Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review sacubitril/valsartan pharmacology and guideline recommendations for use

Discuss literature evaluating the efficacy of sacubitril/valsartan in patients with heart failure and concerns with external validity of study findings

Self Assessment Questions:

Sacubitril/valsartan is an angiotensin receptor-neprilysin inhibitor indicated for:

- A Patients with HFrEF to reduce the risk of cardiovascular death
- B: Patients with HFrEF (NYHA class II to IV) to reduce risk of cardiovascular death
- C: Patients with HFrEF (NYHA class I to III) to reduce risk of cardiovascular death
- D: Patients with HFrEF and HFpEF to reduce risk of cardiovascular death

PARADIGM-HF, the main clinical trial for sacubitril/valsartan, may underestimate the real-world incidence of adverse events mainly due to the:

- A Use of enalapril as a comparator
- B Patient population
- C Run-in period
- D Follow-up timeframe

Q1 Answer: B Q2 Answer: C

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DIRECT ORAL ANTICOAGULANTS VERSUS ENOXAPARIN FOR THE TREATMENT AND PREVENTION OF VENOUS THROMBOEMBOLISM IN CANCER PATIENTS

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Cancer is linked to the increased risk for venous thromboembolism (VTE). According to the National Comprehensive Cancer Network (NCCN) guidelines, studies showed up to a 7-fold increase in risk for VTE in the presence of cancer. National guidelines, including the NCCN guidelines and the American College of Chest Physicians (CHEST) guidelines, recommend using low molecular weight heparin (LMWH) over direct oral anticoagulants (DOACs) in patients with cancer for the treatment and prevention of venous thromboembolism. The objective of this study is to compare the safety and efficacy of DOACs versus enoxaparin for the treatment and prevention of VTE in oncology patients. This study is a retrospective, electronic chart review of patients with a diagnosis of cancer who have received care at Edwards Comprehensive Cancer Center or Cabell Huntington Hospital from January 1, 2010 to September 1, 2017. Patient electronic medical records will be reviewed for up to 6 months following the start of anticoagulation or until an occurrence of the primary outcome, death, or cessation of study therapy. The following data will be collected: Patient's date of birth, height, weight, dosing, dosing start and end dates/times, type of cancer and VTE, anticoagulant selected for the treatment or prophylaxis of VTE and risk factors for both VTE and bleeding. The primary efficacy endpoint of the study will be VTE event during anticoagulation therapy, and the primary safety endpoint will be major bleeding. The secondary endpoints include type of VTE event, all clinically relevant bleeding, and clinically relevant non-major bleeding. Major bleeding will be defined according to the International Society on Thrombosis and Haemostasis (ISTH) criteria with all other bleeding events considered minor. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the literature and major guidelines on appropriate anticoagulation therapy for patients with active cancer

Describe the available safety and efficacy data surrounding the use of DOACs in patients with active cancer

Self Assessment Questions:

According to the CHEST and NCCN guidelines, which of the following VTE treatment options is recommended in patients with active cancer?

- A Low Molecular Weight Heparin (LMWH)
- B: Vitamin K Antagonist
- C: Rivaroxaban
- D: Apixaban

Which of the following challenges limit the use of DOACs in patients with active cancer?

- A Increase in bleeding in patients with cancer
- B Increase in recurrent VTE
- C Decrease in efficacy in patients with cancer
- D Lack of sufficient clinical data in patients with cancer

Q1 Answer: A Q2 Answer: D

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EVALUATING THE EFFECT OF IMPLEMENTING A CONTROLLED SUBSTANCE DIVERSION PREVENTION POLICY AND DISCREPANCY AUDIT PROGRAM

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Purpose: Substance abuse occurs in 10-15% of healthcare professionals and may lead to institutional drug diversion, exposing patients, employees, the organization, and its community to harm. Following ASHP's recent controlled substance (CS) guideline publication, the institution's CS diversion prevention policy was revised to include implementation of a multidisciplinary committee and audit program for expanded CS surveillance, monitoring, and investigation. Hospital-wide in-services regarding the revised policy were delivered in November and a discrepancy notification process was implemented to enforce timely discrepancy resolution. Study objectives are to review policy compliance and ensure complete CS activity documentation. **Methods:** This Institutional Review Board approved two-phase retrospective pre-policy and prospective post-policy implementation study is being conducted from August 2017 to February 2018. Study subjects include patients receiving CII to CV medications and automated dispensing cabinets (ADC) and narcotic vault users. CS activity reports from the narcotic vault and 31 ADCs are being cross-referenced with electronic medical record documentation. Primary outcomes include number of CS discrepancies, time to resolution, selection of appropriate resolution reasons, and causes for unresolved discrepancies. Secondary outcomes include number of cancelled transactions and accurate documentation of waste. The method of batch means will be used to compare percentages and chi squared will be used to compare categorical data. **Results:** Prior to policy implementation, there were 90 CS discrepancies in August with 27.8% unresolved within 24 hours, 109 in September with 35.8% unresolved within 24 hours, and 94 in October with 20.2% unresolved within 24 hours. The most common discrepancy resolution reason was error in previous count. Procedural and med/surg patient care areas each cancelled 36% of ADC CS transactions in September, which was a higher percentage compared to other patient care areas. Post-policy implementation results from December to February and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe common user activities in automated dispensing cabinets that could be possible signs of diversion and review associated monitoring and surveillance strategies

Discuss a multidisciplinary approach to manage controlled substance discrepancies and improve efforts for timely resolution

Self Assessment Questions:

What is the risk to a healthcare organization when controlled substance diversion occurs without effective methods for detection and reporting?

- A Fraudulent billing
- B: Liability for the resulting damages
- C: Decreased trust within the community
- D: All of the above

Which of the following activities involving a controlled substance from an automated dispensing cabinet is considered a possible sign of diversion

- A Overrides without orders
- B Cancelled transactions
- C Unresolved discrepancies
- D All of the above

Q1 Answer: D Q2 Answer: D

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EVALUATING THE SAFETY AND EFFICACY WITH USE OF GLP-1 AGONISTS (GLP-1 RA) IN COMBINATION WITH BASAL/BOLUS INSULIN REGIMENS IN A VETERAN POPULATION

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Statement of Purpose: To determine whether the combination therapy of GLP-1 RAs and basal/bolus insulin regimens improves patient outcomes in the treatment of type 2 diabetes, we evaluated the efficacy and safety of adding a GLP-1 RA in combination with basal/bolus insulin regimens.

Statement of Methods: Retrospective chart review from January 1, 2016 to June 30, 2017 of 120 Veterans in Veterans Integrated Service Network (VISN) 10 (Veterans Affairs facilities in Michigan, Ohio, and Northern Indiana). Charts were reviewed for demographics, baseline and repeat A1c levels, records of adverse drug reactions and hypoglycemia, and all-cause death. Patients on basal/bolus insulin regimens were compared to patients on basal/bolus insulin regimens with a GLP-1 RA based on matching baseline A1c. Differences in A1c reduction was compared using paired T-tests. The number of adverse drug events, hypoglycemic episodes, and death were compared using chi-square test or Fisher's Exact test. **Summary of (preliminary) results to support conclusion:** To be determined **Conclusions reached:** To be determined

Learning Objectives:

Explain the current guidelines for GLP-1 RA in combination with basal/bolus insulin regimens

Discuss the safety and efficacy of adding GLP-1 RA to basal/bolus insulin regimens in a Veteran population

Self Assessment Questions:

1) Considering coadministration of GLP-1 RA and insulin, which of the following is recommended by the American Diabetes Association and American Association of Clinical Endocrinologists:

- A Guidelines recommend GLP-1 RA to be used in combination with insulin
- B: Guidelines recommend GLP-1 RA to not be used in combination with insulin
- C: Guidelines do not recommend GLP-1 RA to be combined with basal/bolus insulin
- D: Guidelines do not recommend GLP-1 RA to be used in combination with insulin

2) In the review by Davies, evidence was found to support the coadministration of GLP-1 RA and insulin included significant weight loss, decrease in insulin requirement and an A1c reduction of what magnitude?

- A There was not a change in A1c reduction
- B 0.1% to 0.35%
- C 0.4% to 1.64%
- D 1.7% to 1.98%

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-303-L01-P

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EVALUATION OF A PHARMACIST AMBULATORY TRANSITIONS OF CARE SERVICE FOR HIGH RISK PATIENTS

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Purpose: High hospital readmission rates are the object of a nationwide focus on creating effective transitions of care (TOC) to reduce costs and improve quality of care. At University of Michigan Health System (UMHS), a post-discharge, centralized clinical pharmacy TOC service was created as part of a multidisciplinary approach to improve TOC for high risk patients. The purpose of this study is to determine the impact of the TOC program on hospital readmissions, describe pharmacist identified medication-related problems and recommendations, and assess provider and patient acceptance rates of pharmacist recommendations. **Methods:** The TOC service includes a nurse navigator phone call within 2 days, a pharmacist phone call within 3 to 6 days, and provider appointment within 7 to 10 days of hospital discharge. Pharmacists obtain a medication history, perform medication reconciliation and comprehensive medication review (CMR), assess medical stability, and document recommendations for providers. Patients eligible for the clinical pharmacy component are those with a LACE score greater than or equal to 10, discharged home from a UMHS family or general medicine service, and have an established UMHS primary care provider. A retrospective chart review of patients discharged from September 5, 2017 to March 5, 2018 will be conducted to collect demographics, dates of TOC and CMR components, and internal readmissions within 30 days (primary outcome). Readmission rates will be compared between those who receive a TOC pharmacist call and eligible patients not scheduled. Secondary outcomes include pharmacist identified medication-related problems, recommendations, and acceptance rates of recommendations. Outcomes will be compared between patients in high (LACE Index 10 to 12) and highest (LACE Index greater than or equal to 13) risk groups. Descriptive and bivariate statistics will be used. The UMHS Institutional Review Board approved this study. **Results and Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss transitions of care and the LACE Index

Describe the ambulatory LACE TOC service at University of Michigan Health System (UMHS)

Self Assessment Questions:

The LACE index is a validated tool used to determine patients at high risk for which of the following?

- A: 30-day mortality and 30-day hospital readmission
- B: 30-day hospital readmission and 30-day morbidity
- C: 30-day morbidity
- D: Only 30-day mortality

The University of Michigan Health System (UMHS) ambulatory transitions of care (TOC) service includes which of the following components?

- A: A physician phone call within 7-10 days of discharge
- B: A nurse care navigator visit within 2 days of discharge
- C: A pharmacist phone call within 3-6 days of discharge
- D: A pharmacist visit within 2 days of discharge

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-683-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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FEBRILE NEUTROPENIA ANTIBIOTIC DE-ESCALATION STUDY IN ACUTE MYELOID LEUKEMIA PATIENTS WITH PROLONGED NEUTROPENIA

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Purpose: Chemotherapy-induced neutropenic fever occurs in greater than 80% of patients with hematologic malignancies. Despite the high incidence rate, clinically documented infections account for only 20-30% of febrile episodes. Currently, there is no standard practice regarding duration of antibiotic therapy in patients with prolonged neutropenia following an initial febrile episode who have resolution of fever and no clinical or documented infectious source. The objective of this study is to compare the incidence of documented or suspected bacterial infection following the implementation of an institutional antibiotic de-escalation protocol. **Methodology:** This will be a single center, quasi-experimental study. Patients will be identified by using an institutional Leukemia and Bone Marrow Transplant Database. Patient demographic primary endpoint, and secondary endpoint data will be retrieved through review of study subjects' charts within the electronic medical record. Patients will be evaluated for antibiotic de-escalation/discontinuation on day 5 after febrile neutropenia onset. At this point, patients will be categorized into 3 groups: those with low suspicion for bacterial infection, suspected bacterial infection, and documented bacterial infection. De-escalation or discontinuation of antibiotic therapy will occur in accordance with recommendations outlined in the protocol. The following data will be collected in both the intervention and historical cohort group: rate of documented or suspected bacterial infection, total days of IV anti-pseudomonal beta-lactam therapy, percentage of patients requiring re-initiation of IV anti-pseudomonal beta-lactam agents, cost expenditure associated with IV anti-pseudomonal beta-lactams, days of antibiotics used to treat a secondary infection to target vancomycin resistant enterococcus (VRE) and methicillin-resistant staphylococcus aureus (MRSA), all-cause mortality at 30-days, ICU admission, and development of Clostridium Difficile Infection.

Results: In process Conclusion: In process

Learning Objectives:

Review the current NCCN recommendations for the management of neutropenic fever in patients with acute myeloid leukemia

Describe the study methodology and outcomes that will be collected to assess the impact of a febrile neutropenia antibiotic de-escalation protocol in acute myeloid leukemia patients

Self Assessment Questions:

In high-risk AML patients with febrile neutropenia, national guidelines recommend which of the following approaches for antibiotic de-escalation?

- A: Discontinue broad-spectrum IV antipseudomonal therapy at 48-72
- B: Continue broad-spectrum IV antipseudomonal therapy until evidence
- C: Narrow antimicrobial therapy to target the isolated pathogen. Dura
- D: These patients are not candidates for antibiotic de-escalation at ar

In this study, what outcomes were collected in both the pre- and post-intervention groups?

- A: Rate of documented or suspected bacterial infection
- B: All-cause mortality at 30-days
- C: Rate of Clostridium difficile-associated infection
- D: All of the above

Q1 Answer: B Q2 Answer: D

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ENGAGING PHARMACISTS TO EFFECTIVELY MANAGE MEDICATION CLINICAL DECISION SUPPORT ALERTS

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Purpose: Clinical decision support (CDS) is an integral component of computerized physician order entry. It represents a vital tool to prevent errors and adverse events, and to improve care processes utilizing patient specific data. However, CDS can be interruptive, overwhelming, and a nuisance leading to alert fatigue. One measure of alert fatigue, increases in override rates, has the potential to increase patient safety events. Due to their expert content knowledge, pharmacists are uniquely capable to manage medication CDS within a healthcare system. The purpose of this project is to engage pharmacists in the utilization of CDS suppression functionality in order to optimize the CDS environment.

Methods: This quality improvement initiative uses the plan, do, study, act methodology to document and track project progression. The plan and do phases consist of engaging pharmacists to optimize their individual CDS experience during a 60-day study period by utilizing newly available CDS suppression functionality within the electronic medical record. The study and act phases analyze how individual pharmacists utilize the suppression functionality to determine specific modifications that could improve the quality of the CDS environment for all providers. The primary outcome is the change in CDS acceptance rates before and after implementation of the suppression functionality. Secondary outcomes include types of alerts suppressed, as well as prioritization of changes to the CDS environment. Data will be summarized using descriptive statistics. **Results/Conclusion:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe advantages of optimizing clinical decision support
Identify reasons to engage pharmacists in optimization of the medication CDS environment

Self Assessment Questions:

Which of the following is NOT an advantage of optimizing the CDS environment?

- A: Prioritize clinically relevant alerts
- B: Enhance engagement of providers
- C: Eliminate alert fatigue
- D: Increase CDS alert acceptance rates

Why should pharmacists be involved in optimization of the medication CDS environment?

- A: Primary stakeholder/user of the process
- B: Trained in programming capabilities
- C: Expert content knowledge
- D: Resistant to alert fatigue

Q1 Answer: C Q2 Answer: C

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INTEGRATION OF CLINICAL PHARMACY SERVICES AT AN OUTPATIENT CANCER CARE CENTER

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Purpose: The provision of outpatient oncology services by pharmacists is limited, but this role is emerging. One force that may provide incentive for future growth is an understanding of the impact that clinical pharmacy services have on patient outcomes in oncology clinics. A 2010 Cochrane review concluded an increased satisfaction and acceptance rate of clinical pharmacy services in outpatient cancer centers. Within this institution, all patients currently undergo routine review by a clinical oncology pharmacist prior to chemotherapy preparation and administration. Although there have been no safety events related to this in recent history, there is a general consensus amongst the pharmacy staff to broaden the scope of pharmacy services within this institution. A pharmacy-driven initiative began on November 1, 2017, which involved the addition of a clinical pharmacist, who was dedicated to comprehensive review of each new chemotherapy patient, including pharmacist-conducted medication history and patient education. The purpose of this study is to retrospectively review the pharmacist activities completed during this pharmacy-driven initiative, and compare those activities with those performed by pharmacy during standard care. **Objective:** The primary objective was to determine the number and type of chemotherapy interventions made by clinical pharmacists in patients initiating new chemotherapy at this institution. Secondary objectives included evaluating and describing drug related, cost related, and workflow related interventions, potential decrease in medication cost secondary to pharmacist recommendations, and emergency department visits within 30 days of first chemotherapy cycle. Baseline interventions through existing workflow were collected from September 1, 2017 through January 31, 2018. For the study group, data were collected from November 1, 2017 through January 31, 2018. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify ways that a clinical pharmacist can impact patients at an outpatient cancer care center.
Describe the benefits of having two pharmacist checks when preparing and dispensing chemotherapy medications.

Self Assessment Questions:

Why is it crucial to verify premedication regimens at the beginning of each cycle?

- A: Ensure that premedications are given after the chemotherapy regimen
- B: Evaluate for therapy duplications
- C: Ensure regimen matches the NCCN guidelines
- D: Both B and C

What is the value of an additional pharmacist check within the cancer care center?

- A: Increasing employee satisfaction
- B: Decreasing patient satisfaction
- C: Ensuring medication is correctly dosed and dispensed at each appointment
- D: Decreasing the amount of paper used

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-684-L04-P

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

EFFECTS OF AN INTERDISCIPLINARY TEAM WITH A CLINICAL PHARMACIST ON THE DEPRESCRIBING OF POTENTIALLY INAPPROPRIATE MEDICATIONS IN PATIENTS EIGHTY YEARS OR OLDER

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Purpose: Medication use in the elderly is complex and challenging due to lack of representation in clinical trials, polypharmacy, and pharmacokinetic/pharmacodynamic changes that occur with aging. The 2015 American Geriatric Society (AGS) Beers Criteria lists potentially inappropriate medications (PIMs) for use in the elderly due to the increased probability of causing adverse effects in this population. However, the literature regarding the deprescribing of these medications is lacking. The purpose of this study is to evaluate the effects of a Geriatric Patient Aligned Care Team (GeriPACT) on the deprescribing of PIMs in patients ≥80 years old compared to usual care in the Veterans Affairs (VA) setting. Methods: This study is a retrospective chart review conducted at the Lexington VA Medical Center (VAMC). Patients ≥80 years who filled a PIM at least 90 days before a GeriPACT visit at the Lexington VAMC from 1/1/2015 to 9/6/17 were included. Usual care patients were selected using a random number generator following the same criteria. PIMs are per Tables 2 and 7 of the 2015 AGS Beers Criteria, as well as aspirin 325mg. The primary outcome is to determine if an interdisciplinary team that includes a clinical pharmacist reduces the number of PIMs compared to usual care. The secondary outcomes are to determine which medication class was deprescribed most often, to identify dose reductions of PIMs, and to examine if risk/benefit discussions occurred with PIMs not deprescribed. Appropriate statistical analysis will be utilized to analyze the outcomes.

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

Learning Objectives:

Discuss why increasing age is a cause of increased risk for adverse drug reactions.
Identify medications that may be considered potentially inappropriate in the elderly population as defined by the 2015 American Geriatric Society Beers Criteria.

Self Assessment Questions:

Why are elderly patients more susceptible to adverse drug reactions?

- A: Increase in hepatic and renal blood flow
- B: Decreased first-pass clearance in the liver
- C: Increase in levels of serum proteins
- D: Increase in the ratio of lean body weight to body fat

Which Beers Criteria medication is correctly matched to the rationale for being potentially inappropriate in older adults?

- A: Ibuprofen & highly anticholinergic
- B: Methocarbamol & extrapyramidal effects
- C: Amitriptyline & high rates of physical dependence
- D: Terazosin & orthostatic hypotension

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-305-L01-P

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

EVALUATING THE SAFETY AND EFFICACY OF A NEW PROTOCOL FOR VANCOMYCIN DOSING IN HEMODIALYSIS

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Purpose: Vancomycin is an antibiotic commonly used for a wide variety of bacterial infections. Although renal function plays a major role in the dosing of vancomycin, guidelines do not exist for vancomycin dosing in patients undergoing hemodialysis. The purpose of this study is to compare the safety and efficacy of a newly implemented dosing protocol for vancomycin in hemodialysis patients to a previously used protocol. Methods: Vancomycin usage data for patients receiving hemodialysis while admitted to the hospital was reviewed. Data from one year prior to implementation of the new dosing protocol and one year after implementation were gathered from the electronic medical record. Information gathered, including vancomycin dosing, serum vancomycin levels, and timing of administration, were used to compare the effectiveness of the updated protocol to the previously used protocol. In addition, reported errors involving vancomycin usage in hemodialysis were gathered from the hospital's error reporting system to compare the safety of the original protocol to the safety of the new protocol. Patient identifiers have been removed from all data in order to maintain patient confidentiality. Results/Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Identify common causes of missed doses in patients receiving vancomycin per the hemodialysis protocol.
Select a plan of action for a patient with a subtherapeutic or supratherapeutic vancomycin level using the institution's vancomycin in hemodialysis protocol.

Self Assessment Questions:

Which of the following may have contributed to missed or incorrect vancomycin doses while using the original vancomycin in hemodialysis protocol?

- A: Extra hemodialysis sessions
- B: PRN order which does not alert RN that dose is due
- C: Multiple PRN vancomycin orders on inpatient order list
- D: All of the above

GW is a 47-year-old female receiving vancomycin per the hemodialysis protocol for MRSA bacteremia. Current dose is 500 mg during the last hour of every hemodialysis session. Trough obtained prior to t

- A: Continue current dose
- B: Give 15 mg/kg re-load, then increase dose to 750 mg during the la
- C: Increase dose to 750 mg during the last hour of every hemodialysi
- D: Hold dose and repeat level prior to the next hemodialysis session

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-854-L05-P

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

A NOVEL PENICILLIN ALLERGY SKIN TESTING STRATEGY IN PREGNANT WOMEN WITH GROUP B STREPTOCOCCUS (GBS) COLONIZATION

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Purpose: Penicillin, ampicillin, or cefazolin are the drugs of choice in pregnant women with Group B Streptococcus (GBS) colonization. In patients with a reported penicillin allergy, these drugs are not used and instead the patient is prescribed vancomycin or clindamycin, which are associated with more adverse events and longer length of stay. The purpose of this study is to de-label reported penicillin allergies in pregnant women with GBS colonization. The antimicrobial stewardship team at Munson Medical Center performs penicillin allergy skin testing for inpatients, but did not have a process for de-labeling penicillin allergies in pregnant women in the outpatient setting. **Methods:** This was a pre-post study of penicillin allergic GBS-positive pregnant patients who gave birth at Munson Medical Center. Baseline data was gathered for all women who gave birth from July 2016 – July 2017. In the prospective arm of the study, pregnant women with a self-reported penicillin allergy were referred by their obstetrician to undergo penicillin allergy assessment and skin testing at a local Allergist's office. GBS-positive pregnant women with a reported penicillin allergy were included. Patients were excluded for the following reasons: the patient was referred for testing but could not undergo testing, the patient reported a hypersensitivity reaction other than a Type I reaction, or if the patient had severe immunosuppression (i.e. Neutropenia, HIV+ with CD4 < 200 Immunosuppressives for organ transplant), not including diabetes or corticosteroid use. The primary outcome of this study was to determine the percentage of patients who received the preferred antibiotics after the implementation of the skin testing referral process. Secondary outcomes include length of inpatient hospital stay, neonatal Group B Streptococcal infection, and reported adverse effects to the administered antibiotic. **Results:** Initial results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify an appropriate patient to undergo penicillin allergy skin testing based on patient-specific factors.

Describe the association of a novel penicillin allergy skin testing strategy on the percentage of preferred antibiotics for Group B Streptococcus intrapartum prophylaxis after implementation of the process.

Self Assessment Questions:

Which of the following has been correlated to penicillin allergies?

- A: Decreased hospital stay
- B: Decreased antibiotic costs
- C: Increase in multidrug-resistant infections
- D: Decreased use of broad-spectrum antibiotics

Which of the following represents the greatest challenge with penicillin allergy skin testing pregnant patients?

- A: Safety of penicillin allergy skin testing in pregnant patients
- B: Efficacy of penicillin allergy skin testing in pregnant patients
- C: Cost of the penicillin allergy skin testing
- D: Logistics of the patient following up with allergy to complete the process

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-306-L01-P

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

RISK FACTORS ASSOCIATED WITH HOSPITAL ACQUIRED PNEUMONIA AND VENTILATOR ASSOCIATED PNEUMONIA CAUSED BY MULTI-DRUG RESISTANT (MDR) PSEUDOMONAS

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Purpose: Pseudomonas aeruginosa (PA) is a frequent cause of nosocomial infection and up to 13% are multi-drug resistant (MDR). Infections due to MDR-PA are more likely to occur in patients that are previously institutionalized, those receiving intravenous antibiotics at home, or are receiving care in an ICU. However, updated guidelines for the treatment and management of hospital-acquired pneumonia (HAP) and ventilator-associated pneumonia (VAP) suggest that prior receipt of intravenous antibiotics within the previous 90 days is the only relevant risk factor for MDR PA. This may lead clinicians to withhold combination antibiotic therapy, as regimens that include a single agent with activity to Pseudomonas are often considered adequate if risk factors for multidrug resistance are not present. As a result, there may be a delay in appropriate antibiotic coverage which may lead to a higher risk of mortality in patients with PA HAP or VAP. The objective of this study is to identify risk factors for HAP or VAP caused by MDR Pseudomonas.

Methods: This retrospective cohort study was conducted utilizing the electronic health record to identify patients with a diagnosis of HAP or VAP and a positive lower respiratory tract specimen of Pseudomonas aeruginosa at Northwestern Memorial Hospital from January of 2016 through December of 2016. Pneumonia was diagnosed and defined according to definitions by consensus guidelines. The primary outcome was presence of MDR PA. Variables for analysis were selected after reviewing prior analyses for risk factors of MDR PA and included inpatient stays, receipt of oral or intravenous antimicrobials, and relevant comorbidities. Univariate and multivariate regression analysis was used to determine the independent impact of each variable after adjusting for potential confounders. Odds ratio calculations were performed to compare the risk of development of MDR PA attributable to each of the independent variables. **Results:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify risk factors for HAP or VAP caused by MDR Pseudomonas

Discuss the relationship of study outcomes to previously identified risk factors

Self Assessment Questions:

Which of the following is a preferred empiric regimen for patients with risk factors for MDR PA HAP/VAP?

- A: Cefepime + azithromycin
- B: Piperacillin/tazobactam + amikacin
- C: Cefepime + ertapenem
- D: Ceftazidime + vancomycin

Which of the following do the IDSA guidelines state is a risk factor for MDR PA?

- A: Two or more hospitalizations within the previous year
- B: Admission from a health-care associated facility
- C: Prior receipt of IV antibiotics within the previous 90 days
- D: History of COPD

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-307-L01-P

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

IDENTIFICATION OF RISK FACTORS FOR HOSPITAL ADMISSIONS AFTER OUTPATIENT CHEMOTHERAPY ADMINISTRATION

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Purpose: Chemotherapy provides significant benefits to patients with cancer, yet is also associated with toxicities that can lead to unwanted hospital admissions. The Oncology Care Model, under the Centers of Medicaid and Medicare, was formed to improve the efficiency and effectiveness of oncology care. A 30-day readmission rate of 37.2% has been reported after inpatient chemotherapy administration. However, there are no studies on rates and risk factors for hospital admission after outpatient chemotherapy administration. This study is designed to examine the incidence of admissions and characteristics of patients who are admitted to the hospital within 30 days of outpatient chemotherapy administration. **Methods:** This study will be a retrospective chart review of patients treated with chemotherapy at University of Illinois Cancer Center. Patients who have a solid tumor diagnosis and received chemotherapy between August 1, 2016 and August 1, 2017 will be selected for data collection. The following baseline patient characteristics will be collected: age, gender, ethnicity, preferred language, insurance type, number of other medications, and Charlson Comorbidity Index parameters. Additionally, the following cancer specific information will be collected: cancer diagnosis, cancer stage, chemotherapy regimen, treatment intent, and whether pharmacy or nursing personnel provided patient education in clinic. For hospitalized patients, their admitting diagnosis, length of stay, days from clinic chemotherapy administration to admission, mortality, and most recently administered chemotherapy cycle number will also be recorded. The estimated sample size is approximately 400 patients. The primary endpoint is the 30-day readmission rate at the University of Illinois Cancer Center. Secondary endpoints include relative risk of admission of each collected data point and frequency of each admitting diagnosis.

Results and conclusion: Data collection is ongoing. Full results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize potential negative effects of unplanned hospital admissions after chemotherapy administration in an ambulatory setting.

Identify high risk populations for hospital readmission after chemotherapy administration

Self Assessment Questions:

Which of the following are potential adverse consequences of hospital admissions?

- A: Payment penalties to healthcare centers
- B: Increased cost to patients
- C: Decreased quality of life of patients
- D: All of the above

Which of the following characteristics increases a patients' risk of readmission after inpatient chemotherapy administration?

- A: Administration of alkylating agent
- B: Good performance status
- C: Age greater than 65
- D: Third chemotherapy cycle

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-685-L04-P

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

EVALUATION OF PLERIXAFOR STEM CELL MOBILIZATION ON MULTIPLE MYELOMA RELAPSE RATES

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Plerixafor is FDA approved in combination with granulocyte-colony stimulating factor (G-CSF) to mobilize hematopoietic stem cells for collection and subsequent autologous hematopoietic cell transplantation (AutoHCT) in patients with multiple myeloma (MM). Plerixafor works by inhibiting stem cell chemokine receptor, CXCR-4, from complexation with stromal cell derived factor-1 (SDF-1) on stromal cells in the marrow space. Notably, CXCR-4 is also prevalent on MM cells, which may lead plerixafor to mobilize cancer cell during hematopoietic cell harvest. Phase 3 data illustrates excellent mobilization results; however, data on survival outcomes is limited. The objective of this project is to determine the effect of plerixafor on progression free survival (PFS) and overall survival (OS). The overall goal of this assessment is to optimize stem cell mobilization therapies for multiple myeloma. This study is a single center, propensity score matched, retrospective cohort, comparing MM patients mobilized with plerixafor plus G-CSF versus G-CSF. All patients greater than the age of 18 years old, with diagnosis of MM, and receiving AutoHCT between January 2007 and January 2015 are eligible. Tandem transplants will be excluded. Patients will be collected in a 2:1 ratio of G-CSF monotherapy to plerixafor plus G-CSF. Day zero transplant data will include: age, gender, weight, height, renal function, date of transplant, remission status at collection, response prior to treatment, previous therapies, and mSMART risk. In addition, plerixafor dose, melphalan dose, post-transplant maintenance, date of mortality, date of relapse, and date of last follow up, will be collected. Covariates adjusted for in propensity score match include: mSMART category, melphalan dose, previous therapy response, renal function, BSA, age, and post-transplant maintenance. After propensity score matching of the two cohorts, analysis of PFS and OS will be performed via log-rank test and Kaplan-Meier curve. **Results:** In process. Presented at Great Lakes Conclusion: Presented at Great Lakes

Learning Objectives:

Recall the mechanism and phase III literature of plerixafor

Discuss the potential implication of plerixafor on multiple myeloma relapse rates

Self Assessment Questions:

Which of the following is true regarding plerixafor?

- A: Plerixafor stimulates the division of stem cells during hematopoiesis
- B: Phase III plerixafor data shows no difference in 5 and 10 year overall survival
- C: Plerixafor blocking CXCR-4 interaction with SDF-1 simply increase overall survival
- D: Plerixafor is specific for stem cells only

How might plerixafor affect multiple myeloma (MM) progression free survival (PFS)?

- A: Decreased PFS: Plerixafor may increase harvest of MM cells, resulting in increased PFS
- B: Increase PFS: Plerixafor may increase the division rate of MM cells, resulting in increased PFS
- C: Increase PFS: Plerixafor may increase harvest of MM cells, causing increased PFS
- D: Decrease PFS: Plerixafor may increase the aggressiveness of MM, resulting in decreased PFS

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-308-L01-P

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

COMPARISON OF POST-OPERATIVE BLEEDING EVENTS IN PATIENTS RECEIVING ORAL VERSUS INTRAVENOUS TRANEXAMIC ACID PRIOR TO TOTAL HIP AND KNEE ARTHROPLASTY

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Purpose: Intravenous (IV) tranexamic acid (TXA) is used off-label to minimize blood loss and transfusion associated with total hip and knee arthroplasty (THA/TKA). The purpose of this study is to determine if oral TXA is as effective as IV TXA. The primary objective will be to show that there are similar transfusion rates and reductions in hemoglobin between patients receiving oral and IV TXA. Secondly, a cost-minimization analysis will compare oral and IV TXA. **Methods:** A Franciscan surgeon began using oral TXA in place of IV TXA in December 2017. Data has been collected from 69 consecutive patients who received IV TXA immediately prior to December 2017 and will be collected from an estimated 50-60 patients receiving oral TXA in January to March 2018. Predetermined pre-operative characteristics will be collected for each patient, as well as the following outcomes (where available): 24-hour post-operative hemoglobin, 48-hour post-operative hemoglobin, number of units transfused, and occurrence of thromboembolic events. In order to conduct a cost-minimization analysis, the direct and indirect costs of preparation of IV and oral TXA will be collected. **Results:** Among the 69 IV TXA patients, 7 had a 24-hour hemoglobin drawn, and the average reduction in hemoglobin was 2.13 g/dL. 1 patient (1.4%) in the IV group received 1 unit of blood. Thus far, data has been collected for 16 oral TXA patients; however, none of the patients have had a post-operative hemoglobin drawn and 0 patients have received transfusions. **Conclusions:** The goal of this research is to demonstrate that oral TXA has equal efficacy for preventing hemoglobin loss and blood transfusion when compared to IV TXA. The second goal is to determine that oral TXA is associated with lower costs than IV TXA. At this time, it is too early to determine if these conclusions can be confirmed.

Learning Objectives:

Explain why oral tranexamic acid is an acceptable alternative to intravenous tranexamic acid in orthopedic surgery patients.
Select an appropriate dosing regimen for oral tranexamic acid.

Self Assessment Questions:

- Select the answer that best describes why oral tranexamic acid is an acceptable alternative to intravenous tranexamic acid.
- A Oral tranexamic acid costs less than intravenous tranexamic acid,
 - B: Studies have shown that oral tranexamic acid results in similar blood loss compared to intravenous tranexamic acid.
 - C: The oral form is 100% bioavailable, so it can be given at the same time as intravenous tranexamic acid.
 - D: The risk of thromboembolism is no greater with oral tranexamic acid than intravenous tranexamic acid.

Which of the following dosing regimens is appropriate based on current literature regarding oral tranexamic acid?

- A 1300 mg given orally 2 hours prior to incision, and 1950 mg given orally 2 hours after incision
- B 1950 mg given orally the evening prior to the procedure
- C 1950 mg given orally 2 hours prior to incision
- D 1950 mg given orally immediately prior to incision

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-686-L01-P

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

ASSESSMENT OF GLP-1 AGONISTS OR SGLT-2 INHIBITORS AS ADD-ON THERAPY AMONG PATIENTS ON BASAL AND BOLUS INSULIN IN VETERAN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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The high morbidity and mortality of type 2 diabetes mellitus exemplifies the importance of providing both quality and cost-effective care. Limited studies have examined the effectiveness of the addition of glucagon-like peptide-1 (GLP-1) agonists or sodium glucose co-transporter 2 (SGLT-2) inhibitors in patients already using basal and bolus insulin. The objective of this study was to assess the efficacy of the addition of a GLP-1 agonist or a SGLT-2 inhibitor to a basal and bolus insulin regimen.

This study was a retrospective electronic chart review of all patients on basal and bolus insulin who received additional therapy with a GLP-1 agonist or a SGLT-2 inhibitor at the Richard L. Roudebush Veterans Affairs Medical Center from September 1, 2015-August 31, 2017. A list of all patients with active prescriptions for basal insulin, bolus insulin, and a GLP-1 agonist or SGLT-2 inhibitor within this timeframe was generated from the computerized patient record system. Patients served as their own control and data points were collected for at least six months before and at least six months after the initiation of the GLP-1 agonist or SGLT-2 inhibitor. The primary outcome of change in A1c was assessed through collection of all documented A1c levels within the study period. Data was collected for change in the following secondary outcomes: weight, daily insulin requirements, blood pressure, serum creatinine, incidence of hypoglycemia and adverse effects, percentage of patients who achieved their A1C goal, percentage of patients receiving target dose of the study medication, and the presence of pharmacy or endocrinology involvement. Data collected was de-identified through utilization of random study number assignments. Final results to be presented at Great Lakes Residency Conference. This study has been approved by the Institutional Review Board.

Learning Objectives:

Explain the mechanism of actions of GLP-1 agonists and SGLT-2 inhibitors

Indicate the potential benefits that have led providers to prescribe a GLP-1 agonist or SGLT-2 inhibitor in addition to a basal and bolus insulin regimen

Self Assessment Questions:

Which of the following is a benefit to the use of an SGLT2 inhibitor?

- A Once weekly dosing
- B: Decreased incidence of hypoglycemia compared to sulfonylureas
- C: Decreased cholesterol
- D: Same A1c lowering as metformin

Which of the following is part of the mechanism of action for GLP-1 agonists?

- A Increase glucagon secretion
- B Increase glucose-independent insulin secretion
- C Decrease beta-cell growth
- D Slow gastric emptying

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-309-L01-P

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

TIME TO BLOOD STERILIZATION FOR NAFICILLIN VERSUS CEFAZOLIN IN METHICILLIN-SUSCEPTIBLE STAPHYLOCOCCUS AUREUS (MSSA) BACTEREMIA IN AN ACADEMIC MEDICAL CENTER

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Purpose: Staphylococcus aureus, one of the most common pathogens for both community and hospital acquired bloodstream infections (BSI), is associated with high healthcare costs and mortality.¹ For methicillin-susceptible Staphylococcus aureus (MSSA) catheter-related infections, the Infectious Diseases Society of America recommends an anti-staphylococcal penicillin for first-line therapy. Although the guidelines list cefazolin as an alternative agent to nafcillin or oxacillin, numerous studies have demonstrated similar efficacy with cefazolin. Studies have also established the importance of obtaining negative cultures and source control in S. aureus infections. The purpose of this study was to investigate time to blood sterilization with nafcillin versus cefazolin in patients with MSSA bacteremia. The secondary objectives included comparing hospital cost of therapy and further evaluation of blood culture sterility in specified, subgroup populations. **Methods:** A single-center, retrospective chart review was conducted at the University of Louisville Hospital. Patients admitted from October 2014 to December 2017 were identified using International Classification of Disease 9 and 10 codes for MSSA bacteremia. Patients were included in the study if they were over 18 years of age, had at least 2 paired blood culture sets positive for MSSA, and received nafcillin or cefazolin with an appropriate dose for at least 7 days. Time to blood sterilization was measured from the documented time the first positive cultures were collected to the documented time the first negative blood cultures were collected. **Results and Conclusions:** Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the existing literature and guideline recommendations for the utilization of nafcillin and cefazolin in methicillin-susceptible Staphylococcus aureus (MSSA) bacteremia

Discuss the selection of optimal therapy in patients with MSSA bacteremia based on clinical considerations and patient characteristics

Self Assessment Questions:

According to the IDSA guidelines, which of the following antimicrobials is first-line for catheter-related infections and infective endocarditis due to MSSA?

- A: Penicillin G
- B: Nafcillin
- C: Cefazolin
- D: Ceftriaxone

Which of the following statements is true regarding nafcillin and cefazolin?

- A: Nafcillin does not require a renal dose adjustment
- B: Cefazolin penetrates the central nervous system
- C: Cefazolin is most often dosed every 4 hours, thus, usually requiring
- D: Cefazolin is associated with causing acute kidney injury (e.g. inter-

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-310-L01-P

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

RELIABILITY OF SELF-REPORTED PENICILLIN AND CEPHALOSPORIN ALLERGIES VIA A PHARMACIST-DRIVEN QUESTIONNAIRE IN A RURAL COMMUNITY HOSPITAL

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Purpose: According to the Center for Disease Control and Prevention, approximately one in every ten patients in the United States reports having an allergic reaction to a penicillin class antibiotic, but less than one percent of the population is truly allergic. Patients with reported beta lactam allergies are more likely to receive alternative antibiotics that may be less efficacious, more costly, or have more adverse effects. The purpose of this study is to assess the reliability of self-reported penicillin and cephalosporin allergies and the impact of a pharmacist-led questionnaire on antimicrobial therapy among hospitalized patients at St. Claire HealthCare. **Methods:** This is a single-center, prospective, observational study. Patients 18 years of age or older will be included if they have an allergy to penicillins or cephalosporins documented in the electronic medical record and are receiving an antibiotic other than penicillins or cephalosporins. If patients are unable to participate in a verbal interview, are not admitted to the hospital, or are on guideline appropriate therapy regardless of their listed allergy they will be excluded. Data to be collected include baseline demographics, reason for admission, results of the allergy questionnaire, antibiotic prescribed and indication, prescribing physician, percentage of antibiotics that are changed as a result of pharmacist intervention, discrepancies between electronic medical record and questionnaire, and adverse drug reactions. The likelihood of a self-reported allergy being a true allergy will be determined based on questionnaire results and will be categorized as probable, possible, or unlikely. Results will be grouped by the reliability of the reported allergy (probable, possible, or unlikely) and whether the antibiotic was changed based on questionnaire results and pharmacist intervention. **Results and Conclusions:** This study is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference pending data collection and analysis.

Learning Objectives:

Identify the prevalence of true versus reported penicillin allergies in the United States

Recognize the difference between an allergy and an adverse effect

Self Assessment Questions:

What percentage of the United States population has a true penicillin allergy?

- A: ≤ 0.1%
- B: ≤ 1%
- C: ≤ 5%
- D: ≤ 10%

Which of the following would most likely be considered a true penicillin allergy?

- A: Red non-itchy rash, uneventful second exposure
- B: Nausea and diarrhea, eventful second exposure
- C: Swelling and itching of hands, never re-exposed
- D: A & C

Q1 Answer: B Q2 Answer: C

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

INCIDENCE OF DRUG-BUG MISMATCH IN TRAUMA INTENSIVE CARE UNIT PATIENTS TREATED PER PROTOCOL WITH A RESPIRATORY FLUOROQUINOLONE FOR SUSPECTED VENTILATOR ASSOCIATED PNEUMONIA

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Purpose: The purpose of this study is to evaluate and validate the current trauma ventilator associated pneumonia (VAP) protocol at OhioHealth Grant Medical Center. Per protocol, patients with a length of stay less than seven days are empirically initiated on levofloxacin monotherapy, which may limit the scope of antimicrobial coverage. Studies from other Level 1 Trauma Centers emphasize the value of selecting empiric antibiotics for VAP from institution-tailored algorithms in order to optimize antibiotic use and ensure appropriate antimicrobial coverage. The objective of this study is to provide evidence-based, hospital-specific support for the trauma VAP protocol at OhioHealth Grant Medical Center. **Methods:** This study was submitted to the Institutional Review Board for approval. This study is a retrospective, single-center review of patients admitted to the OhioHealth Grant Medical Center trauma intensive care unit (TICU) and critical care units with suspected VAP and empirically initiated on levofloxacin between the dates of June 1, 2015 through December 31, 2017. Patients were included when treated for at least 7 days for VAP, received a bronchoalveolar lavage (BAL) per protocol, and admitted with trauma as their primary service line. The primary aim is to evaluate the incidence of drug-bug mismatch in trauma ICU patients treated per protocol with levofloxacin for suspected VAP. Secondary aims include comparing total antibiotic days and total ventilator days for patients requiring changes to empiric therapy versus those who did not. In addition, pertinent patient medical history will be collected and assessed to provide support and recommendations to the current trauma VAP protocol. **Results/Conclusions:** A total of 237 patients were screened during the data collection process. Of these patients, 71 were included for evaluation and analysis. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define current practice recommendations from IDSA guidelines for ventilator associated pneumonia.

Select appropriate empiric antibiotic therapy for ventilator associated pneumonia patients based off of hospital and unit antibiograms.

Self Assessment Questions:

In which patients do the 2016 IDSA HAP/VAP Guidelines recommend empiric anti-MRSA antibiotics in ventilator associated pneumonia (VAP)

- A: Patients in a unit where >10-20% S. aureus is methicillin resistant
- B: Patients with five or more days of hospitalization prior to VAP occur
- C: Patients with prior IV antibiotic use within 90 days
- D: All of the above

Which of the following are possible negative outcomes of inappropriate empiric antibiotic therapy in ventilated patients?

- A: Prolonged ventilator days
- B: Prolonged antibiotic days
- C: Increased intensive/critical care length of stay
- D: All of the above

Q1 Answer: D Q2 Answer: D

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ASSESSMENT OF CLINICAL SAFETY OUTCOMES IN PATIENTS WITH NONVALVULAR ATRIAL FIBRILLATION ON RIVAROXABAN AND DILTIAZEM

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Purpose: The current recommendation per the prescribing information for rivaroxaban is to avoid the use of rivaroxaban in patients with a creatinine clearance (CrCl) between 15 and 80 ml/min receiving combined P-gp and moderate CYP3A4 inhibitors unless the potential benefit justifies the potential risk. Given the ambiguity of this recommendation, the approach to managing this interaction, especially in various tiers of renal function, remains unclear. The objective of this study is to assess the proportion of patients with major and clinically relevant non-major bleeding in patients on rivaroxaban with concomitant diltiazem, a combined P-gp and moderate CYP3A4 inhibitor, in a real-world setting. **Methods:** The treatment group will include patients age 18 years or older with nonvalvular atrial fibrillation on rivaroxaban and diltiazem. The control group will be identified as patients with nonvalvular atrial fibrillation on rivaroxaban without concomitant diltiazem. Patients in the control group will be matched 1:1 to the treatment group by age and renal function. Patients with a CrCl less than 30 ml/min or taking concomitant medications identified as combined P-gp and moderate or strong CYP3A4 inhibitors (other than diltiazem) or combined P-gp and strong CYP3A4 inducers will be excluded. The following data will be collected from the electronic medical record for both groups: age, race, gender, weight, renal function, comorbidities, baseline labs, medications, major bleeding events, and non-major clinically relevant bleeding events. The primary outcome of the composite of major bleeding and non-major clinically relevant bleeding will be compared between the treatment and control groups. **Results/Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the pathway of rivaroxaban metabolism and excretion.

Discuss the drug-drug interaction between rivaroxaban and diltiazem.

Self Assessment Questions:

Rivaroxaban is primarily metabolized by which CYP enzyme?

- A: Cyp2c9
- B: Cyp3a4
- C: Cyp1a2
- D: Cyp2d6

The drug-drug interaction between rivaroxaban and diltiazem is a result of diltiazem's activity as a:

- A: Moderate CYP3A4 and P-gp inhibitor
- B: Moderate CYP2J2 and P-gp inhibitor
- C: Strong CYP3A4 and P-gp inhibitor
- D: Strong CYP3A4 inducer

Q1 Answer: B Q2 Answer: A

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**PROJECT EVADE (EDUCATING VETERANS AFTER DISCHARGE):
IMPLEMENTATION OF A PHARMACIST-RUN TRANSITIONS OF
CARE CLINIC ON HOSPITAL READMISSIONS**

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Hospital readmissions are extremely costly to the healthcare system. Effective medication management is an imperative part of transitional care for patients after hospital discharge. To date, literature has demonstrated the role of the pharmacist at discharge but literature is scarce to support models that operate from the primary care setting. To improve the care of high-risk Veterans transitioning from the hospital back to primary care, the Columbus VA has initiated a pilot, pharmacist-managed transitions of care (ToC) clinic. The ToC pharmacist screened utilization review documents to identify patients who had recently been discharged from the hospital. Patients with a Care Assessment Needs (CAN) score greater than 90 were called and offered a ToC visit within 14 days of discharge. Hospital records were assessed along with patient interviews to identify medication related problems. All recommendations were summarized in an encounter note and alerted to the primary care physician (PCP) for action. To date, the ToC pilot clinic has enrolled 21 patients. The clinic will continue to see patients through June 2018. Outcomes of clinic interventions will be assessed next year using the inverted research model. Clinic implementation presents unique challenges at each individual facility. Independent of facility variation, it is critical to the success of a clinic to gain support from pharmacy leadership and collaborating providers. One way to build acceptance is with a thorough needs assessment of the facility by soliciting input from all key stakeholders. A standard operating procedure for the clinic may then be designed to optimize workflow and address the gaps in patient care. A timeline has served as a useful tool when creating the building blocks of the clinic factoring in patient recruitment, physical space in the clinic and pharmacist availability. Adapting the clinic after implementation has meant consistent reevaluation of workflow and time utilization.

Learning Objectives:

Outline one approach to a transitions of care clinic in the VA healthcare system

Describe challenges and lessons learned from implementation of a transitions of care clinic

Self Assessment Questions:

Which of the following is an advantage to incorporating a transitions of care pharmacist into the primary care team?

- A Coordinating care with specialists
- B: Educating patients on discontinued or new medications
- C: Evaluating the appropriateness of medication regimen
- D: All of the above

Which of the following are ways to gain support from key stakeholders when implementing a clinic?

- A Conduct a thorough needs assessment of the facility
- B Educate collaborating providers on the benefits to their practice
- C Present a clear and concise standard operating procedure for the
- D All of the above

Q1 Answer: D Q2 Answer: D

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Activity Type: Knowledge-based Contact Hours: 0.5
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**IMPACT OF QUETIAPINE ON NEUROCOGNITIVE OUTCOMES IN
TRAUMATIC BRAIN INJURY SURVIVORS**

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Millions of Americans suffer from traumatic brain injury (TBI) annually, which carries substantial morbidity, mortality, and economic consequences. Due to overlapping symptoms between delirium, psychosis, and TBI, antipsychotics are often prescribed to treat these symptoms. A retrospective cohort study analyzing the implications of atypical antipsychotics (AAP) in the intensive care unit (ICU) found that patients with TBI were more likely to be prescribed an AAP at discharge than patients without TBI. However, antipsychotics have been demonstrated to worsen cognitive recovery, memory loss, and overall clinical outcomes in patients with TBI. The primary objective of this retrospective, single-center, cohort study is to compare neurocognitive outcomes between acute TBI patients who were and were not discharged on quetiapine to a long-term acute care facility. Secondary outcomes included adverse effects, mortality, hospital readmission, and disposition at 30 and 90 days. Quetiapine prescribing patterns between surgical and neuroscience ICU providers were also evaluated. The investigators hypothesized that TBI survivors discharged on quetiapine would have poorer neurocognitive outcomes compared to those not discharged on quetiapine. Forty-eight adult patients admitted to either the surgical or neuroscience ICU with a diagnosis of moderate or severe TBI were included for analysis. Data points collected included baseline demographics, Glasgow Coma Score, TBI severity, neurocognitive assessments, mortality, hospital readmission, disposition, length of stay, and quetiapine exposure. Continuous data will be analyzed using t-test or Wilcoxon Rank Sum, whereas categorical data will be analyzed using Chi-squared or Fisher's exact test, as appropriate. Data collection and analysis are currently on-going.

Learning Objectives:

Review epidemiology, pathophysiology, and long-term consequences of traumatic brain injury (TBI)

Discuss the implications of antipsychotics on clinical outcomes in traumatic brain injury survivors

Self Assessment Questions:

A 22 year-old unhelmeted male s/p motorcycle accident is transported to the UCMC ED by EMS. Upon initial exam, he is unable to speak or open eyes, and has no motor response to pain. What is his GCS sc

- A 13, Mild
- B: 7, Moderate
- C: 3, Severe
- D: 14, Severe

When comparing the general ICU population to TBI survivors, which of the following is correct?

- A TBI survivors are less likely to be discharged with an atypical antip
- B TBI survivors with a GCS < 8 are more likely to be discharged with
- C TBI survivors with a GCS > 12 are more likely to be discharged wit
- D There is no difference between the atypical antipsychotic discharg

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-314-L01-P

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(if ACPE number listed above)

EARLY GLYCEMIC CONTROL IN ADULT PATIENTS WITH NECROTIZING FASCIITIS

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Purpose: Necrotizing fasciitis is associated with increased morbidity and mortality as compared to other skin and soft tissue infections. Hyperglycemia is associated with poor wound healing; however, there are no studies evaluating outcomes of glycemic control in patients with necrotizing fasciitis. The objective of this study was to determine the difference in number of debridements and mortality in patients with necrotizing fasciitis that achieve early glycemic control (EGC) compared to patients that did not. **Methods:** This was a retrospective chart review of patients diagnosed with necrotizing fasciitis or Fournier's gangrene between November 1, 2011 and August 31, 2017. Early glycemic control was defined as a daily average blood glucose level ≤ 150 mg/dL for a minimum of two consecutive days from admission to hospital day three. The primary outcome of this study was a composite of ≤ 3 debridement procedures at hospital day 14 and survival at discharge. **Results:** One-hundred five patients were included in the analysis; 62% male, mean age 55.3 years, mean weight 106.9 kg and 57.1% diabetes mellitus (DM). The 54 (51.4%) patients who achieved EGC were less likely to have DM (29.6% versus 86.2%, $p < 0.001$), had a lower median admission glucose (120.5[97-144] versus 198[153-295.5] mg/dL, $p < 0.001$), and had lower median daily glucose values during the first 96 hours of admission ($p < 0.001$). Patients that achieved EGC were less likely to receive subcutaneous (44.4% versus 70.6%, $p = 0.01$) and intravenous (14.8% versus 54.9%, $p < 0.001$) insulin. There was no significant difference in the composite clinical outcome (83.3% versus 84.3%, $p > 0.99$), ICU admission (66.7% versus 78.4%, $p = 0.2$), or incidence of hypoglycemia (14.8% versus 23.5%, $p = 0.32$). **Conclusion:** Overall, there was no difference in composite clinical outcomes between patients that achieved EGC and those that did not. Patients with DM were less likely to achieve EGC. Targets for improvement have been identified.

Learning Objectives:

Identify the layers of the skin affected by necrotizing fasciitis
Recognize the benefits of early glycemic control in trauma, burn, and surgical intensive care unit patients.

Self Assessment Questions:

What layer of the skin does necrotizing fasciitis occur within?

- A: Epidermis and dermis
- B: Dermis and fat
- C: Fat and fascia
- D: Fascia and muscle

What is a postulated benefit of early glycemic control?

- A: Faster wound healing
- B: Shorter duration of antibiotics
- C: Less nursing time per patient and cost of nursing care
- D: Decreased incidence of hospital-acquired infections

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-315-L01-P

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IMPACT OF IMPLEMENTATION OF A SKIN AND SOFT TISSUE INFECTION TREATMENT GUIDELINE IN THE EMERGENCY DEPARTMENT

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Skin and soft tissue infections (SSTIs) are diverse in clinical presentation and degree of severity. SSTIs account for 2.6% of all emergency department (ED) visits with 13.9% of visits resulting in hospitalization. At Froedtert Hospital's ED, antibiotic selection for SSTIs has traditionally been left to provider discretion. To help align prescribing recommendations with the Infectious Diseases Society of America (IDSA) guideline for SSTI treatment, a SSTI treatment guideline was developed. With guideline compliance, the goal is to increase treatment concordance with IDSA recommendations for patients with SSTIs in the ED. This quasi-experimental study will be conducted at Froedtert hospital. Froedtert hospital is a 536 bed academic medical center in Milwaukee WI, which has over 140,000 visits to its ED yearly. An SSTI guideline was implemented in January 2018, with provider education completed prior to implementation. Data will be analyzed from March 1 to May 31, 2018 for the post-intervention group and compared to data for the same timeframe one year prior (pre-implementation group). Patients greater than 18 years of age with a diagnosis of SSTI in the emergency department will be included. Patients with a diagnosis of surgical infection, bites (including animal and human), osteomyelitis, necrotizing SSTIs, diabetic foot infection, or joint infection will be excluded. The primary outcome is to measure the rate of compliance with a skin and soft tissue infection guideline pre and post guideline implementation. Secondary outcomes include infection recurrence, antibiotic escalation, 30-day all-cause mortality, number of patients admitted to the hospital and the number of patients who receive antibiotics directed at treating methicillin resistant *Staphylococcus aureus* (MRSA) using agents such as vancomycin, daptomycin, linezolid and ceftaroline. Data collection is in progress and the results will be presented at the conference.

Learning Objectives:

Recall the Infectious Disease Society of America guideline for skin and soft tissue infections
Identify common pathogens that cause skin and soft tissue infections

Self Assessment Questions:

What is the best treatment option according to the IDSA guidelines for a mild non-purulent SSTI infection?

- A: Vancomycin
- B: Cephalexin
- C: Clindamycin + Cefepime + Vancomycin
- D: Cephalexin + Metronidazole

Which of the following pathogens is most likely to cause a purulent skin and soft tissue infection

- A: *Pseudomonas Aeruginosa*
- B: *Vibrio vulnificus*
- C: *Peptostreptococcus spp*
- D: *Staphylococcus aureus*

Q1 Answer: B Q2 Answer: D

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EVOLUTION OF CARDIO-ONCOLOGY: VASCULAR ENDOTHELIAL GROWTH FACTOR INHIBITION AND HYPERTENSION IN A SINGLE-CENTER, RETROSPECTIVE, COHORT STUDY

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Purpose: Advances in earlier detection and prolonged treatment of malignancies have led to an increased number of cancer survivors. As a result, there has been a trend in elevated treatment-related complications relating to the cardiovascular system. Hypertension is associated with anti-vascular endothelial growth factor (VEGF) tyrosine kinase inhibitors (TKIs) and monoclonal antibodies utilized in the treatment of many solid tumors. There is no standard guideline for screening and treatment of hypertension in patients receiving these agents. Currently at UC Health, management is largely provider-specific and may include administration of an anti-hypertensive agent immediately pre-treatment, therapy deferral, and/or dose reduction. The primary objective of this study is to investigate the rate of intervention due to hypertension. Intervention is defined as a dose reduction, dose deferral, and/or initiation of pharmacotherapy. Future directions include development of an algorithm for management of patients who experience anti-VEGF therapy induced hypertension. **Methods:** This single-center, retrospective, cohort study includes patients 18 years and older who have received at least one dose of pre-specified anti-VEGF therapy (bevacizumab, ramucirumab, sorafenib, sunitinib, or pazopanib) for malignancy as an outpatient at UC Health. Patients are stratified according to blood pressure documented at the first medical oncologist visit (>140/90 mmHg or <140/90 mmHg.) Prisoners, pregnant females, and patients initiated at a starting dose above or below national oncology guideline recommendations are excluded. Primary outcome includes the total number of patients receiving an intervention. Secondary outcomes include time from initiation of anti-VEGF therapy to both elevation in blood pressure and intervention during the first three months of therapy. A multivariate logistic regression analysis will be performed to determine baseline characteristics, including comorbid conditions and oncologic diagnoses, predictive of blood pressure elevation during anti-VEGF therapy. Kaplan Meier curves will be utilized to assess time-to-event outcomes. **Results:** Data collection and analysis are currently ongoing.

Learning Objectives:

Review the pathophysiology of anti-VEGF induced hypertension.
Discuss national guidelines for severity scoring of adverse events.

Self Assessment Questions:

Which of the following mechanism(s) is/are thought to contribute to the development of anti-VEGF induced hypertension?

- A Increased nitric oxide production
- B: Vasoconstriction of efferent arteriole
- C: Increased endothelin-1
- D: A & c

According to CTCAE v4.0, for which grade of hypertension is pharmacologic therapy indicated?

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

Q1 Answer: C Q2 Answer: B

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INTERNATIONAL NORMALIZED RATIO STABILITY WITH DAILY USE OF LOW-DOSE VITAMIN K

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Purpose: The purpose of this quality improvement project is to determine the impact of vitamin K on time in therapeutic range (TTR) in patients with labile international normalized ratios (INRs). **Methods:** Labile INR patients enrolled in the anticoagulation clinic will be selected and offered low-dose vitamin K supplementation. Labile INR will be defined as individuals with a TTR less than 60 percent and at least 3 INRs within 150 days. Veterans that consent to vitamin K will receive a prescription for 100 micrograms of phytonadione daily. The primary endpoint of this study will evaluate TTR 150 days after addition of vitamin K compared to the 150 days immediately prior. Secondary endpoints include average follow-up time interval, bleeding events, thromboembolic events, and hospitalization. **Results:** Seven Veterans with labile INRs were offered low-dose vitamin K supplementation. An interim analysis was performed at 30 days from when each Veteran began vitamin K supplementation. At 30 days, TTR showed significant improvement in three Veterans. TTR ranged from 23%-47.8% prior to vitamin K supplementation and within 30 days TTR improved by 25% to 73%. TTR was unable to be calculated for three Veterans based on lack of available INR results. Additionally, one Veteran's TTR decreased by 12%. **Conclusions:** Based on the above interim analysis, favorable outcomes can be suggested from the addition of daily low-dose vitamin K supplementation in Veterans with labile INRs. However, this quality improvement project is still within data collection; therefore a final conclusion cannot be determined at this time. Further interim analyses will be performed at 2, 3, and 4 months with final outcome data measured 150 days after the first dose of vitamin K for each patient.

Learning Objectives:

Explain the rationale for use of low-dose vitamin K in patients with labile INRs.

Recognize possible adverse outcomes in individuals with labile INRs.

Self Assessment Questions:

What impact does low-dose vitamin K have on labile INR?

- A Low-dose vitamin K results in decreased production of clotting factor
- B: Low-dose vitamin K has no impact on INR results.
- C: Low-dose vitamin K results in steady production of clotting factors
- D: Low-dose vitamin K results in a substantial increase in production

Individuals with labile INRs are at increased risk for:

- A Bleeding
- B Thromboembolic events
- C Hospitalization
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-317-L01-P

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

INCIDENCE OF ACUTE KIDNEY INJURY (AKI) IN PEDIATRIC PATIENTS WITH PLEURAL EFFUSIONS RECEIVING CHEST TUBES AND VANCOMYCIN

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Purpose: Pleural effusions are commonly treated using antibiotics, including vancomycin. Because treatment for this condition routinely involves placement of a chest tube to drain excess fluid in combination with vancomycin, these patients are presumed to be at high risk for acute kidney injury (AKI). Incidence of AKI after placement of a chest tube and vancomycin administration for pleural effusions in the pediatric population is currently unknown, as are the risk factors increasing AKI incidence. This study will determine AKI incidence and identify AKI risk factors in this population. **Methods:** This study is approved by the Indiana University Health Institutional Review Board. This is a retrospective chart review of patients age 30 days to 17 years diagnosed with an effusion who received a chest tube and vancomycin therapy for at least 72 hours. Acute kidney injury is defined using the pRIFLE criteria. Factors analyzed to determine increased risk of AKI are duration of chest tube placement and vancomycin usage, amount of fluid drained from chest tube, initial and maximum vancomycin doses and troughs, and the use of concomitant nephrotoxins. Descriptive statistics will describe baseline demographic and clinical data. Incidence of AKI will be compared to historical incidence of 14% in the pediatric population receiving vancomycin. Normal continuous data points will be reported as mean \pm standard deviation and analyzed via a t-test. Non-normal continuous data points will be reported as median with a range and analyzed using a Mann-Whitney U test. Categorical data will be reported as N (%) and analyzed via a Chi-squared or Fisher's exact test. **Results and Conclusions:** Data collection is ongoing and results will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define acute kidney injury in a pediatric population using the pRIFLE criteria

Recognize factors that may increase the risk of AKI in children receiving vancomycin

Self Assessment Questions:

What percent decrease in estimated creatinine clearance defines pediatric acute kidney injury category per the pRIFLE criteria?

- A: 20%
- B: 25%
- C: 50%
- D: 75%

Which of the following has been correlated with increased AKI incidence in children receiving vancomycin therapy?

- A: Higher vancomycin daily doses
- B: Lower vancomycin troughs
- C: Use of concomitant cephalosporins
- D: Use of concomitant IV fluids

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-318-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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IMPACT OF INAPPROPRIATELY PRESCRIBED DIRECT ORAL ANTICOAGULANTS ON ADVERSE EVENT RATES

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Purpose: Direct oral anticoagulants (DOACs) offer benefits over standard-of-care warfarin for the treatment of venous thromboembolism (VTE) or stroke prevention in non-valvular atrial fibrillation (NVAF) due to lack of routine laboratory monitoring requirements, dietary restrictions, and reduced incidence of drug-drug interactions. However, dose adjustments of DOACs may be necessary based on certain clinical criteria which may lead to inappropriate prescribing and the potential for increased rates of adverse events. **Methods:** A single-center, retrospective observational cohort study was conducted to evaluate the adverse event rates of inappropriately dosed dabigatran, rivaroxaban, and apixaban in adult patients with a diagnosis of VTE or NVAF. The primary objective was the composite rate of bleeding and thrombosis between patients who were prescribed an inappropriately dosed DOAC compared to patients who were appropriately dosed. Secondary objectives include rates of thrombosis, rates of bleeding, prescribing services, reasons for inappropriate dosing, and rates of inappropriate dose adjustment for each DOAC. **Results:** Among the 158 patients included, the rate of inappropriately dosed DOACs was 10.8%. The most common indication for DOAC prescribing was NVAF (55.7%). Rivaroxaban was the most frequently prescribed DOAC (53.8%). Inappropriately dosed DOACs occurred most frequently with apixaban (52.9%). The primary endpoint found no significant difference in composite rates of bleeding and thrombosis in the inappropriately prescribed group (11.8%) compared to the appropriately prescribed group (21.3%) ($p=0.19$). The overall rate of adverse events was 20%, with minor bleeding being the most commonly reported adverse event. **Conclusions:** Initial findings show low rates of inappropriately prescribed DOACs. No differences in the composite rate of bleeding or thrombosis were seen in patients who received an inappropriately dosed DOAC for treatment of VTE or stroke prevention in NVAF compared to those who were appropriately dosed.

Learning Objectives:

List the pros and cons of direct oral anticoagulants compared to warfarin
Review the dosing recommendations of direct oral anticoagulants for non-valvular atrial fibrillation and treatment of venous thromboembolism.

Self Assessment Questions:

What are the potential advantages of direct oral anticoagulants when compared to warfarin?

- A: Reduced monitoring requirements
- B: Availability of reversal agents for all of the direct oral anticoagulant
- C: Decreased risk of drug-drug and drug-food interactions
- D: A and C

What is the appropriate dose of apixaban for an 82 year old female with an acute pulmonary embolism who weighs 57 kg with a serum creatinine of 1.2 mg/dL?

- A: 2.5 mg twice daily
- B: 5 mg twice daily
- C: 5 mg BID x 7 days, followed by 2.5 mg BID
- D: 10 mg BID x 7 days, followed by 5 mg BID

Q1 Answer: D Q2 Answer: D

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EVALUATING THE LINK BETWEEN MEDICATION ORDER VOIDING AND PRESCRIBING ERRORS

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Purpose: Medication errors cause preventable adverse drug events in approximately 1.5 million individuals each year; however, only 10-20% of all errors are reported. The use of "triggers" such as abnormal lab results, antidote administration, and vital signs to identify adverse events is an effective method to identify and track medication errors. However, there is currently no standardized methodology to detect and report adverse drug events utilizing trigger tools. Errors commonly occur during medication ordering/prescribing. The computerized provider order entry (CPOE)-based function of medication order voiding is a way for clinicians to remove medication orders from a patient's active medication list, including those that were placed in error. Therefore, a voided order may serve as a proxy for medication order entry errors. Analysis of prescribing errors identified in voided orders can provide useful insight into the source of these errors as a step towards reducing them. The primary purpose of this study is to determine if voided medication orders can serve as a useful method for detecting prescribing errors. Methods: This is a single-center, retrospective chart review of a random sample of inpatient medication orders that were voided between January 1, 2016 and December 31, 2016 at Northwestern Memorial Hospital. Data will be obtained from Cerner's PharmNet and will include voided order ID, position of person placing the order and voiding it, date/time order was voided, and new orders placed within 10 minutes of the voided order. Orders will be analyzed to determine the proportion of voided orders that are potentially medication errors. Medication errors will be categorized as one of the following: wrong route, wrong dose, wrong schedule, wrong strength, wrong indication, wrong drug, duplicate order, or not clinically appropriate. The primary endpoint will be to assess the incidence of medication order entry errors among voided medication orders.

Learning Objectives:

Identify potential trigger tools which can be used to recognize adverse drug events.

Define the CPOE-based function of medication order voiding.

Self Assessment Questions:

Which of the following would NOT serve as a trigger tool that an adverse drug event may have occurred?

- A Medication order abruptly discontinued
- B: Administration of glucagon
- C: Potassium level of 6
- D: Nausea after chemotherapy session

Which of the following statements is true about the CPOE-based function of medication order voiding?

- A Function of voiding is standardized across all institutions
- B Orders can be voided before or after medication administration
- C Discontinuing an order is the same as voiding it
- D Once an order is voided, there is no record of it being placed

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-855-L05-P

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

THE FINANCIAL IMPACT OF MEDICARE COVERAGE DESIGN

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Purpose: Total national spending on specialty medications has increased by almost 20 percent annually since 2014, and, in 2015, accounted for almost \$150.8 billion in cost. Medicare's coverage system has shifted some of these costs to patients while also limiting coverage of certain disease states. This lack of coverage has prohibited patients from starting or maintaining therapy due to affordability issues. As a result, patients have enrolled in safety net options, such as manufacturer free drug and foundation support programs versus solely utilizing health insurance. This resulted in decreased claims to Medicare. This study aimed to quantify the financial savings to Medicare as a result of patient utilization of safety net options. Secondly, the financial impact was quantified for patients, manufacturers, foundations, and the study site due to patient utilization of safety net payment options. Methods: This was a single-center, non-randomized, retrospective pilot study of Medicare beneficiaries prescribed oncology specialty medications. All patients actively received care at the study site during the study period of July 1, 2015 to June 30, 2017. Subjects were identified by a query of specialty pharmacy databases and dispensing systems. Investigators collected data related to prescription fill history, drug cost, and associated prescription coverage information through Medicare, drug manufacturers, and/or foundations. Results and Conclusion: Data collection and analysis are ongoing. Preliminary results and conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Define "specialty medication" according to Medicare.

Recall parts of the Medicare coverage system (Medicare Part A, Part B, Part C, and Part D.)

Self Assessment Questions:

Which of the following is the definition of a specialty medication according to Medicare?

- A Cost of at least \$600 per month
- B: Cost of at least \$1000 per month
- C: Cost of at least \$200 per week
- D: Cost of at least \$500 per month

Which of the following parts of Medicare is most commonly involved with coverage of outpatient self-administered medications?

- A Medicare Part D
- B Medicare Part C
- C Medicare Part B
- D Medicare Part A

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-689-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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CRITICAL CARE PHARMACY COLLABORATIVE PRACTICE TO OPTIMIZE MANAGEMENT OF SEVERE COMMUNITY ONSET PNEUMONIA

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Purpose: Approximately 10% of patients hospitalized for community-onset pneumonia require admission to an intensive care unit (ICU), which is associated with high mortality rates. Diagnostic uncertainty in pneumonia has contributed to inappropriate and excess antimicrobial treatment, especially in cases of viral pneumonia. Diagnostic laboratory tests that can assist clinicians in the appropriate diagnosis and treatment of pneumonia include influenza PCR, respiratory virus panel (RVP), Legionella urine antigen test (UAT), and procalcitonin (PCT). The purpose of this study was to improve management and outcomes of severe community-onset pneumonia through implementation of a pneumonia diagnostic bundle and the advancement of an Antimicrobial Stewardship (AMS) pharmacy practice model in the Medical Intensive Care Unit (MICU). **Methods:** This was a single-center, IRB-approved, quasi-experiment for severe community-onset pneumonia in the MICU before and after implementation of an advanced AMS pharmacy model. The intervention gave MICU pharmacists delegated authority to order a diagnostic bundle with influenza PCR, RVP, Legionella UAT, and PCT for cases of community-onset pneumonia from November 2017 to March 2018. The intervention was compared to a similar cohort of patients admitted from November 2016 to March 2017. Adults started on empiric antibiotics for onset on pneumonia < 48 hours from admission were included. Patients were excluded from this study if they were made comfort care measures or transferred from outside hospitals after 48 hours from admission, or had documented cystic fibrosis, lung abscesses, empyema, or loculated pleural effusion. The primary outcome was days of antimicrobial therapy. Secondary outcomes included diagnostic yield, length of hospitalization and ICU stay, inpatient all-cause mortality, re-treatment for pneumonia, re-admission to the ICU, and Clostridium difficile infection during the hospitalization. Antimicrobial therapy was assessed for de-escalation, escalation, and discontinuation. Post-intervention results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the consequences of treating viral pneumonia with antimicrobials
Describe the impact of available pneumonia diagnostic laboratory tests on antimicrobial optimization

Self Assessment Questions:

Which laboratory test can help identify a causative pathogen in viral pneumonia?

- A Legionella urine antigen test
- B: Procalcitonin
- C: Respiratory virus panel
- D: Respiratory culture

What is the appropriate treatment for pneumonia with a respiratory virus panel positive for influenza A infection and a procalcitonin of 0.1 ng/dL?

- A Ceftriaxone and azithromycin
- B Oseltamivir
- C Moxifloxacin
- D No antimicrobials indicated for treatment

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-320-L01-P

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

IMPROVING MEDICATION ACCESS THROUGH AMBULATORY CLINICS

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Purpose: In the current healthcare environment, healthcare leaders are challenged to focus on improving quality of care, reduce costs, and develop and sustain new revenue streams. One opportunity is investment in the organizations retail pharmacy operations. Medications are the primary treatment modality for patients seen in a clinic setting. Maximizing the utilization of internal retail pharmacy services can yield major financial returns to an organization, while also improving access to medications for patients and potentially improving clinical outcomes. At one large health-system, an opportunity to increase prescription capture was identified from two outpatient clinics whose prescription capture remained low during FY' 17. In a specialty clinic located at the academic medical center only 8.6% of the medications prescribed were filled within the organizations retail pharmacies; similarly, only 10.8% were captured from the stand-alone community health center. The primary objective for this process improvement project is to utilize two unique strategies to improve internal prescription first-fill rates, refill rates and gross revenue in the two clinic locations. The secondary objective is to identify patients perceptions and awareness of internal retail pharmacies and available pharmacy services (medication management and home delivery).

Methods: A unique implementation strategy will be deployed at each site. Pre- and Post- implementation metrics will be measured to identify the impact of the strategies on overall prescription capture.

Conclusion/Results: Expected results include an increase in prescription capture from the two intervention clinics, as well as identification of strategies that can be utilized to increase prescription capture across the system's 25+ healthcare centers and specialty clinics. Future steps of this project include measuring the impact on patient outcomes by assessing admissions to hospital and emergency department visits since project implementation.

Learning Objectives:

Define prescription capture and the importance to a healthcare organization

Describe tactics that can be used to increase prescription capture within a health system retail pharmacy

Self Assessment Questions:

Which of the following best describes prescription capture?

- A A patient filling their medications at any pharmacy
- B: A patient filling all their medications at a single pharmacy, regardless
- C: A patient filling their medications within the same system in which
- D: A patient filling their medication refills on time

What percent of patients fail to fill first-time prescription medications?

- A 10%
- B 30%
- C 50%
- D 75%

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-690-L04-P

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

IMPLEMENTATION OF A PHARMACIST TOOLKIT AND STANDARDIZED ASSESSMENT OF CHRONIC OPIOID PRESCRIPTIONS TO REDUCE OPIOID PRESCRIBING AND DISPENSING ACROSS A HEALTH-SYSTEM'S COMMUNITY PHARMACIES

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Purpose: To reduce the prescribing and dispensing of opioids through the implementation of a toolkit that standardizes the community pharmacists' review of opioid prescriptions for non-malignant chronic pain. **Methods:** Community and ambulatory pharmacists were surveyed to better understand pharmacists' assessment, confidence, and counseling practices related to chronic opioid prescriptions. New workflows were developed to standardize the assessment of opioid prescriptions, naloxone dispensing, documentation of pharmacist interventions and recommendations within the electronic health record (EHR). A toolkit was designed in alignment with the new guidelines, with input from physician stakeholders, pharmacy leadership and frontline pharmacists. The toolkit included a standardized prescription assessment tool, an opioid taper calculator and new workflow processes. The standardized prescription assessment tool was constructed to ensure that opioids were reviewed and reassessed based on opioid risk, which was calculated by morphine milligram equivalence (MME). The opioid taper calculator was designed to compute MME the patient's opioids, as well as clinically appropriate taper plans with the intention to provide an initial recommendation to the patient's care team to reduce the patient's opioid use. Community pharmacists were trained on the toolkit through in-person and computer based learning modules. The standardized processes and toolkit were implemented at two locations to pilot the workflows and identify necessary modifications. A larger scale rollout, post pilot study, would include the remaining community pharmacies within a health system (total #12 pharmacies). Post-implementation analyses would review the quantity of patients using high and moderate risk opioids on which recommendations were made, percentage of accepted recommendations, percentage of opioid doses that were tapered and quantity of naloxone dispensed. The discrete and free text data to be analyzed will be collected from both the community pharmacy management system and the health-system's EHR. **Conclusions:** The implementation of this toolkit will be expected to reduce opioid prescribing and dispensing at UW Health.

Learning Objectives:

Describe key components that should be included in an opioid toolkit for a health system's community pharmacies.

Discuss different methods for documenting and communicating pharmacists' opioid-related interventions within a health system

Self Assessment Questions:

1. What resources are available to guide MME calculations AND were embedded in UW Health's Opioid Taper Calculator?

- A: CDC Guideline: Prescribing Opioids for Chronic Pain
- B: CMS Guidance
- C: The Joint Commission Standards
- D: All of the Above

One of UW Health's current initiatives is to reduce opioid prescribing and dispensing, this undoubtedly requires a multi-disciplinary collaboration and dedication from a broad array of health care pro

- A: Ambulatory Pharmacy Management
- B: Ambulatory and Community Pharmacists
- C: Focused Group of Physicians
- D: All of the Above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-321-L01-P

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

OUTCOMES OF TREATMENT WITH CLOZAPINE MONOTHERAPY VERSUS ANTIPSYCHOTIC POLYPHARMACY IN PATIENTS WITH SCHIZOPHRENIA OR SCHIZOAFFECTIVE DISORDER

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Purpose: Schizophrenia and schizoaffective disorder are psychiatric disorders that cause significant morbidity and mortality. Treatment resistance to antipsychotic therapy is common in this patient population. While clozapine is the medication of choice for patients with treatment resistance schizophrenia, underutilization of the agent has been reported. Current clinical practice commonly involves antipsychotic polypharmacy to assist with symptom control, despite the lack of evidence for this approach. This project was designed to assess the use of clozapine versus antipsychotic polypharmacy in patients with schizophrenia and schizoaffective disorder with respect to treatment outcomes at a Veteran Affairs Medical Center. **Methods:** This study is a retrospective electronic chart review of patients with schizophrenia or schizoaffective disorder who were treated with clozapine monotherapy or antipsychotic polypharmacy at the Richard L. Roudebush Veteran Affairs Medical Center. Antipsychotic polypharmacy was defined as the combination of more than one antipsychotic for at least 90 days. Medication fill records from January 1, 2015 to January 1, 2017 were reviewed to assess treatment. The primary outcome is a composite of use of acute care mental health services. Secondary outcomes include psychiatric hospitalization(s), psychiatric emergency room visits, mental health walk-in clinic visits, and safety outcomes. Pertinent demographic and laboratory information was collected in addition to antipsychotic medications and doses prescribed, total length of therapy, number and length of hospitalizations, number of emergency room visits, number of mental health walk-in clinic visits, abnormal involuntary movement scale (AIMS) scores, reason for discontinuation of therapy and reason for not using clozapine, if applicable. All the data was collected on a data collection form and data was de-identified. **Results and conclusion:** Final results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review guideline recommendations for the treatment of schizophrenia and schizoaffective disorder

Identify when a patient with schizophrenia or schizoaffective disorder has become treatment resistant given a patient case

Self Assessment Questions:

According to American Psychiatric Association practice guidelines, which of the following is the most appropriate first line treatment option for a patient with schizophrenia or schizoaffective disorder

- A: First generation antipsychotic
- B: Second generation antipsychotic
- C: Combination of a first and second generation antipsychotic
- D: Behavioral therapy

Which of the following patients would classify as having treatment resistant schizophrenia?

- A: A patient who has tried one antipsychotic at a therapeutic dose for
- B: A patient who is on their second antipsychotic at a therapeutic dose
- C: A patient who has tried one antipsychotic at a therapeutic dose for
- D: A patient who is on their second antipsychotic at a therapeutic dose

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-322-L01-P

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

IMPLEMENTATION AND EVALUATION OF CLINICAL DECISION SUPPORT FOR ANTIBIOTIC TIME-OUTS

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Purpose: Overuse of antibiotics is an issue of national and global concern. Strategies to optimize antibiotic use have been recommended by the Infectious Diseases Society of America; one such strategy is the use of antibiotic time-outs. Antibiotic time-outs allow for structured evaluation of empiric antibiotics after additional information has resulted in aiding the antibiotic decision making processes. Studies of antibiotic time-outs have shown reduction in rates of *C. difficile* infection, decreases in antibiotic use, and cost savings. The purpose of this project is to assess implementation of antimicrobial time-outs at Froedtert & the Medical College of Wisconsin in order to facilitate the more timely de-escalation of broad-spectrum antibiotics. **Methods:** Antibiotic time-outs at Froedtert will be prompted by customized alerts that fire for providers after 48 hours of continuous therapy with either cefepime or piperacillin/tazobactam. Providers will then be directed to a workflow navigator with clinical questions related to antibiotic therapy. The primary objective of this descriptive study is percentage of completed navigator questionnaires over the three month study period. Secondary objectives include assessment of customized alert firing, utilization of the workflow navigator, and the impact of time-outs on antimicrobial de-escalation. Patients will be included in the analysis if they are 18 years of age or older and prescribed cefepime or piperacillin/tazobactam during admission. Patients will be excluded if they are on either antibiotic immediately prior to admission, on hospice or comfort care, or have any prophylaxis indication. **Conclusion:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference, but it is expected that implementation of antibiotic time-outs, through customized alerts and workflow navigators, will result in quicker de-escalation of broad spectrum antibiotics.

Learning Objectives:

Recall two benefits of provider-driven antimicrobial time-outs compared to alternative antimicrobial stewardship strategies

Describe three key elements to the antibiotic time-out process at Froedtert and MCW

Self Assessment Questions:

According to the CDC's recommendations for use of antimicrobial time-outs, how long after initiation of antibiotics should the review occur?

- A: 24 hours
- B: 36 hours
- C: 48 hours
- D: 72 hours

Which of the following statements regarding antibiotic time-outs at Froedtert and MCW is TRUE?

- A: Antibiotic time-outs occur after 72 hours of continuous therapy with
- B: Antibiotic time outs are completed by the floor pharmacist.
- C: The customized alert will fire only once, regardless of completion of
- D: Antibiotic time-outs have been implemented for patients being treated

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-691-L04-P

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

IMPACT OF DIRECT ACTING ANTIVIRALS FOR HEPATITIS C VIRUS THERAPY ON TACROLIMUS DOSING IN LIVER TRANSPLANT RECIPIENTS

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Purpose: Direct acting antivirals (DAAs) have transformed hepatitis C virus (HCV) management post-liver transplant. As virus clears, hepatic metabolism improves, which may result in subtherapeutic tacrolimus trough levels that may require dose adjustments. The purpose of this study was to evaluate impact of DAAs on tacrolimus levels and dosing requirements. **Methods:** This study was conducted as a single-center retrospective chart review of liver transplant recipients on tacrolimus who were treated for HCV infection post-transplantation with DAA between July 2014 and March 2017. Patients were excluded if prescribed concomitant ritonavir or interferon, did not complete therapy, or had HIV. The primary outcome was change in dose-normalized tacrolimus levels from start of DAA compared to 12 weeks following therapy. Secondary outcomes include rates of subtherapeutic troughs, dose adjustments, mortality, acute cellular rejection (ACR), and sustained virologic response at 12 weeks post DAA therapy (SVR). **Results:** 94 patients were screened; 71 patients met inclusion criteria. From start of DAAs to 12 weeks post therapy, the mean change in log-transformed dose-normalized tacrolimus levels was -0.43 ng/mL/mg (95% CI; 0.26-0.60, p<0.05). The most significant decline in dose-normalized tacrolimus levels occurred in the first 4 weeks, after which levels stabilized. The overall mean tacrolimus level was 4.8 ng/mL (+2.5) with a mean of 1 dose change per patient. A total of 649 troughs were collected throughout this study in which 72.3% were considered subtherapeutic, a <6 ng/mL. The highest incidence of subtherapeutic troughs occurred at week 4 and post-week 12 at 82.3% and 83.6%, respectively. Seventy patients (99%) achieved SVR, two patients had ACR, two patients had graft loss and died. **Conclusions:** From start of treatment to 12 weeks post-direct acting antiviral, liver transplant recipients experienced a decrease in log-transformed dose-normalized tacrolimus levels. Close monitoring of tacrolimus levels, is warranted and dose increases may be indicated.

Learning Objectives:

Describe how tacrolimus levels may change during treatment with direct acting antivirals.

Explain why increased tacrolimus monitoring is necessary in liver transplant recipients treated with direct acting antivirals.

Self Assessment Questions:

Which of the following explains what happens to tacrolimus levels during treatment with direct acting antiviral therapy?

- A: Higher levels
- B: Lower levels
- C: Similar levels
- D: All of the above

Which of the following explains why tacrolimus levels require more frequent monitoring during treatment with direct acting antivirals?

- A: Patients may be at increased risk of rejection due to subtherapeutic
- B: Drug interactions often lead to variable trough levels
- C: Patients often experience tacrolimus toxicities during treatment with
- D: All of the above

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-323-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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OPTIMIZATION OF MICAFUNGIN DOSING IN INTENSIVE CARE UNITS AT A LARGE HEALTH-SYSTEM

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Purpose: Fungemia is a significant cause of morbidity and mortality in critically ill patients, with *Candida* species being the fourth most common cause of healthcare-associated bloodstream infections. Due to rising rates of fluconazole-resistance among non-albicans *Candida* species, combined with the preferable safety profile of echinocandins, the most recent IDSA Candidiasis guidelines favor echinocandins for initial empiric therapy of invasive fungal infections (IFI). At the Cleveland Clinic Health System (CCHS), micafungin is the preferred echinocandin agent and is restricted for use by the infectious disease (ID) consult service. A comparison of outcomes between micafungin 150 mg/day vs 100 mg/day in prior literature has not demonstrated a benefit of higher doses in most *Candida* infections in patients treated for candidemia and other forms of IFI. Per CCHS guidelines, doses of 150 mg/day are reserved for more invasive infections such as *Candida* endocarditis, osteomyelitis or meningitis, mold infections, and mold, or small bowel fungal prophylaxis. In this study, we aim to evaluate the dosing trends of micafungin in the intensive care units (ICU) at the CCHS and the associated pharmacoeconomic implications. **Methods:** This is a retrospective, descriptive study of adult patients admitted to CCHS ICU who received > 1 dose of micafungin from January 1, 2017 to April 27, 2017. Patients were excluded if micafungin was ordered without an administration documented on the electronic health record. The primary objective is to evaluate initial dosing, indication for use, and adherence to CCHS guidelines. The secondary outcome is to evaluate the pharmacoeconomic implications of the dosing trends observed in the CCHS ICUs. Pertinent data collected includes age, gender, indication, diagnosis, *Candida* species treated, number of doses and total milligrams of micafungin administered, duration of therapy, disposition of micafungin, ID consultation, ID team recommendation, and cost of micafungin. **Results & Conclusions:** Data analysis is currently underway.

Learning Objectives:

Describe the role of micafungin in infectious disease
Recognize the proper dosing of micafungin based on IDSA guidelines

Self Assessment Questions:

What class of medications is micafungin?

- A Glycopeptide
- B: Ssri
- C: Beta-blocker
- D: Echinocandin

What dose of micafungin would you recommend for a line related *C. glabrata* infection?

- A 100 mg every 24 hours
- B 250 mg every 24 hours
- C 50 mg every 8 hours
- D 1000 mg every 24 hours

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-324-L01-P

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

APIXABAN SAFETY IN END-STAGE RENAL DISEASE

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Purpose: Anticoagulation in patients with venous thromboembolism or non-valvular atrial fibrillation and concurrent end-stage renal disease (ESRD) requiring hemodialysis continues to pose a challenge to practitioners. Prior to 2014, warfarin was the only anticoagulant approved for use in ESRD. In 2014, apixaban labeling was updated to include utilization for patients with ESRD. Despite this update, there is a paucity of data regarding apixaban safety and efficacy in this patient population. The purpose of this study was to compare safety and efficacy outcomes in patients with ESRD on apixaban or warfarin.

Methods: A retrospective chart review was utilized to identify ESRD patients newly initiated on apixaban or warfarin between January 1, 2015 and January 1, 2017. Patients were matched in a 1:1 ratio based on age, gender, and indication for anticoagulation. The primary outcome was a composite of major bleeding or clinically relevant, non-major bleeding events. Secondary outcomes were major bleeding events, clinically relevant, non-major bleeding events, thrombotic events including recurrent DVT or PE, stroke, and death. All outcomes were assessed at 6 and 12 months post-initiation of anticoagulation. Baseline characteristics including age, gender, weight, and serum creatinine, apixaban dose, CHA₂DS₂-VAsC scores in atrial fibrillation patients, receipt of blood products, and death from any cause were collected. Student T-test and Mann-Whitney U were used to analyze descriptive data. Chi-squared models were used to analyze the primary and secondary outcomes. **Results and Conclusions:** Data collection and analysis is on-going. Full results will be presented at the Great Lakes Pharmacy Resident Conference in April 2018.

Learning Objectives:

Recall the evidence for apixaban use in end-stage renal disease requiring hemodialysis.

Discuss the clinical questions surrounding dosing of apixaban in end-stage renal disease requiring hemodialysis.

Self Assessment Questions:

Which of the following statements regarding apixaban use in patients with end-stage renal disease is TRUE?

- A Apixaban has been demonstrated as safe but requires anti-Xa monitoring
- B: Current guidelines recommend apixaban over warfarin for VTE treatment
- C: Data to support apixaban use are limited to a single pharmacokinetic study
- D: Small clinical trials suggest similar safety and efficacy to warfarin

The patient is a 63yoF with a PMH significant for atrial fibrillation, hypertension, diabetes, hyperlipidemia, and ESRD with hemodialysis on MWF. Labs: Wt: 6.3kg; Ht: 167cm; BP: 136/84mmHg SCr: 5.63mg/dL

- A 2.5mg PO BID
- B 5mg PO BID
- C 10mg PO BID x 7 days, then 5mg PO BID
- D Patient is not a candidate for apixaban use

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-325-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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EVALUATING THE EFFECT OF INTRAVENOUS VERSUS ORAL STEROIDS IN PATIENTS ADMITTED WITH COPD EXACERBATIONS AND CONCOMITANT PNEUMONIA.

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Systemic corticosteroids are a mainstay of therapy for patients hospitalized with acute exacerbations of chronic obstructive pulmonary disease (AECOPD). Guidelines state that oral corticosteroids are non-inferior to intravenous (IV) corticosteroids in time to clinical improvement, hospital length of stay (LOS), and in reducing rates of treatment failure. Patients with concomitant pneumonia have been excluded from studies comparing IV versus oral corticosteroids in patients with AECOPD. Patients with concomitant AECOPD and pneumonia often have a higher degree of systemic inflammation and hypoxia which may alter the pharmacokinetic and pharmacodynamic profile of systemic corticosteroids. The purpose of this study is to evaluate whether IV corticosteroids are superior to oral corticosteroids in patients with concomitant AECOPD and pneumonia. This is a retrospective cohort study of patients who were admitted to St. Joseph Mercy Health System (SJMHS) between 10/01/2015 and 10/02/2017. A data pool of subjects will be assembled from five SJMHS hospitals based on established inclusion and exclusion criteria. The study population will be divided into two groups: patients who received both IV and oral corticosteroids and patients who received exclusively oral corticosteroids during the first 48 hours of treatment. The primary outcome is treatment failure, defined by a composite of admission to the ICU after the second hospital day, intensification of pharmacologic therapy, death during hospitalization, and all-cause hospital readmission within 30 days of discharge from the index hospitalization. Intensification of pharmacologic therapy is defined as an increase in total daily dose of steroids after the first 48 hours of admission. The secondary outcomes are reduction in pneumonia severity index (PSI) score at 72 hours and a discharge stratified by admission PSI score, hospital LOS, 3-month mortality from index admission date, and comparison of baseline characteristics between the IV and oral treatment groups.

Preliminarily, we have identified 615 patients for inclusion.

Learning Objectives:

Describe the impact of chronic obstructive pulmonary disease (COPD) on individual patients, larger populations, and health systems
Recall pharmacologic treatment and management strategies for acute exacerbations of COPD

Self Assessment Questions:

Which of the following statements is true?

- A COPD is the 5th leading cause of death in the United States
- B: One in five patients hospitalized for AECOPD will be readmitted w
- C: AECOPD hospitalizations account for the minority of the economic
- D: Adjusted for inflation, annual COPD-related expenditures are proje

When should azithromycin be used in the treatment of AECOPD?

- A Azithromycin may be used to reduce frequency of AECOPD in sel
- B Azithromycin should be given for 5 days during all AECOPD event
- C Azithromycin should be used when infectious etiology is suspecte
- D Both A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-326-L01-P

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

EFFECT OF PRE-LIVER TRANSPLANT RIFAXIMIN THERAPY ON EARLY POST-LIVER TRANSPLANT INFECTION

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Background: Responsible antimicrobial use is paramount as the incidence of infections caused by antimicrobial-resistant organisms is on the rise. Prolonged antimicrobial exposure is a well-established cause of antimicrobial resistance and cross-resistance. Rifaximin is a heavily used antimicrobial in the liver transplant population. Although it was originally developed to treat traveler's diarrhea, rifaximin carries an orphan drug designation for treatment of hepatic encephalopathy. Given the current threat of antimicrobial resistance, it is important to investigate potential impact of rifaximin use on development of multi-drug resistant organisms. Methods: This study has two objectives: (1) To determine if exposure to rifaximin prior to liver transplantation has an impact on early post-transplant infection rate and (2) To determine if exposure to rifaximin prior to liver transplantation has an impact on rate of early post-transplant multi-drug resistant infections. This is a retrospective chart review of liver transplant patients at Indiana University Health University Hospital who did and did not receive rifaximin prior to transplant. The primary endpoint is the rate of early post-transplant infection and the secondary endpoint is the rate of early post-transplant multi-drug resistant infection. Patients included will be >18 years old who received a liver or liver/kidney transplant from June 1 2016 to January 11, 2018. Analysis: The comparisons are between two groups; therefore, Student's t-test will be used to analyze continuous data and Pearson chi-square analysis will be used to analyze categorical data. If continuous data require non-parametric analysis, the Mann-Whitney U test will be used. A proportional hazards model will be used to assess the impact of other factors on infection rate. Results/Conclusion: Data collection and analysis is ongoing. Results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the clinical pharmacology of rifaximin.

Discuss the use of rifaximin to treat hepatic encephalopathy.

Self Assessment Questions:

Which of the following drug classes best describes rifaximin?

- A Beta lactam
- B: Aminoglycoside
- C: Macrolide
- D: Lipoglycopeptide

Rifaximin mitigates hepatic encephalopathy by:

- A Increasing ammonia clearance
- B Decreasing ammonia production
- C Increasing ammonia production
- D Decreasing ammonia clearance

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-327-L01-P

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

IDENTIFICATION OF FACTORS RESPONSIBLE FOR DELAYS IN TIME TO INITIATION OF THERAPY IN A PHARMACIST-DRIVEN ORAL ANTICANCER AGENT PROGRAM

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Purpose: Oral anticancer agents have emerged as a standard treatment option in cancer care. The shift from infusion-based therapy to oral therapy presents unique challenges in managing patient therapy. Oral anticancer therapy involves many steps from the initial prescription through patient receipt of the medication. Froedtert & the Medical College of Wisconsin employs a pharmacist-driven oral anticancer agent program to manage this medication use process for cancer care patients; however, delays in the initiation of therapy still occur and may negatively impact patient prognosis. The objective of this project is to identify the specific factors impeding the start of therapy and create strategies to achieve more favorable outcomes. **Methods:** This system-wide, retrospective study was performed as a quality improvement project. Patients were eligible for inclusion if they were > 18 years of age and completing a first fill of an oral anticancer agent prescribed between April 2017 and July 2017. The primary outcome of the study is to determine the difference in time from prescription writing to the start of therapy for patients filling at internal compared to external pharmacies. Secondary objectives of this study include differentiation of time to therapy initiation based on site of care and prior authorization completion. **Results/Conclusion:** Data has been collected and analysis is ongoing; results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify causes for delay in initiation of oral anticancer agent therapy
Describe the benefit of patients filling oral anticancer agents at an internal pharmacy vs external pharmacy

Self Assessment Questions:

Which of the following was found to have the least impact on delaying the start of therapy for patients on oral anticancer agent therapy?

- A Shipping error
- B: Benefits investigation
- C: Medical doctor signing prescription
- D: Patient picking up medication

What are potential advantages to having patients fill oral anticancer agents internally?

- A Communication between inpatient and outpatient staff
- B Likelihood of patients filling medication on time
- C Less filling errors
- D A and B

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-692-L04-P

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

CHARACTERIZATION OF URINARY TRACT INFECTIONS (UTI) POST RENAL TRANSPLANT

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Purpose: Urinary tract infections (UTIs) are the most common infectious complication following renal transplantation. The estimated incidence of UTIs following renal transplant varies between 6-86% and has been associated with risk for graft loss and death. The American Society of Transplantation recommends UTI prophylaxis with trimethoprim/sulfamethoxazole (TMP/SMX) daily for at least 6 months following renal transplantation. Patients allergic to TMP/SMX alternatively receive ciprofloxacin PO daily for UTI prophylaxis at Cleveland Clinic Main Campus (CCMC) for an unspecified duration. Variations in practice also exist regarding use and duration of ureteral stenting and the management of asymptomatic bacteriuria in this population at CCMC. The purpose of this study is to describe the epidemiology, temporality, and microbiology of UTIs within the first year post-renal transplantation at CCMC. **Methods:** This is a retrospective medical chart review of patients undergoing renal transplantation at CCMC between January 1, 2013 and October 1, 2016. Data was collected on all recipients with positive urine cultures within the first year post-transplantation; those without positive cultures were counted for descriptive purposes. Positive urine cultures have been classified as either asymptomatic bacteriuria, cystitis, or pyelonephritis. Baseline, transplant-related, and UTI-related characteristics were collected via medical chart review of the electronic health record and transplant database. It was estimated that 350 patients will be required for analysis of 100 UTIs assuming an UTI rate of 25-30% at CCMC. The primary outcome was one-year incidence of UTIs post-transplant. Secondary outcomes include one-year incidences of asymptomatic bacteriuria, recurrent UTI, and relapsed UTI, time to first UTI post-transplant, antimicrobial susceptibility patterns, and presence/absence of risk factors for multidrug resistance. Primary and secondary outcomes were analyzed using descriptive statistics. Multidrug resistance risk factors were analyzed using chi-squared or Fisher's exact test. **Results and Conclusions:** Final results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the most appropriate UTI prophylaxis regimen for renal transplant recipients.
Review current practices regarding treatment of asymptomatic bacteriuria following renal transplantation.

Self Assessment Questions:

What is the first line urinary tract infection prophylaxis agent following renal transplantation per the American Society of Transplantation?

- A Ciprofloxacin
- B: Cephalexin
- C: Sulfamethoxazole/Trimethoprim
- D: Cefpodoxime

Which of the following statements is most accurate regarding management of asymptomatic bacteriuria in renal transplant recipients?

- A Antimicrobial treatment should be provided until culture negative
- B No treatment should be provided
- C Antimicrobial treatment should be provided for 14 days
- D Antimicrobial treatment should be provided for 7 days

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-328-L01-P

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

EFFICACY OF CEFTAZIDIME-AVIBACTAM ALONE OR IN COMBINATION WITH POLYMYXIN B AGAINST CARBAPENEM-RESISTANT KLEBSIELLA PNEUMONIAE IN A TANDEM IN VITRO TIME-KILL AND IN VIVO GALLERIA MELLONELLA SURVIVAL MO

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Background: The optimal treatment for carbapenem-resistant Enterobacteriaceae infections is unknown. **Methods:** Three blaKPC-producing *K. pneumoniae* clinical isolates were used for all experiments. MICs and time-kill analyses were performed according to CLSI guidelines with *E. coli* ATCC 25922 serving as QC. Individual drugs were tested at 1/4, 1/2, 1, 2, 4 x MIC. Synergy was assessed by testing combinations at the highest concentration of each drug that showed no activity alone. A >3 log₁₀ CFU/mL reduction compared to the starting inoculum was considered bactericidal. Synergy was defined as ≥2 log₁₀ CFU/mL increase in killing at 24 hours with the combination compared to most active agent alone. One-way ANOVA was used to compare 24 hour colony counts. *G. mellonella* at final instar stage acquired and used within 7 days. Models proceeded in a stepwise fashion to confirm inoculum lethality and lack of drug toxicity. Groups of 10 healthy larvae were inoculated with the test organism followed by either drug alone or in combination within 1 hour, at the same concentrations used in time-kill analyses. Larvae were incubated at 37°C with survival measured daily for 5 days. Survival was plotted via Kaplan-Meier method and differences assessed by log-rank test. **Results:** Isolates 33, 157, 158 had the following MICs to ceftazidime-avibactam: 1, 8, and 16, respectively. Polymyxin MICs were 0.5, 0.5, and 8, respectively. Time-kill analyses showed bactericidal activity with ceftazidime-avibactam against isolate 33 at 4x MIC, 157 at 4x MIC (achieved at 6 hours and maintained through 24 hours), and 158 at 2x and 4x MIC. Polymyxin bactericidal activity seen against isolate 33 with 2 and 4x MIC, 157 with 2 and 4x MIC, and 158 with 4x MIC, all achieved at 6 hours with regrowth by 24 hours. Further results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the danger posed by carbapenem-resistant Enterobacteriaceae and the need for further investigations of available therapeutic options.

Describe the benefits of a non-mammalian infection model, like *Galleria mellonella*, when conducting in vivo survival studies.

Self Assessment Questions:

The optimal antimicrobial therapy for treating carbapenem-resistant Enterobacteriaceae is:

- A Polymyxin B
- B: Tigecycline
- C: Ceftazidime-avibactam
- D: Unknown

Galleria mellonella provide an advantage over other survival models because they:

- A Provide quick and inexpensive in vivo data
- B Can be incubated at human body temperature and provide an innate immune response
- C Can be directly injected with an accurate inoculum and drug concentration
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-329-L01-P

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

ASPARAGINASE: STANDARDIZING UTILIZATION AND TOXICITY MANAGEMENT IN ADULT AND PEDIATRIC PATIENTS

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Purpose: Asparaginase products pegylated-asparaginase (pegaspargase) and asparaginase *Erwinia chrysanthemi* (*Erwinia* asparaginase) are integral in treating pediatric acute lymphoblastic leukemia (ALL) and are often used in treating adult ALL. Currently, UW Health lacks a standardized approach to asparaginase utilization, monitoring, and toxicity management for adult and pediatric patients. This project aims to optimize asparaginase product selection, utilization, and monitoring for adult and pediatric patients to maximize efficacy, minimize toxicity, and lower health care spend. **Methods:** Current protocols for adult and pediatric patients, other established clinical practice guidelines, primary literature, and external institution practices were evaluated by a multidisciplinary workgroup of adult and pediatric physicians and pharmacists. Recommendations regarding therapy guidance, drug use, and toxicity management were identified and a formal policy was presented to appropriate stakeholder groups. New workflow implementation was supported by tools developed in conjunction with the pharmacy and therapeutics committee, drug policy program, pharmacy informatics, laboratory services, and frontline clinical pharmacists. **Preliminary Results:** A multidisciplinary workgroup oversaw development and implementation of a clinical practice guideline. Guideline implementation supported enabling providers to measure asparaginase serum levels, updating of asparaginase-containing Beacon treatment plans to guide safety and drug product selection, and designing of ambulatory clinical pharmacist workflows and an electronic health record tool to optimize monitoring, adverse event management, and patient follow-up. A retrospective review of pediatric patients revealed that 11 of 57 (19%) pegaspargase-treated patients experienced hypersensitivity. All were switched to *Erwinia* asparaginase, regardless of hypersensitivity grade. Analysis of adult pegaspargase doses revealed 16% of doses (n=8) were eligible for dose banding to one vial. **Conclusions:** A clinical practice guideline with supporting tools and workflows for standardizing asparaginase utilization and toxicity management is expected to improve patient outcomes and diminish costs to UW Health by decreasing adverse events, drug spend, and hospital admissions.

Learning Objectives:

Identify common toxicities adult and pediatric patients may experience due to asparaginase therapy

Recognize the value of therapeutic drug monitoring in patients on asparaginase therapy

Self Assessment Questions:

Which toxicity requires transition from pegaspargase to *Erwinia* asparaginase therapy when it presents as a severe grade 2 or higher toxicity?

- A Hepatotoxicity
- B: Hypersensitivity
- C: Thrombosis
- D: Pancreatitis

What asparaginase serum level is an appropriate threshold for transitioning from pegaspargase to *Erwinia* asparaginase due to concerns of silent inactivation?

- A < 0.1 IU/mL
- B < 0.3 IU/mL
- C < 0.5 IU/mL
- D < 1 IU/mL

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-330-L01-P

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

INCORPORATING A PHARMACIST INTO THE DISCHARGE PROCESS OF A COMMUNITY HOSPITAL: IDENTIFYING BENEFITS AND BARRIERS IN THIS NEW ROLE

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Purpose: When patients are discharged from the hospital, they deserve a smooth, coordinated, and efficient process that will keep them home and healthy. Unfortunately, many hospitals have not standardized their method of discharging patients and errors are made during this transition of care. Many studies have shown that some of the most common and most serious errors made during hospital discharges are medication errors. When pharmacists are involved with the hospital discharge processes they help reduce these medication errors and improve patients' satisfaction with their transition to the outpatient setting. Pharmacists have a unique ability provide more thorough medication reconciliation, patient counseling, and ensure adequate prescription coverage for new medications. Through this research project, a community hospital in northern Michigan will determine how a discharge pharmacist can improve transitions of care on a cardiac care unit. **Methods:** A pharmacy resident and student will work together to identify high risk patients using a triage tool and assist in their discharge process. They will counsel the patient on new medications, offer to fill medications at the hospital outpatient pharmacy, and screen the discharge medication reconciliation for errors. Data will be gathered on return emergency department visits, readmissions, pharmacy-related HCAHP scores, and the amount of errors discovered in medication reconciliations. Pending these results, a business plan will be created to help hire a discharge pharmacist to continue work after the research concludes. **Results and Conclusions:** Results and conclusion to be presented at the Great Lakes Pharmacy Resident's Conference.

Learning Objectives:

Describe the role a pharmacist can fill in the hospital discharge process
Identify characteristics that put a patient at high risk for unplanned readmission

Self Assessment Questions:

Which responsibility is most appropriate to be performed by a discharge pharmacist?

- A Fax the discharge summary to the primary care physician
- B: Perform medication reconciliation at discharge
- C: Arrange for appropriate outpatient follow up
- D: Coordinate patient transportation

Which of the following is a risk factor for unplanned readmissions?

- A Errors on medication reconciliation
- B Counseling a patient on new medications
- C Scheduling outpatient appointments
- D Allowing the patient to set up their own transportation

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-693-L04-P

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

REDEFINING REFEEDING SYNDROME IN BURN PATIENTS

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Purpose: Refeeding syndrome describes metabolic changes, including fluid shifts and fluctuations in glucose, protein, and electrolytes, when initiating nutrition. Refeeding hypophosphatemia, however, describes phosphorus depletion upon nutrition initiation. The objective of this study is to classify electrolyte deficiencies in burn patients as either refeeding syndrome or refeeding hypophosphatemia and to define risk factors for each. **Methods:** This retrospective chart review includes adult burn patients admitted from 10/1/16 to 8/31/17 with at least a day length of stay. The primary outcome is to assess and classify electrolyte deficiencies including hypophosphatemia, hypokalemia, and hypomagnesemia. Refeeding syndrome is defined as deficiencies in all three electrolytes at any point, with refeeding hypophosphatemia defined as isolated hypophosphatemia. **Preliminary Results:** Data collection is on-going with 20 patients reviewed. On Day 0, patients had average potassium, magnesium, and phosphorus levels within normal ranges. Median (IQR) nadir potassium and magnesium levels were within normal ranges. Nadir phosphorus was markedly low [1.8 mg/dL (1.4-2.8), range 1-6.4]. By Day 7, all levels had returned to normal. Overall, 10 patients were classified as refeeding hypophosphatemia, 4 met refeeding criteria and 6 had neither deficiency. The median (IQR) total body surface area (TBSA) was 10% (6-13) in the refeeding hypophosphatemia group, 22% (18-29) in the refeeding group, and 7% (5-7) in the group with neither deficiency ($p = 0.004$). Groups were well-matched at baseline.

Conclusion: The preliminary results of this analysis indicate patients with a major burn (>20% TBSA) may be at a higher risk of developing refeeding syndrome versus those with smaller TBSA. Future directions include ongoing data collection to target a larger sample size and inclusion of trauma and medical ICU patients to further define risk factors. To our knowledge, this is the first study to evaluate risk factors for refeeding syndrome versus refeeding hypophosphatemia in critically ill patients.

Learning Objectives:

Describe electrolyte disturbances commonly seen with refeeding syndrome vs. refeeding hypophosphatemia.

Identify the recommended timeframe for initiation of enteral nutrition for burn patients according to the 2016 SCCM/ASPEN Nutrition Support Therapy Guidelines.

Self Assessment Questions:

Which of the following electrolyte disturbances are commonly associated with refeeding syndrome?

- A Hypophosphatemia and hyperkalemia
- B: Hypophosphatemia and hypokalemia
- C: Hyperphosphatemia and hypokalemia
- D: Hyperphosphatemia and hyperkalemia

The 2016 SCCM/ASPEN Nutrition Support Therapy Guidelines recommend initiating enteral nutrition in burn patients within which of the following time frames?

- A 4-6 hours
- B 8-12 hours
- C 24-36 hours
- D 36-48 hours

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-331-L01-P

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

EFFECT OF PHARMACIST PROVIDED MEDICATION EDUCATION ON PATIENT SATISFACTION AT A COMMUNITY TEACHING HOSPITAL

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Cleveland Clinic South Pointe Hospital, 20000 Harvard Avenue, Warrensville Heights, Ohio 44122 branta@ccf.org, 216-346-4674 Purpose: The Healthcare Consumer Assessment of Hospital Providers and Systems (HCAHPS) survey has been used since 2006 to compare patient experiences at hospitals in domains such as communication, environment, pain management, and the discharge process. Starting in 2013, The Centers for Medicaid and Medicare (CMS) linked 1% of hospital reimbursement to HCAHPS scores. Two questions of the HCAHPS survey focus on medication communication. Pharmacists are ideal candidates to positively impact medication related HCAHPS scores as they have extensive knowledge of medications and their side effects, patient counseling techniques, and medication education. Hospitals that have integrated pharmacists into their medical teams have shown increased patient satisfaction as well as decreased drug costs. The purpose of this research project is to determine if pharmacists are able to positively impact patient satisfaction as seen through HCAHPS scores. Methods: Data will be compared from before and after implementation of a pharmacist provided medication education. Patient education includes the possible side effects and indication for any new medications as well as highlighting any medications changes from prior to admission. Education is provided on or after day three of admission to patients who are planning to be discharged home or with home health care. The primary endpoint will be the difference in medication related HCAHPS scores before and after the educational service implementation. HCAHPS survey scores will be provided via Press-Ganey. Secondary endpoints will evaluate the utilization rate of a discharge medication bedside delivery program as well as participation rates in post-discharge follow up phone calls. Results: Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the increased emphasis being placed on quality of health care provided.

Discuss the effect that pharmacist can have on patient satisfaction.

Self Assessment Questions:

Which of the following is assessed on the HCAHPS survey?

- A Meal services
- B: Communication about medications
- C: Laboratory draws
- D: Experiences during procedures

Which of the following strategies should be utilized during patient counseling?

- A Teach back method
- B Close ended questions
- C Patient friendly terms
- D Both A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-694-L04-P

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

A STICKY SITUATION: MODERNIZATION OF PHARMACIST CLINICAL MONITORING AND DOCUMENTATION

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Purpose: Clinical pharmacy resources are expensive; therefore, it is important to ensure the majority of pharmacist time is dedicated to appropriate clinical tasks. The purpose of this project is to increase clinical pharmacist monitoring and documentation efficiency by promoting the automaticity of monitoring activities and standardizing the documentation of clinical patient monitoring at UW Health. Methods: Individual interviews were conducted with frontline pharmacists to assess core pharmacist interventions. Baseline data was collected to quantify the value of pharmacist time spent monitoring and documenting on patients, along with the number of clicks to retrieve data for core interventions. Physician and nursing colleagues were interviewed to understand their preference for pharmacist documentation visibility and method of delivery. In an iterative pilot process, electronic medical record (EMR) functionality will be reviewed against core interventions and tools developed for increasing automaticity and standardization of pharmacist monitoring and documentation activities. Comparison of the amount of pharmacist transcription versus the amount of assessment and plan documentation, standardization of documentation of core interventions, and pharmacist satisfaction will be performed after implementation. Results: Pre-implementation interview data was gathered to determine the core interventions for frontline pharmacists. The EMR build based on the gathered core interventions was implemented using standardized methods developed during the project. Post-implementation results of change in pharmacist time documenting assessment and plan versus objective transcription, number of clicks to access data for core pharmacist interventions, and pharmacist satisfaction with new EMR build to be presented at Great Lakes Pharmacy Residency Conference (GLPRC). Conclusions: This project is expected to increase the amount of assessment and plan information documented, decrease transcription of objective data, and reduce the number of clicks required to access data for core interventions. Final conclusions to be presented at GLPRC.

Learning Objectives:

Describe how EMR tools can be utilized to increase the standardization and efficiency of clinical pharmacist monitoring

Recognize the value of increasing the ratio of pharmacist time spent documenting assessment and plan versus transcription of data

Self Assessment Questions:

What characteristic do pharmacists' value in the tools they utilize for clinical monitoring and documentation?

- A Expensive
- B: Unstructured
- C: Standardized
- D: Manual

What problems can transcription of objective information introduce into clinical documentation?

- A None, it actually helps clarify the documentation
- B Inaccurate or irrelevant information
- C None, redundancy is good for documentation
- D Increased clarity

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-695-L04-P

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

DEPRESCRIBING OPPORTUNITIES FOR ELDERLY INPATIENTS IN AN ACADEMIC, SAFETY-NET HEALTH SYSTEM

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Purpose: The most rapidly expanding age group in the United States is people greater than 65 years old. Many of these older adults have several comorbidities being treated with multiple medications. The use of numerous medications increases the risk for drug-drug interactions, duplication of therapy, nonadherence, and adverse effects. Additionally, medications can contribute to a financial burden and adversely affect quality of life. Deprescribing is one way to reduce or avoid these medication complications in elderly patients. Deprescribing algorithms have been published, but data regarding their utility in clinical practice is lacking. The objective of this study is to assess the applicability of published deprescribing protocols in elderly internal medicine patients at an academic, safety-net hospital. **Methods:** This is a retrospective study including patients that were at least 65 years of age and were discharged from an internal medicine team between January 1, 2017 and June 30, 2017. Eligibility criteria extracted from published deprescribing protocols for proton pump inhibitors, benzodiazepines, antipsychotics, and antihyperglycemic agents is being applied to medicare record data from included patients. The primary endpoint is the percentage of patients eligible for deprescribing based on published algorithms. Secondary endpoints include the percentage of patients receiving medications which were included in a deprescribing algorithm, percentage of medications included in the algorithms eligible for deprescribing, percentage of eligible medications deprescribed during inpatient hospital stay, percentage of patients with 30 day and 6 month readmissions, and reason for readmission (if applicable). **Preliminary Results:** Preliminary data suggest that a significant proportion of older adults admitted to the hospital and who are users of certain medications meet eligibility criteria for deprescribing. Final results are pending the completion of data collection and will be presented during presentation. **Conclusions:** Conclusions are pending the completion of data collection and will be presented during presentation.

Learning Objectives:

Describe the purpose of deprescribing.
Identify specific medication classes for which deprescribing algorithms have been published.

Self Assessment Questions:

Which of the following is the primary purpose of deprescribing?
A Decreasing length of stay and hospital costs
B: Managing polypharmacy and improving outcomes
C: Achieving higher patient satisfaction scores
D: Increasing patient medication adherence

Which of the following is a medication class specifically listed in published deprescribing algorithms?
A Proton Pump Inhibitors (PPIs)
B Selective Serotonin Reuptake Inhibitors (SSRIs)
C Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)
D Angiotensin II Receptor Blockers (ARBs)

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-696-L04-P

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

DESIGNING A TOOL TO STANDARDIZE PHARMACIST WORKFLOW IN AN AMBULATORY CARE SPECIALTY PRACTICE

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Purpose: Pharmacists have been shown to be valuable resources within ambulatory care practices. A wide variety of disease states with high-risk treatments requiring careful management has warranted the expansion of specialty provider practices, and with that, the need for ambulatory care specialty practice pharmacists. The American Society of Health-System Pharmacists recommends that all ambulatory care pharmacists implement a standardized patient care process with defined components to measure meaningful pharmacist impact. Norton Healthcare has recently integrated a pharmacist into a multiple sclerosis ambulatory practice site; however, there is not yet a well-defined workflow. As Norton Healthcare expands ambulatory care specialty pharmacy services, there is a need to standardize the workflow for pharmacists within these settings. The purpose of this project is to design a tool within the electronic medical record (EMR) to support a standardized pharmacist workflow in ambulatory care specialty practice sites that is flexible to accommodate individual practice needs. The standardized workflow provides the foundation for expansion of ambulatory care specialty pharmacy services throughout Norton Healthcare. **Methods:** This process improvement project utilizes an analyze, design, and develop (ADD) methodology to outline the need for and generate a standardized pharmacist workflow in an ambulatory care specialty practice. The analyze step investigates necessary and potential aspects of workflow common to most ambulatory care specialty practice sites. Workflow components focus on medication safety, efficacy, adherence, and access. The design step creates a workflow tool within the EMR consisting of the identified workflow components to support the daily activities of the pharmacist. Finally, the develop step incorporates disease specific considerations within the multiple sclerosis ambulatory practice into the workflow tool. **Results and conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the benefits of a standardized workflow for ambulatory care specialty pharmacists
Identify components for inclusion in an ambulatory care specialty practice pharmacist workflow tool

Self Assessment Questions:

Which of the following is a benefit of a standardized workflow for ambulatory care specialty pharmacists?
A Defined pharmacist role
B: Continuity of patient care
C: Improved patient outcomes
D: All of the above

Which of the following is a component for inclusion in an ambulatory care specialty pharmacist workflow tool?
A Emergency contact information
B Financial assistance options
C Past primary care appointment dates
D Patient's place of employment

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-697-L04-P

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

REAL-WORLD EVALUATION OF THE SAFETY AND TOLERABILITY OF ABACAVIR/DOLUTEGRAVIR/LAMIVUDINE IN AN INCARCERATED POPULATION

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Purpose: There has been a trend of increasing side effects and laboratory abnormalities in prisoners treated at an academic medical center's HIV Telemedicine clinic after switching to abacavir/dolutegravir/lamivudine. It seems as though major clinical trials overestimate the safety and tolerability of dolutegravir based antiretroviral therapy. The primary objective of this study is to determine the incidence of patient reported side effects and changes in laboratory values from baseline after switching to abacavir/dolutegravir/lamivudine monotherapy. Data generated from this study will raise awareness amongst providers about common side effects and laboratory changes associated with abacavir/dolutegravir/lamivudine. **Methods:** This study is Institutional Review Board approved. The electronic medical record system identified adult patients switched to abacavir/dolutegravir/lamivudine monotherapy at an academic medical center's HIV Telemedicine clinic. The following baseline data is being collected: patient gender, age, ethnicity, medications, previous HIV medication regimen, reason for switch to abacavir/dolutegravir/lamivudine, other medical issues, serum creatinine, blood glucose, hemoglobin A1c, liver function tests, HIV viral load, and CD4 count. Serum creatinine, liver function tests, blood glucose, hemoglobin A1c, new medications, and patient reported side effects are being collected at each follow up visit. HIV viral load and CD4 count will be collected at the last follow-up visit to evaluate efficacy of abacavir/dolutegravir/lamivudine. Eligible subjects include those who were at least 18 years old when switching to abacavir/dolutegravir/lamivudine at the HIV telemedicine clinic at the academic medical center, have baseline labs and follow up visit labs, and were seen between January 1, 2015 and June 30, 2017. Subjects are being followed for no less than one follow-up visit and no more than 4 follow-up visits or 12 months, whichever comes first. All data is being recorded without patient identifiers and maintained confidentially.

Results: Data collection in progress **Conclusions:** N/A

Learning Objectives:

Discuss the incidence of side effects reported in major clinical trials of dolutegravir based antiretroviral therapy

Identify the most common laboratory abnormalities reported in major clinical trials of dolutegravir based antiretroviral therapy

Self Assessment Questions:

Which of the following are the most common side effects reported in major clinical trials of dolutegravir based antiretroviral therapy?

- A: Constipation, headache, nausea and vivid dreams
- B: Headache, nausea, diarrhea, and insomnia
- C: Nausea, fever, abdominal pain, and hyperbilirubinemia
- D: Rash, muscle aches, depression, and suicidal ideation

Which of the following is the best explanation for the "bump" in serum creatinine seen after initiation of dolutegravir based antiretroviral therapy?

- A: Angiotensin-II induced constriction of afferent arteriole
- B: Crystallization of drug into the urine
- C: Dehydration leading to decreased renal perfusion
- D: Inhibition of tubular secretion of creatinine

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-677-L02-P

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

EVALUATION OF SERUM VITAMIN B12 LEVELS AND SUPPLEMENTATION UTILIZATION IN AMBULATORY PATIENTS PRESCRIBED METFORMIN FOR TYPE 2 DIABETES MELLITUS

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Purpose: There is extensive published data on the association between metformin use and vitamin B12 deficiency. The overall incidence has varied greatly in the literature, ranging from 5.8-52 percent, with a dose and duration dependent mechanism. The 2017 American Diabetes Association guidelines recommend periodic assessment of vitamin B12 in patients taking metformin. There are few published studies that evaluate monitoring of vitamin B12 in such patients. Based on the available literature, the percentage of patients being monitored is approximately 35-45 percent. Appropriate monitoring and management of these patients could allow for more cost-effective and improved patient care. An additional gap in the current literature is addressing the use of B12 supplementation in patients treated with metformin. The primary objective of the study is to determine the proportion of ambulatory patients with type 2 diabetes mellitus prescribed metformin for at least 6 consecutive months that have had a serum vitamin B12 level ordered while on metformin during the study period. **Methods:** This is a descriptive retrospective cohort study spanning from June 1, 2016 to December 1, 2017. Patients were identified through a query based on a diagnosis of type 2 diabetes and the use of metformin on their outpatient medication list within Epic®. Ambulatory patients, at least 18 years of age, with type 2 diabetes mellitus on metformin that have had at least one office visit at either an internal medicine practice or endocrine practice were included. The primary outcome of the study is the proportion of eligible patients who have had a serum vitamin B12 level ordered. The secondary outcomes describe B12 levels and supplementation use as well as predictors of serum B12 monitoring. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify recommendations for monitoring serum B12 levels in patients prescribed metformin for type 2 diabetes.

Recognize the clinical consequences of a serum B12 deficiency.

Self Assessment Questions:

According to the 2017 American Diabetes Association (ADA) Guidelines how often should clinicians measure a serum vitamin B12 level?

- A: Periodically
- B: Annually
- C: Every 2 years
- D: Every 3 years

What are the potential clinical consequences of a serum vitamin B12 deficiency?

- A: Anemia, nephropathy, retinopathy
- B: Anemia, neuropathy, retinopathy
- C: Anemia, nephropathy, impaired cognitive function
- D: Anemia, neuropathy, impaired cognitive function

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-332-L01-P

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

FIXED VERSUS TITRATION BASED DOSING OF CISATRACURIUM IN MECHANICALLY VENTILATED PATIENTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME

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Purpose: Acute respiratory distress syndrome (ARDS) occurs in 150,000 patients in the United States each year with a mortality rate of 34.9-46.1%. Neuromuscular blocking agents (NMBAs) are standard of care in the treatment of early ARDS. Clinical practice guidelines suggest dosing should be titrated in response to train-of-four monitoring and clinical assessment. This differs from the landmark trial, ACURASYS, which demonstrated a mortality benefit in ARDS using a fixed-dose strategy of cisatracurium (CIS). Currently, practitioners use NMBAs to increase oxygenation and decrease mortality, but may follow guideline titration-based dosing recommendations or employ fixed-dose regimens aligning with the ACURASYS Trial. **Methods:** This retrospective, multi-center, observation cohort study will include mechanically ventilated, adult patients with a diagnosis of ARDS who are receiving CIS between January 2013 and October 2017. The primary objective is to compare the total dose of CIS between fixed and titrated dosing groups during the first 48 hours after NMBA initiation. Secondary objectives will be compared 48 hours after CIS initiation and include time within clinical endpoint, defined as no spontaneous breaths over the ventilator; percent change in PaO₂/FIO₂ between groups; and CIS cost. Total mechanical ventilation-free days and total index CIS cost will also be reported. Continuous data will be analyzed using student's t-test, Wilcoxon Rank Sum, or analysis of variance (ANOVA), as appropriate. Mechanical ventilation-free days will be represented by Kaplan-Meier curves and log rank tests. Approximately 116 to 268 patients will be included to detect a 600mg difference between groups in the first 48 hours with 80% power and alpha of 0.05. **Results:** Data collection and analysis are ongoing.

Learning Objectives:

Describe the current evidence in the treatment of acute respiratory distress syndrome, particularly the benefit of neuromuscular blocking agents.

Discuss existing literature surrounding fixed versus titration based dosing of cisatracurium in the treatment of acute respiratory distress syndrome.

Self Assessment Questions:

What trial published in 2010 demonstrated a mortality benefit in the treatment of ARDS with the use of the neuromuscular blocking agent, cisatracurium, compared to placebo?

- A Acurasys
- B: ARDSNet
- C: Factt
- D: Proseva

The 2016 Clinical Practice Guidelines for Sustained Neuromuscular Blockade in the Adult Critically Ill Patient recommends assessing the depth of neuromuscular blockade with which of the following?

- A Peripheral nerve stimulation with train of four monitoring
- B Clinical assessment
- C The clinical practice guidelines do not recommend assessing the depth of neuromuscular blockade
- D Both A and B

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-333-L01-P

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

DEBUGGING THE DATA OF ORITAVANCIN: PATIENT OUTCOMES, COMPLIANCE WITH FORMULARY RESTRICTIONS, AND FISCAL ASSESSMENT OF A NOVEL ANTIBIOTIC

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Purpose: Oritavancin is a lipoglycopeptide antibiotic approved for use in acute bacterial skin and structure infections caused by Gram-positive organisms. Oritavancin was added to the formulary of an academic medical center with restrictions for inpatient use. We assessed oritavancin formulary restriction compliance, determined clinical outcomes associated with oritavancin use, and calculated a return on investment (ROI) associated per indication. **Methods:** We retrospectively evaluated all patients with medication orders for oritavancin at an academic medical center between April 2015 and September 2017. Manual chart review was conducted for all patients by three reviewers using the electronic health record. Data regarding therapeutic indication, rationale for antibiotic use, and phase of care were collected to assess compliance with formulary restrictions. Additionally, efficacy and safety outcomes were collected to assign clinical outcomes to indications. Lastly, an ROI was calculated for each indication. **Preliminary Results:** Seventy-five patients received one or more doses of oritavancin. Oritavancin was most commonly used to treat cellulitis (34%). The most common rationale for oritavancin use was avoidance of intravenous line placement (44%). Forty patients (53%) received oritavancin in the outpatient setting only. Cure and improvement were noted most often when treatment was for osteoarthritis, septic arthritis, diabetic foot infections, line infections, and pneumonia. Treatment failure was noted with use for cellulitis, surgical wound infections, and septicemia. Eight patients (11%) experienced an adverse reaction with oritavancin administration. Results of the ROI calculation will be presented. **Conclusions:** Oritavancin was used most often in the outpatient setting with cure or improvement noted for each indication. Indication-specific ROI data will provide further guidance on what indications provide financial opportunities.

Learning Objectives:

Describe the FDA-approved use of oritavancin.

Identify common reasons for choosing oritavancin therapy.

Self Assessment Questions:

Oritavancin is FDA approved for which of the following indications?

- A Skin and skin structure infection
- B: Osteomyelitis
- C: Surgical site infection
- D: Pneumonia

Which of the following scenarios is the most appropriate reason to consider therapy with oritavancin?

- A Treatment of a gram negative infection
- B Rash with penicillin
- C Avoidance of PICC line placement
- D Septicemia

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-335-L01-P

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

EVALUATION OF OUTCOMES OF CLINICAL PHARMACY SERVICES FOR RESIDENCY ACCREDITATION STANDARD ADHERENCE

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The American Society of Health-System Pharmacists (ASHP) updated accreditation standards for residency programs in 2017. One section of the standards that is commonly cited by accreditors is pharmacy services. A key component of the pharmacy services section is Residency Accreditation Standard 6.9: Continuous Quality Improvement which states pharmacy personnel must engage in an ongoing process to assess the quality of pharmacy services, develop and implement improvement initiatives to respond to assessment results, and assess and develop skills of the department staff. While numerous studies have demonstrated that clinical pharmacy services positively impact patient outcomes, there is limited literature on how to perform quality assessments on these services. Tools to track how well pharmacists are performing their clinical duties have been developed but have not resulted in standardized utilization. The purpose of this project is to develop and implement a method to consistently evaluate the outcomes of clinical pharmacy services to achieve adherence with ASHP Residency Accreditation Standard 6.9. This quality assurance project was exempt from Institutional Review Board approval. A taskforce consisting of three residency program directors and one resident was formed. Specific indicators to measure outcomes of inpatient pharmacy services were determined by the taskforce based upon services performed by pharmacists. The indicators included the number of vancomycin trough levels addressed by a pharmacist, vancomycin trough levels within therapeutic range, patients on warfarin with a supratherapeutic international normalized ratio (INR) ≥ 4.5 who received vitamin K, patients who were administered a hypoglycemia rescue agent while receiving insulin glargine, and drug-related adverse events that occurred during inpatient admissions. Quality of pharmacy services will be evaluated through review of retrospective data from the electronic health record for each indicator. The results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define ASHP Residency Accreditation Standard 6.9: Continuous Quality Improvement and discuss its importance for pharmacy residency programs

Identify measurable indicators in order to assess quality of clinical pharmacy services and skills of clinical pharmacy staff

Self Assessment Questions:

Which of the following is a component of the ASHP Residency Accreditation Standard 6.9: Continuous Quality Improvement?

- A: The residency program must provide qualified preceptors to ensure
- B: Preceptors must provide ongoing feedback to residents about how
- C: The pharmacy practice must have personnel, facilities, and other
- D: Pharmacy department personnel must engage in an ongoing process

Which of the following objectives did not have a measurable indicator during this evaluation that was utilized to assess the quality of pharmacy services?

- A: Evaluate vancomycin dosing in relation to vancomycin trough levels
- B: Evaluate incidence of nephrotoxicity associated with supratherapeutic
- C: Evaluate occurrence of hypoglycemia in patients receiving insulin
- D: Evaluate occurrence of supratherapeutic INR in patients receiving

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-698-L04-P

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

IMPLEMENTATION OF RAPID DIAGNOSTIC TESTING WITH STEWARDSHIP EDUCATION FOR GRAM-POSITIVE BLOOD CULTURES IN A COMMUNITY TEACHING HOSPITAL

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Purpose: Staphylococcus aureus bacteremia (SAB) is a serious infection with an incidence ranging from 20-50 cases/100,000 per year. Prompt initiation of appropriate antibiotic therapy is essential to avoid treatment failure and complications. De-escalating broad-spectrum antibiotics promptly is also essential to prevent collateral damage and decrease the risk of inducing antibiotic resistance. Recent studies have shown that rapid identification of Staphylococcus aureus using polymerase chain reaction, without stewardship intervention, significantly decreases time to appropriate therapy in patients with bloodstream infections. This study aimed to determine the impact of rapid diagnostic testing (RDT) on the time to appropriate therapy for SAB in a community teaching hospital without active stewardship team notification. **Methods:** This retrospective quasi-experimental study was approved by the Institutional Review Board and was conducted at Mercy Health Saint Mary's (MHSM) utilizing the electronic medical records database. The primary outcome of this study was to compare the time to appropriate therapy for SAB before and after implementation of a RDT. Secondary outcomes included comparing the time to appropriate therapy for coagulase-negative Staphylococcus (CoNS) before and after RDT implementation, length of stay, time to infectious disease consult, cost savings, pharmacist versus physician initiated de-escalation and outcomes of SAB compared to CoNS bacteremia. Patients were excluded if they were less than 18 years old, had positive blood culture results from an outside facility, had antimicrobial therapy initiated outside of MHSM, had polymicrobial blood cultures, expired, chose comfort care or transferred within 48 hours of presentation or had prior SAB within 90 days. 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 a student's t-test or a Mann-Whitney U test, as appropriate. **Results & Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Identify appropriate therapy for Staphylococcus aureus bacteremia.

Discuss the impact that rapid identification of Staphylococcus aureus using polymerase chain reaction (PCR) may have on patients with bloodstream infections.

Self Assessment Questions:

Which of the following is an appropriate treatment option for a patient with MRSA bacteremia?

- A: Oral vancomycin
- B: Intravenous piperacillin/tazobactam
- C: Oral linezolid
- D: Intravenous vancomycin

Which of the following describes the impact rapid identification of Staphylococcus aureus via PCR has on patients with bloodstream infections?

- A: Cost to the patient is increased
- B: Increased treatment of Staphylococcus species other than S. aureus
- C: Decreased time to appropriate therapy
- D: Increased incidence of Clostridium difficile infections

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-336-L01-P

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

EFFICACY OF ACETAMINOPHEN IN COMPARISON TO IBUPROFEN AND INDOMETHACIN FOR THE CLOSURE OF PATENT DUCTUS ARTERIOSUS (PDA)

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Purpose: Patent ductus arteriosus (PDA) is a common complication in preterm infants where a delay in closure can lead to significant consequences such as pulmonary edema, impaired gas exchange, and intraventricular hemorrhage. Current strategies to induce PDA closure include nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, and surgical ligation. Although previous studies have compared PDA closure rates between acetaminophen and NSAIDs, no study has been able to demonstrate superiority of acetaminophen. The objective of this study is to determine if the use of intravenous acetaminophen is more effective for PDA closure when compared to intravenous NSAIDs. **Methods:** A retrospective, case-control study of patients receiving medications for PDA closure was conducted at the University of Louisville Hospital. Patients who received intravenous acetaminophen, ibuprofen, or indomethacin for PDA closure over three years were screened for inclusion. Patients with congenital anomalies and those who did not receive any medications for PDA closure were excluded. The treatment group consisted of patients who received acetaminophen and the standard of care group included patients who received either ibuprofen or indomethacin. Patients were matched 1:2 based on gestational age and weight. The primary endpoint was whether PDA closure was achieved. Secondary endpoints included the use of additional treatment courses to induce PDA closure, the need for surgical ligation, and the cost of therapy. Safety endpoints included differences in platelets, serum creatinine, blood urea nitrogen, hemoglobin, bilirubin, liver function tests, and necrotizing enterocolitis. Chi-squared tests and student's t tests were utilized for data analysis.

Results: After screening 167 patients with PDA, 24 patients met inclusion and matching criteria. Fifty percent of patients who received acetaminophen achieved PDA closure after one treatment course compared to 62.5% of patients who received NSAIDs ($p=0.558$). **Conclusions:** Full results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the potential consequences of delayed PDA closure in preterm infants.

Discuss the potential benefits of using acetaminophen compared to NSAIDs for PDA closure.

Self Assessment Questions:

Which of the following is not a potential consequence of delayed PDA closure in preterm infants?

- A: Pulmonary edema
- B: Necrotizing enterocolitis
- C: Pneumothorax
- D: Intraventricular hemorrhage

Which of the following adverse effect(s) are associated with NSAIDs but not acetaminophen therapy?

- A: Renal dysfunction
- B: Gastrointestinal bleeding
- C: Hyperbilirubinemia
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-337-L01-P

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

IMPLEMENTATION AND IMPACT OF A PREDICTIVE SCORING SYSTEM TO IDENTIFY PATIENTS AT RISK FOR ESBL BLOODSTREAM INFECTIONS

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Purpose: Time to effective antimicrobial therapy is the leading independent predictor for mortality in patients with bloodstream infections (BSI). The purpose of this study is to develop and implement a predictive scoring tool to easily identify patients at risk for extended-spectrum β -lactamase-producing (ESBL) Enterobacteriaceae BSI (eBSI). The goal of the tool is to decrease time to optimal antimicrobial therapy and reduce over-prescribing of broad-spectrum antibiotics. **Methods:** Development: Predictive scoring tool was derived and validated in 600 patients with Enterobacteriaceae BSI from UIC from 2010-2015. Implementation: Single center, pre-post quasi-experimental study including hospitalized patients from University of Illinois at Chicago Hospital for Inclusion criteria: ≥ 18 years of age, presumed infection, and prescribed broad-spectrum antipseudomonal β -lactams for ≥ 48 hours. The predictive scoring tool will be implemented into our electronic medical record and pre-intervention and post-intervention groups will be matched 1:1 based on hospital location. The primary outcome is time to antimicrobial optimization. Secondary outcomes include: length of stay, time to switch of antimicrobial therapy, imipenem days of therapy, and health care cost. **Results:** Univariate models identified a significant association between previous hospitalization (OR=3.49, $p<0.01$), previous antibiotic therapy (OR=5.01, $p<0.01$), antibiotics on admission (OR=2.48, $p<0.01$), urinary catheterization (OR=2.46, $p<0.01$), and history of non-ESBL multidrug resistant organism (OR=6.34, $p<0.01$) and ESBL eBSI. After adjusting for confounders in the multivariable model, previous antibiotic therapy (aOR=5.42, $p=0.02$) and history of non-ESBL multidrug resistant organisms (aOR=3.14, $p=0.14$) were retained in the final model based on their predictive ability (AUC-ROC=0.74). The implemented predictive scoring tool will include previous antibiotics (2 points) and history of multidrug resistant organism (1 point). Implementation of the score is ongoing.

Learning Objectives:

Describe the process of deriving a predictive score.

Discuss the clinical impact of a predictive scoring tool.

Self Assessment Questions:

Which of the following are components of the ESBL-producing enterobacteriaceae predictive score?

- A: Hemodialysis
- B: Previous antibiotic therapy
- C: Antibiotics on admission
- D: Length of hospital stay

Which of the following is a benefit of using a predictive scoring tool?

- A: to increase the use of broad-spectrum antipseudomonal beta-lactams
- B: to increase the use of rapid diagnostic tests.
- C: to improve appropriate initial antibiotic prescribing and time to effective therapy
- D: to raise awareness about those at risk for ESBL-producing enterobacteriaceae

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-338-L01-P

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

FACTORS ASSOCIATED WITH UNSUCCESSFUL FOLLOW-UP IN PATIENTS UNDERTREATED FOR GONORRHEA AND CHLAMYDIA INFECTIONS IN THE EMERGENCY DEPARTMENT

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Purpose: Neisseria gonorrhoea (GC) and Chlamydia trachomatis (CT) are commonly treated sexually transmitted infections (STIs) in the emergency department (ED). The Center for Disease Control and Prevention recommends empiric treatment for GC and CT when an STI is suspected. Recent literature suggests these infections are overtreated, and antimicrobial resistance is increasing for their treatment. In contrast, undertreatment may result in adverse reproductive health complications and continued sexual transmission for patients with unsuccessful follow-up. The primary aim of this study was to determine factors associated with unsuccessful follow-up in patients undertreated (tested positive, but not treated) for GC and CT STIs.

Methods: This was a single-center, retrospective study at a large academic medical center evaluating patients tested for STIs in the ED. Patients tested for GC and CT between January 1, 2013 and November 30, 2017 were reviewed for inclusion. Patients were excluded if they were tested secondary to sexual assault. Patients tested multiple times in the study period were included once by random selection to ensure a single encounter per patient in the final analysis. Electronic reports were used to obtain clinical data. Data extracted were demographics (age, race, sex, preferred language, insurance, homelessness, pregnancy) and encounter information (chief complaint, diagnosis, antibiotic treatments, STI co-infections). For undertreated patients, additional data included method and number of contacts. The primary outcome was to determine factors associated with unsuccessful follow-up in patients that are undertreated for GC and CT STIs. Secondary outcomes included rates of overtreatment (empirically treated and tested negative) and undertreatment for GC and CT STIs. An additional secondary outcome was to describe the number of attempts and method of successful contact for patients undertreated for GC and CT STIs. Results are pending. Conclusions are pending statistical analysis.

Learning Objectives:

Identify indications for empiric treatment of Neisseria gonorrhoea and Chlamydia trachomatis infections in the emergency department.

Discuss increasing antimicrobial-resistance of sexually transmitted infections.

Self Assessment Questions:

According to CDC guidelines, which patient should receive empiric treatment for Chlamydia trachomatis?

- A: 17 year old female with abdominal pain and history of sexually transmitted infection
- B: 23 year old male unlikely to follow up after a positive result.
- C: 26 year old newly pregnant female presenting for first prenatal appointment
- D: 37 year old male patient entering a correctional facility.

Which of the following is a guideline-recommended treatment for Neisseria gonorrhoea infection?

- A: Azithromycin 1,000 mg PO x 1 + Ceftriaxone 250 mg IM x 1
- B: Azithromycin 1,000 mg PO x 1 + Metronidazole 500 mg orally BID
- C: Gentamicin 250 mg IM x 1 + Doxycycline 100 mg PO x 7 days
- D: Levofloxacin 500 mg PO daily x 7 days

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-339-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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IMPLEMENTATION OF A CERVICAL RIPENING ALGORITHM TO REDUCE THE USE OF VAGINAL DINOPROSTONE

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Purpose: Vaginal misoprostol and vaginal dinoprostone are frequently used for cervical ripening during the induction of labor at UnityPoint Health-Meriter Hospital. Current guidelines recommend the use of vaginal misoprostol, oral misoprostol and vaginal dinoprostone but do not provide a clear recommendation on the preferred cervical ripening agent. To date, there are no clinical tools to determine when dinoprostone would be chosen over misoprostol. Despite vaginal misoprostol's proven efficacy, concerns for tachysystole and non-reassuring fetal heart tones exist. The more frequent dosing interval of misoprostol presents a concern because vaginal administration of both misoprostol and dinoprostone has historically been done by a medical provider at our institution. Dinoprostone vaginal insert is often preferred to misoprostol due to its extended dosing interval and ease of removal but is significantly more expensive compared to misoprostol. The purpose of this project is to evaluate the efficacy and safety of a cervical ripening algorithm utilizing oral and vaginal misoprostol to reduce the use of vaginal dinoprostone. **Methodology:** A retrospective chart review of patients requiring cervical ripening with vaginal misoprostol or dinoprostone was conducted from January 2017 to March 2017. Based on the results, a clinical-based algorithm was developed and will be implemented to limit the use of vaginal dinoprostone to pregnancies with high risk fetal indications when dinoprostone would be preferred (e.g. intrauterine growth restriction, cardiac anomalies). A comparison of the efficacy and safety between the pre- and post-implementation groups will be performed through retrospective chart review. Primary efficacy endpoints include achievement of vaginal delivery in less than 24 hours and rates of cesarean deliveries. Secondary safety endpoints include tachysystole, category III fetal heart rate tracings and NICU admissions. **Results/Conclusions:** Data collection is ongoing. The available results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

List two indications and contraindications for the induction of labor
Describe two methods available for cervical ripening in the induction of labor

Self Assessment Questions:

According to the American College of Obstetricians and Gynecologists, which of the following is an appropriate indication for the induction of labor?

- A: Previous classical cesarean delivery
- B: Preeclampsia
- C: Active genital herpes infection
- D: Previous myomectomy entering the endometrial cavity

Which of the following cervical ripening methods for the induction of labor is recommended by the World Health Organization?

- A: Oral misoprostol 100 micrograms every 2 hours
- B: Breast stimulation
- C: Vaginal misoprostol 25 mcg every 6 hours
- D: Vaginal misoprostol 25 mcg every 6 hours plus 10 mg vaginal dinoprostone

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-340-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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PHARMACISTS' IMPACT ON ADHERENCE OF ADDICTION TREATMENT WITH EXTENDED-RELEASE NALTREXONE: A RETROSPECTIVE REVIEW

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Purpose: A six-month study of extended-release naltrexone along with biweekly psychosocial support demonstrated reduced relapse in patients with opioid or alcohol dependence. Although adherence is improved with therapy, efficacy is seen with subsequent doses. Previous studies have indicated pharmacist-led clinics' improvement in patient adherence and clinical outcomes. The present study will assess the clinical pharmacists' administration and management of extended-release naltrexone in the outpatient setting. **Methods:** A retrospective review will evaluate patients 18 years and older receiving extended-release naltrexone at St. Matthews Community Pharmacy (SMCP) or an outpatient primary care clinic. (Therapy administered at the out-patient clinic is dispensed by SMCP.) Prescription processing, a drug screen, counseling, and a naltrexone test dose are provided at the initial visit by clinical pharmacists. The pharmacy is responsible for communication and monitoring adherence, while administration and counseling for subsequent doses are performed by clinical pharmacists. Data collected from SMCP dispense history will include the indication (opioid or alcohol dependence), previous naltrexone treatment, and the number of repeat injections received through the SMCP program or out-patient clinic. This study was submitted to Sullivan University's Institutional Review Board for approval. **Preliminary results:** We anticipate that education and follow up by a clinical pharmacist improves adherence rates and reduces relapse. One major limitation is lack of access to administration documentation at the outpatient clinic; however, no further fills indicate a halt in therapy. Additionally, patients are not continually assessed for contributing factors (i.e. frequency of psychosocial support). **Conclusion:** Pharmacists have a reputation of improving adherence and increasing access to care by implementing reminders and collaborative care agreements. Extended release injectable therapy is proven to reduce relapse occurrence; however, some patients require more comprehensive management, making adherence difficult. This study aims to demonstrate pharmacists' role in improving adherence to extended-release naltrexone therapy.

Learning Objectives:

Identify the number of patients achieving greater than 6 months of therapy when managed by a pharmacist-led program at a community pharmacy as compared to an outpatient primary care clinic.

Describe the pharmacists' role in improving adherence to injectable extended-release naltrexone therapy

Self Assessment Questions:

1. Extended-release naltrexone therapy has shown efficacy after patients have achieved at least _____ months of therapy

- A: 3 months
- B: 6 months
- C: 12 months
- D: 24 months

Extended-release naltrexone therapy was approved following a six-month study performed over six months of monthly injections along with

- A: Weekly urine drug screens
- B: Weekly doses of naltrexone 50mg tablets
- C: Monthly liver function tests
- D: Biweekly psychosocial support

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-341-L01-P

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

INCIDENCE OF ACUTE KIDNEY INJURY FOLLOWING CARDIOTHORACIC SURGERY IN PATIENTS UTILIZING A PERIOPERATIVE AMIODARONE PROTOCOL

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The use of perioperative amiodarone is correlated with decreased rates of postoperative atrial fibrillation after coronary artery bypass graft surgeries. To decrease postoperative atrial fibrillation, hospital length of stay and patient morbidity the institution implemented a perioperative amiodarone protocol. Following protocol implementation, there was an increase in the incidence of acute kidney injury. The purpose of this study is to assess incidence of acute kidney injury in patients after coronary artery bypass graft surgery, comparing pre and post perioperative amiodarone protocol initiation. This study is a retrospective review of two groups: patients who underwent coronary artery bypass grafting on dates prior to and after implementation of the perioperative amiodarone protocol. These patients were identified through a reporting system. Data was collected by review of electronic health record including patient demographics, and clinical criteria as well as specific criteria throughout the procedure itself. Acute kidney injury will be defined according to the Risk, Injury, Failure, Loss of kidney function, and End-stage kidney disease (RIFLE) criteria as used by the Society of Thoracic Surgeons. The primary endpoint assessed is the incidence of acute kidney injury. Secondary endpoints include postoperative hypotension requiring vasopressors, patients requiring dialysis, bradycardia requiring pacing, length of stay and patient mortality. The incidence of post-operative acute kidney injury will be compared between the pre and post protocol groups. Appropriate statistical tests will be used with p-values < 0.05 considered statistically significant.

Learning Objectives:

Describe factors that can increase the risk of acute kidney injury in patients undergoing coronary artery bypass graft surgery.

Explain the rationale for the use of perioperative amiodarone to decrease rates of postoperative atrial fibrillation in patients undergoing coronary artery bypass graft surgery.

Self Assessment Questions:

Which of the following is a factor that has been related to the development of acute kidney injury in patients undergoing coronary artery bypass graft surgery?

- A: Pre operative atrial fibrillation
- B: Prolonged mechanical ventilation
- C: Hypotension
- D: Use of insulin drips for post operative care

In 2005, the PAPABEAR trial found which of the following to be TRUE?

- A: Mean duration of postoperative treatment with amiodarone was shorter
- B: Postoperative atrial tachyarrhythmias occurred in fewer amiodarone patients
- C: In patients that experienced atrial tachyarrhythmias, the ventricular rate was lower
- D: Therapy was more often withdrawn or decreased in placebo group

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-856-L05-P

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

INITIAL MANAGEMENT OF KETOACIDOSIS IN NEW-ONSET TYPE 1 DIABETES MELLITUS IN PEDIATRIC PATIENTS

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Purpose: A 2-bag intravenous fluid protocol with dextrose 10% solution and 0.45% NaCl with electrolytes will be implemented for the management of diabetic ketoacidosis (DKA) in pediatric patients with type 1 diabetes mellitus in spring of 2018 at Children's Hospital of Wisconsin. The purpose of this study is to predict the safety and efficacy of this new protocol compared to previous practice using multiple bags. Parameters to evaluate safety include incidences of hypoglycemia, cerebral edema, hypokalemia, and hyperkalemia. Previous studies have proved that the 2-bag system simplifies therapy, is associated with more rapid correction of acidosis, decreases the number of IV bags used per admission, and decreases incidence of DKA complications. **Methods:** Using the electronic medical record system, pre-protocol data will be collected from pediatric patients ages 18 or younger with a new diagnosis of type 1 diabetes mellitus who presented to the emergency department with diabetic ketoacidosis from November 1, 2016 to June 30, 2017. The following data was collected: demographic information, blood glucose, capillary and arterial bicarbonate, carbon dioxide, anion gap, venous and arterial pH, hemoglobin A1c, urine ketones, basic metabolic panels, and serum electrolytes. Data collection included use of insulin, mannitol, 3% sodium chloride, glucagon, urine ketones, changes to maintenance intravenous fluids, and length of hospital stay. The number of intravenous fluid bags dispensed, checked, and administered were recorded. This retrospective study evaluation was submitted to the Institutional Review Board and was deemed exempt. **Results/Conclusions:** A total of 134 patients were admitted for DKA during the allotted time frame. Of this total, 30 patients were newly diagnosed with type 1 diabetes mellitus upon admission and were included in this retrospective study; 13 (43%) females and 17 (57%) males, averaging 9 years of age. Results and conclusive predictions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the current literature that supports the use of a 2-bag fluid system for the management of DKA

Identify monitoring parameters for patients presenting with DKA

Self Assessment Questions:

Which of the following is considered an indicative parameter of DKA?

- A Serum bicarbonate < 15 mmol/L
- B: Serum potassium < 3 mEq/L
- C: Venous pH > 7.3
- D: Serum glucose > 200 mg/dL

Which of the following is predicted to be affected by implementation of a 2-bag fluid system for management of DKA?

- A Incidences of DKA
- B Number of hospital admissions
- C Time to acidosis correction
- D A delay in fluid adjustment administration

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-857-L05-P

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

ANALYZING OUTPATIENT DIRECT ORAL ANTICOAGULANT (DOAC) UTILIZATION IN A COMMUNITY HEALTH SYSTEM

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Purpose: The use of direct oral anticoagulants (DOACs), such as apixaban, rivaroxaban, edoxaban, and dabigatran, has been increasing in clinical care since their introduction in 2010. These medications offer benefits such as an improved safety profile, similar efficacy, standard dosing regimens, and a lack of routine and necessary monitoring when compared to warfarin, which has been the standard of venous thromboembolism (VTE) and atrial fibrillation therapy since its development over 60 years ago. However, there are some factors which can compromise safe use that must be considered. Increased prices often confer a higher out of pocket cost, which can impact adherence. Because these medications do not require frequent monitoring, patients may develop worsening liver and/or kidney function which may go unnoticed for long periods of time. This can lead to inappropriate dosing. The purpose of this study was to assess DOAC use in a small health system and to determine whether patients are being appropriately dosed and monitored while taking these medications. **Methods:** In this retrospective study, patients initiated on a DOAC during the study period were identified and categorized based on various criteria, including renal and liver function, age, relevant past medical history, and concurrent medications that increase bleeding risk. Patients who met all inclusion criteria were identified using ICD-9/10 codes. The primary outcome of this study was to determine the prescribing and monitoring accuracy of DOAC dosing in the outpatient setting. Secondary outcomes included the incidence of bleeding on DOAC therapy, the use of blood transfusions and reversal agents for severe bleeding, and overall cost of associated patient admissions. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the adverse clinical outcomes associated with inappropriate dosing of DOACs

Recognize the advantages and disadvantages to DOAC therapy

Self Assessment Questions:

Which DOAC has an FDA approved reversal agent?

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

Which of the following is a contraindication for DOAC therapy?

- A CrCl < 50 mL/min
- B History of nosebleeds
- C Mechanical heart valve
- D Non-valvular atrial fibrillation

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-342-L01-P

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

A COST ANALYSIS OF HOSPITALIZATIONS FOR INFECTIONS RELATED TO INJECTION DRUG USE AT A SAFETY-NET HOSPITAL IN HUNTINGTON, WV

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Purpose: According to the United States Centers for Disease Control and Prevention (CDC), the rate of death due to drug overdose nearly tripled during 1999-2014. West Virginia was among the states with the largest absolute rate change in both heroin deaths and deaths from synthetic opioids other than methadone. In central Appalachia (Kentucky, Tennessee, Virginia, and West Virginia), the proportion of hospital admissions for treatment of opioid dependency increased by 21.1% from 2006-2012. Bacterial infection results in high rates of morbidity and high health care costs amongst those who use injectable drugs. The purpose of this study is to estimate the incidence and cost of admissions in patients with bacterial infections secondary to injectable drug use. **Methods:** This is a single-center, retrospective chart review study in patients admitted between the 10-year period of August 1, 2007 and July 31, 2017. Patients were identified through billing data using ICD-9, ICD-10, and DRG codes associated with brain abscess, endocarditis, vertebral osteomyelitis, bacteremia, necrotizing fasciitis, cellulitis, abscess, and pneumonia. Eligible patient records also contained at least one ICD-9 or ICD-10 code associated with opioid/heroin, cocaine, amphetamine/other stimulant, or hepatitis C. Patients aged less than 18 or greater than 89 were excluded. Patients with multiple infections will be analyzed based on their most severe infection. Infection severity is classified from most to least severe in the following order: brain abscess, endocarditis, vertebral osteomyelitis, bacteremia, necrotizing fasciitis, cellulitis, abscess, and pneumonia. The primary endpoints include the incidence and average cost of hospital admission by infection type. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the rationale for analyzing costs associated with bacterial infections in injectable drug users.

Describe the general characteristics (age, gender, and insurance status) of injectable drug users admitted to the hospital with bacterial infections.

Self Assessment Questions:

Which of the following best describes the rationale for conducting a cost analysis on bacterial infections in injectable drug users?

- A Rationalize anger directed towards individuals addicted to illicit drugs
- B Foster a lack of compassionate care
- C Promote legislation to limit Medicaid expansion
- D Justify investment in services aimed at reducing addiction

Which of the following statements is true regarding the overall patient population described in this study?

- A Most patients were below age 30
- B Bacterial infective endocarditis was associated with the highest cost
- C Most patients were uninsured
- D Skin and soft tissue infections accounted for approximately 90%

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-343-L01-P

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

VENOUS THROMBOEMBOLISM (VTE) RECURRENCE RATES IN OBESE PATIENTS TREATED WITH DIRECT-ACTING ORAL ANTICOAGULANTS (DOACs) COMPARED TO WARFARIN

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Background: VTE is a common condition with the potential to cause significant morbidity and mortality. In 2010, the Centers for Disease Control and Prevention (CDC) estimated a 10-30% mortality rate among adults within 30 days of initial VTE diagnoses, with the majority of deaths involving pulmonary embolisms (PEs). Over the last decade, the United States Food and Drug Administration (FDA) approvals of four DOACs have shifted the landscape of anticoagulation therapy for the treatment of VTE. The 2016 CHEST guideline update recommends dabigatran, rivaroxaban, apixaban, or edoxaban over vitamin K antagonists (VKAs) for treatment of VTEs. However, the "one size fits all" dosing recommendations per the manufacturer pose a concern for anticoagulation in obese patients. To address the challenge of anticoagulation in a growing obese population, this study will evaluate the effectiveness and safety of DOACs in obese patients hospitalized across a large hospital network in the United States. The objective of this study is to assess and compare the recurrence rates of DOACs versus warfarin treatment in obese patients diagnosed with acute VTE. **Methods:** This is a multi-center, retrospective, observational, cohort review study that will utilize electronic medical records across 33 Trinity Health hospitals to evaluate hospital readmission rates, emergency department visits, and mortality rates of obese patients with acutely diagnosed VTEs and discharged on a DOAC compared to warfarin. Patients are included if they are admitted to one of the 33 targeted hospitals between January 1st, 2012 through March 31st, 2017 with an acute diagnosis of VTE and discharged on a DOAC or warfarin. This study will exclude any patient less than 18 years of age; with end stage renal disease on hemodialysis; pregnancy; or on anticoagulation for a non-VTE indication. **Results/Conclusions:** Pending.

Learning Objectives:

Review the current literature regarding use of DOACs in obese patients. Identify risk factors associated with developing a VTE.

Self Assessment Questions:

Which of the following is true regarding the 2016 International Society of Thrombosis and Haemostasis guidance statement?

- A Large randomized trials that focus on the use of DOACs in obese patients
- B Doses for DOACs should be increased in patients weighing greater than 100 kg
- C There are no concerns with using DOACs in morbidly obese patients
- D Standard dosing of DOACs is recommended in patients weighing less than 100 kg

Which of the following is not a potential major risk factor for VTE?

- A Major trauma within 3 months of VTE diagnosis
- B Body mass index less than 30 kg/m²
- C Orthopedic surgery within 3 months of VTE diagnosis
- D Factor V Leiden mutation

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-344-L01-P

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

THE IMPACT OF OBESITY ON VASOPRESSOR DOSING IN CRITICALLY ILL PATIENTS WITH SHOCK

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Purpose: There is conflicting evidence regarding outcomes of obese critically ill patients given that obesity is typically associated with the development of chronic illnesses. Despite this association, some studies also suggest that elevated body mass index may confer a mortality benefit compared with patients of normal weight (obesity paradox). However, increased adiposity alters metabolic response and secretion of various inflammatory cytokines may lead to worse outcomes. In addition, alterations in pharmacokinetic parameters in obese critically ill patients complicate optimal medication dosing. One previous study demonstrated that obese patients tended to receive lower doses of vasopressors which could ultimately affect time to hemodynamic stability during various shock states. At this time, the practice of using weight based or non-weight based dosing to titrate vasopressors is not standardized. The objective of this study was to determine the cumulative vasopressor dose required by obese patients versus non-obese patients who experienced distributive, cardiogenic, hypovolemic, or obstructive shock during the first 72 hours of therapy. **Methods:** This retrospective, single centered, cohort study included adults with shock who received vasopressors in the emergency department, medical, trauma/surgical, cardiology or neurosciences intensive care unit (ICU) services at Loyola University Medical Center from January - July 2017. The primary outcome was cumulative vasopressor doses in obese and non-obese adult patients at 72 hours. Secondary endpoints included in-hospital and 28-day mortality, duration of shock, the addition of a second agent, time to hemodynamic stability, hospital length of stay, ICU-free days and vasopressor related side effects. 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 as appropriate. The study was approved by the Institutional Review Board. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the relationship between body mass index and mortality as proposed by the "obesity paradox."
Review current literature addressing dosing considerations in obese patients requiring vasopressors.

Self Assessment Questions:

What is the perceived relationship between obesity and mortality as proposed by the "obesity paradox"?

- A Obesity is associated with an increased long-term risk of cardiovascular
- B: Obesity is associated with an increased risk of non-cardiovascular
- C: Obesity is associated with a decreased risk of mortality
- D: Obesity has not been shown to affect risk of mortality

Which vasopressor has more pronounced metabolic effects such as glycogenolysis, inhibition of insulin release, and lipolysis?

- A Norepinephrine
- B Epinephrine
- C Vasopressin
- D Dopamine

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-345-L01-P

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

ASSESSMENT OF TIME-TO-OPTIMAL THERAPY AFTER INCORPORATION OF AN ANTIMICROBIAL STEWARDSHIP PHARMACY RESIDENT INTO A RAPID DIAGNOSIS PROTOCOL FOR BLOODSTREAM INFECTIONS

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Purpose: Antimicrobial stewardship programs (ASPs) expedite optimization of antimicrobial therapy. Rapid diagnostic testing (RDT) provides objective data for ASPs to facilitate antimicrobial therapy optimization. With RDT, time to organism identification occurs within minutes to hours. RDT in bloodstream infections (BSIs) has been demonstrated to decrease time-to-effective antibiotic therapy. A recent meta-analysis demonstrated that RDT employed in combination with ASPs for BSIs produced significant decreases in mortality and hospital stay whereas RDT without the presence of an ASP produced no difference in mortality or hospital stay. This institution implemented RDT in December 2016. A pharmacy resident functioning in an antimicrobial stewardship capacity was incorporated into the RDT protocol for BSIs in December 2017. This study's objectives were to evaluate time-to-effective, time-to-optimal therapy, and length of stay before and after implementation of an antimicrobial stewardship pharmacy resident into RDT protocol for BSIs. **Methods:** This is a pre-post quasi-experimental, retrospective study at Mount Sinai Hospital. At this institution, blood culture identification (BCID) polymerase chain reaction (PCR) panels are automatically performed on any positive blood culture. An antimicrobial stewardship pharmacy resident was alerted of all positive results Monday through Friday 8:00a.m. to 4:30p.m. Electronic medical records for patients who had a positive BCID PCR panel prior to pharmacy resident implementation (December 2016 to February 2017) were retrospectively reviewed and will be compared to medical records for patients after pharmacy resident implementation (December 2017 to February 2018). Data to be collected includes patient age, gender, length of stay (LOS), mortality, antibiotics received, estimated creatinine clearance, serum lactate levels, white blood cell count, maximum body temperature up to time of blood culture orders, time-to-effective therapy, and time-to-optimal therapy. Results & Conclusions will be presented at the Great Lakes Pharmacy Residency Conference pending data collection and analysis.

Learning Objectives:

Discuss the advantages and limitations of multiplex polymerase chain reaction panels for rapid diagnosis of bloodstream infections
Describe time-to-effective therapy and time-to-optimal therapy before and after implementation of an antimicrobial stewardship pharmacy resident into the rapid diagnosis protocol for bloodstream infections

Self Assessment Questions:

Which antibiotic resistance gene does BioFire's blood culture PCR panel not identify?

- A blaKPC
- B: mecA
- C: blaAmpC
- D: vanA/B

Which of the following is an advantage of rapid diagnostic testing?

- A It can decrease time to effective antimicrobial therapy
- B It can decrease costs compared to traditional microbiological methods
- C It can decrease mortality in conjunction with a stewardship program
- D A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-699-L04-P

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

IMPACT OF A MEDICATION ASSISTANCE PROGRAM ON RATES OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AND ASTHMA RELATED EMERGENCY DEPARTMENT VISITS AND HOSPITALIZATIONS

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Purpose: Chronic obstructive pulmonary disease (COPD) and asthma are chronic conditions that usually require expensive inhalers to control symptoms and prevent complications. A lack of control in these pulmonary disease states from poor inhaler adherence may result in an exacerbation, leading to an emergency department (ED) visit and/or hospitalization for treatment. Given an increase in access to life saving medications, it may be theorized that patient clinical outcomes relating to the associated disease states would be improved once the barrier of cost is removed. Community Health Network's (CHNw) Medication Assistance Program (MAP) employs a team of pharmacy technicians that work to help patients receive brand-name medications that they cannot afford on their own. The goal of this study is to determine if patients who have been enrolled in CHNw's MAP for their COPD and asthma inhalers have improved clinical outcomes, specifically through a reduction in ED visits and hospitalizations. **Methods:** A retrospective chart review will be performed at CHNw, utilizing the electronic medical record to track the number of ED visits and hospitalizations for patients who obtained a brand name inhaler through the MAP. Patients will be examined for a year before and a year after their time of enrollment, defined as the time the patient first received a medication through the MAP. Other data points will be collected to further determine clinical impact of the MAP such as number of therapy changes, steroid use, and outpatient acute care visits. **Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the potential benefits associated with utilization of a medication assistance program.

Discuss the potential impact of a medication assistance program on clinical outcomes for chronic disease states.

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

Medication assistance programs can help patients receive medications through which the following means:

- A Manufacturer prescription assistance programs
- B Recently expired medications
- C Charity organizations
- D A and C are correct

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-700-L04-P

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

IMPACT OF REGIMEN SELECTION ON RESPONSE TO ANTIRETROVIRAL THERAPY IN TREATMENT-NAÏVE HUMAN IMMUNODEFICIENCY VIRUS-INFECTED INDIVIDUALS

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A previous 550 clinic human immunodeficiency virus (HIV) cohort subgroup analysis showed protease inhibitor (PI) regimens were superior to non-nucleoside reverse transcriptase inhibitor (NNRTI) and integrase inhibitor (INSTI) regimens in CD4 count improvement. The objective of this study is to compare PI regimens to INSTI regimens in virologic suppression and immunological recovery in treatment-naïve HIV-infected individuals. This is a retrospective, observational study of treatment-naïve HIV-infected individuals at the 550 clinic who started antiretroviral therapy (ART) between January 1, 2010, and December 31, 2016. Patients at least 18 years old with viral load and CD4 counts before and one year after ART initiation were included. Patients were excluded if they received NNRTIs or both PI and INSTI therapy within one year of ART initiation. Virologic suppression was defined as HIV-1 RNA less than 48 copies/mL and immunological recovery as CD4 count increase of at least 150 cells/mm³. Dichotomous and continuous variables were analyzed using chi-squared or Fisher's exact tests and Wilcoxon rank sum tests, respectively. Multivariate analyses performed were logistic regressions with adjustments for identified covariates. P-value less than 0.05 was considered statistically significant.

Preliminary analysis includes 131 patients. Patients in the PI group had significantly lower CD4 counts at baseline than the INSTI group with median of 171.5 cells/mm³ and 378 cells/mm³ respectively. Virologic suppression at one year was documented with 65% of PI regimens and 70% of INSTI regimens (p=0.58). Immunological recovery was documented with 80% of PI regimens and 59% of INSTI regimens (p=0.013) with odds ratio of 0.3 (0.12-0.68) on multivariate analysis.

Preliminary data suggests greater immunological recovery with PI versus INSTI regimens with similar virologic suppression. This result may be due to earlier clinical practice of initiating PI regimens in individuals with lower CD4 counts. Further data collection including patients from recent practice is needed.

Learning Objectives:

Identify advantages and disadvantages to protease inhibitor and integrase inhibitor regimens for treatment of human immunodeficiency virus

Discuss the difference between protease inhibitor and integrase inhibitor regimens in virologic suppression and immunological recovery

Self Assessment Questions:

Which of the following is an advantage of protease inhibitor regimens?

- A Few drug-drug interactions
- B: Low incidence of metabolic toxicity
- C: Low pill burden
- D: Low rate of resistance

How does immunological recovery with integrase inhibitors compare to that of protease inhibitors?

- A CD4 count recovery is higher with integrase inhibitors
- B CD4 count recovery is similar with integrase inhibitors
- C CD4 count recovery is lower with integrase inhibitors
- D CD4 count recovery has not been compared between these drug c

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-678-L02-P

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

APPROPRIATENESS OF DIRECT ORAL ANTICOAGULANT (DOAC) PRESCRIBING IN PATIENTS WITH NONVALVULAR ATRIAL FIBRILLATION

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Purpose: Direct oral anticoagulants (DOACs) have been widely accepted in clinical practice because of their efficacy, convenience, and fewer drug interactions. However, there are important patient-specific parameters that must be evaluated prior to therapy initiation and throughout the course of therapy to ensure the appropriate use of these agents and minimize adverse events. Direct oral anticoagulants are often prescribed by cardiologists at Froedtert & the Medical College of Wisconsin (F&MCW); however, there are patients who may not be on appropriate doses of DOACs, require additional monitoring, or for whom warfarin may be a better alternative. Currently, clinical pharmacists are not formally involved in DOAC prescribing or monitoring, and very rarely are consulted when these agents are initiated. Pharmacists are well-positioned to identify potentially inappropriate prescribing practices and provide proactive monitoring. The purpose of this project is to evaluate the appropriateness of DOAC prescribing by Cardiology providers at F&MCW in patients with nonvalvular atrial fibrillation (NVAF). Additionally, this project will serve to identify opportunities for the development of pharmacist-led DOAC management services. **Methods:** This retrospective chart review evaluated patients with NVAF initiated or DOAC therapy between August 1st, 2016 and April 30th, 2017. Patients initiated outside of F&MCW were excluded. The primary outcome is the prevalence of inappropriate DOAC prescribing at therapy initiation. Appropriateness of prescribing will be assessed based on DOAC choice and dose in the setting of various patient-specific parameters, including renal function, age, weight, and drug-drug interactions. Secondary outcomes include prevalence of inappropriate DOAC prescribing at six months post therapy initiation, categories of inappropriate prescribing, and the incidence of adverse events within the first six months of therapy. **Results/Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review appropriate dosing for DOACs based on various patient-specific parameters.

Identify opportunities for pharmacist involvement in optimizing DOAC prescribing and monitoring in an ambulatory clinic.

Self Assessment Questions:

A 70 year old patient with NVAF is taking rivaroxaban 20 mg once daily. She weighs 55 kg and her serum creatinine is 1.6 mg/dL (CrCl = 40 mL/min). What would be an appropriate therapy recommendation?

- A: Apixaban 5 mg twice daily
- B: Apixaban 2.5 mg twice daily
- C: Apixaban 5 mg daily once daily
- D: Continue rivaroxaban 20 mg once daily

What services could an ambulatory pharmacist provide when patients are initiated on DOAC therapy to ensure safe and appropriate use?

- A: Verify appropriate dosing based on indication, age, weight, renal function
- B: Identify and evaluate potential drug-drug interactions
- C: Determine and recommend appropriate intervals for laboratory monitoring
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-346-L01-P

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

FACTORS INFLUENCING KETAMINE USE AS AN ANALGESIC IN THE EMERGENCY DEPARTMENT

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Purpose: The purpose of this study is to identify factors which influence prescribers' use of ketamine for pain management in the Emergency Department (ED). Particularly in the setting of the current opioid crisis, alternative options for ED pain management are being considered, including ketamine. The specific aims of this study are to identify the barriers and/or concerns prescribers have when considering ketamine for analgesia in adult ED patients and to explore, through prescriber interviews, how ketamine is currently being utilized for pain management in the ED. Data suggests that ketamine is a safe and effective option for acute pain management in the ED, but utilization in this setting has not been widely accepted. The results of this study will provide insight for ED clinicians regarding the current and potential role of ketamine for pain management. **Methods:** This study is designed as a mixed methods qualitative analysis. Individual interviews will be completed with top prescribers of ketamine for pain as well as prescribers who rarely use ketamine for pain in the ED. Using the information gathered in these interviews, we will develop a brief survey to distribute to Emergency Room prescribers and pharmacists in Chicagoland hospitals. The survey will address prescribing habits, concerns for using ketamine and barriers to ketamine prescribing.

Results/Conclusions: Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify appropriate ketamine dosing when used for analgesia
Review potential side effects that are associated with ketamine administration

Self Assessment Questions:

Which dose of ketamine would be most appropriate when used for analgesia?

- A: 1 mg/kg IV
- B: 1 mg/kg IM
- C: 0.3 mg/kg IV
- D: 3 mg/kg IM

Administering ketamine over 15 minutes decreases the likelihood of which side effect?

- A: Tachycardia
- B: Unreality
- C: Hypertension
- D: Dizziness

Q1 Answer: C Q2 Answer: B

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RETROSPECTIVE REVIEW OF ANALGESIA AND SEDATION PRACTICES POST-INTUBATION IN A COMMUNITY HOSPITAL EMERGENCY DEPARTMENT

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Purpose: Few studies investigate the use of analgesia in patients undergoing endotracheal intubation in the emergency department (ED). The available evidence suggests that 63% of patients who underwent intubation received no analgesia. The purpose of this project is to identify current post-intubation analgesia and sedation prescribing practices in the ED at a community hospital and develop a pharmacist-driven workflow to ensure that patients receive appropriate analgesia post-intubation. **Methods:** This is a single-center, retrospective cohort analysis of adult patients who presented to the emergency department from January 1, 2016 through August 31, 2017 and underwent endotracheal intubation. Patient selection was performed by an ICD9 report, generated to identify patients for inclusion in the study. The primary outcome was to determine the percentage of patients that received analgesia post endotracheal intubation in the ED. Secondary objectives were time to analgesia administration post-intubation and evaluation of the appropriateness of the opioid agent and sedative. **Results/Conclusions:** Statistical analysis is currently underway. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the benefit of providing analgesia to patients undergoing endotracheal intubation.

Identify contraindications to providing analgesia post endotracheal intubation.

Self Assessment Questions:

Choose the BEST option in appropriate medication administration order for Rapid Sequence Intubation.

- A Neuromuscular blocker, Analgesic, Sedative
- B: Sedative, Neuromuscular blocker, Analgesic
- C: Analgesic, Neuromuscular blocker, Sedative
- D: Neuromuscular blocker, Sedative, Analgesic

Which of the following medications have analgesic properties?

- A Fentanyl
- B Propofol
- C Ketamine
- D Answers A and C

Q1 Answer: B Q2 Answer: D

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

EFFECT OF DRUG COST TRANSPARENCY AT ORDER ENTRY ON PHYSICIAN PRESCRIBING WITHIN A PEDIATRIC INTENSIVE CARE UNIT

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PURPOSE: Recent literature reveals most prescribers are unaware of the cost of the medications they prescribe. As drug costs rise, health-systems are challenged to reduce medication costs. Some evidence suggests increasing cost transparency at the point of order entry can lead to a decrease in medication costs. However, a recent study found that the passive display of medication costs alone had minimal effects on prescriber ordering. The purpose of this study is to assess the impact on physician prescribing when the drug cost is displayed at the point of order entry to reduce medication costs. **METHODS:** The Wholesale Acquisition Cost (WAC) for 2,500 drugs was used to determine the cost per unit for each medication. The cost per unit for each medication was stratified based on the distribution of cost frequencies and was used to create five cost tiers. The study was piloted in a pediatric intensive care unit (PICU). Eight drugs were selected based on high utilization in the PICU and because they had a lower cost alternative. The study is composed of two parts; a passive and an active phase. In the passive phase, the primary intervention was assigning a cost tier to each of the eight drugs within the electronic health record, which generates the cost range at order entry. Three months of baseline physician ordering data will be collected from the PICU and compared to 3 months of data post-intervention to assess changes in physician ordering behavior. In the active phase, a PICU pharmacist will actively intervene on daily rounds to encourage prescribers to order lower cost-alternative medications. Ordering behavior will be assessed by determining medication costs in each period. **RESULTS:** N/A **CONCLUSIONS:** N/A

Learning Objectives:

Describe cost-transparency methodology utilized to decrease high-cost medication orders

Identify future opportunities to increase cost-transparency within a health system

Self Assessment Questions:

What percent of all hospitals are using computerized provider order entry (CPOE)?

- A 50%
- B: 60%
- C: 80%
- D: 90%

Which of the following influence prescriber decision-making?

- A Evidenced-based guidelines
- B Clinician practice habits
- C Clinicians' prior beliefs about costs of medications
- D All of the above

Q1 Answer: C Q2 Answer: D

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RETROSPECTIVE EVALUATION OF A MEDICAID INTERVENTION TO PROMOTE APPROPRIATE TREATMENT OF DISRUPTIVE BEHAVIOR DISORDERS IN CHILDREN AND ADOLESCENTS (REMIND)

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Purpose: Antipsychotics are often used in the treatment of disruptive behavior disorders such as oppositional defiant disorder and conduct disorder in children and adolescents, but there is a lack of data to support their efficacy. Available guidelines support the use of psychotherapy for first-line treatment to control aggression, modify behaviors, and enhance social skills. As a result, the Indiana Medicaid Drug Utilization Review Board retrospectively provided an interventional facsimile to encourage providers to evaluate antipsychotic use in their pediatric patients with disruptive behavior disorders. This study will (1) Evaluate the effectiveness of the retrospective facsimile in decreasing inappropriate antipsychotic prescribing; (2) Identify the frequency of initiation of evidence-based therapies; (3) Obtain descriptive data of antipsychotic usage for the treatment of disruptive behavior disorders among children and adolescents.
Methods: This study is a retrospective chart review of Indiana Medicaid claims filed from January 1, 2017 to September 30, 2017. All members under the age of 18 with documented diagnosis codes for disruptive behavior disorders and claims for antipsychotics have been included. Members will be grouped based on whether their providers received the interventional facsimile. Demographic data related to patients, prescribers, and specific therapies will be collected. A retrospective analysis will be conducted to assess the number of patients tapered off antipsychotics and the number of patients switched to evidence-based therapies. Descriptive statistics will be used to compare therapy changes between the two groups.
Results (Preliminary): Data collection is on-going, and analysis will be presented at a future date. **Conclusions:** Data collection is on-going in partnership with Indiana Medicaid. We will report the number of total participants and those with changes in therapy. The demographic and descriptive data will be analyzed for potential future interventions to decrease antipsychotic use in children and adolescents for the treatment of disruptive behavior disorders.

Learning Objectives:

Describe the appropriate use of pharmacotherapies in the treatment of disruptive behavior disorders.

Recognize current pattern of antipsychotic overuse in children and adolescents.

Self Assessment Questions:

Which of the following is an evidence-based therapy option for disruptive behavior disorders in children and adolescents?

- A Cognitive behavior therapy
- B: First-generation antipsychotics
- C: Psychostimulants with co-morbid ADHD
- D: A and C

Which of the following is an FDA approved use of antipsychotics in children and adolescents?

- A Conduct disorder
- B Antisocial personality disorder
- C Bipolar I disorder
- D Oppositional defiant disorder

Q1 Answer: D Q2 Answer: C

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

APPROPRIATENESS OF APIXABAN AND RIVAROXABAN PRESCRIBING PRE- AND POST-IMPLEMENTATION OF FLOW CHART

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Background: Growing trends in prescribing of direct oral anticoagulants (DOACs) have led to concerns about inconsistent and inappropriate dosing patterns. Choosing initial DOAC therapy remains complex because of the need to consider patient-specific factors and concomitant medication usage. An institution-specific anticoagulant flow chart was developed and implemented in an outpatient setting to help guide appropriateness of selected DOAC agents.
Purpose: The primary objective of this study was to assess appropriateness of apixaban and rivaroxaban prescribing for patients with nonvalvular atrial fibrillation (NVAF) or venous thromboembolism (VTE) before and after an anticoagulant flow chart was made available to outpatient providers. Secondary objectives were to identify rates of hospital admissions and emergency department visits due to bleeding in these patients.

Methods: A retrospective chart review of patients was conducted at an integrated health care system in south-central Wisconsin. Data were collected on patients age 18 years and older who were newly prescribed apixaban or rivaroxaban for stroke prevention in NVAF or treatment of VTE between January to March 2017 (pre-implementation group) and January to March 2018 (post-implementation group). Appropriateness of DOAC prescribing including indication, dosage, and drug interactions was evaluated based on recommendations approved by the U.S. Food and Drug Administration. **Results/Conclusion:** Data collection in progress. Results and conclusion to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize patient-specific factors for which dose adjustments of apixaban and rivaroxaban are recommended based on FDA-approved product labeling

Identify appropriate direct oral anticoagulant treatment regimens for nonvalvular atrial fibrillation and treatment of venous thromboembolism

Self Assessment Questions:

Which of the following two patient-specific factors would indicate a reduced dose of apixaban for nonvalvular atrial fibrillation based on FDA approved product labeling?

- A Concomitant use of aspirin and weight \leq 60 kg
- B: Concomitant use of aspirin and CrCl \leq 30 mL/min
- C: Age \geq 80 years old and weight \leq 60 kg
- D: Age \geq 80 years old and CrCl \leq 30 mL/min

Which of the following is the most appropriate dosage of rivaroxaban to initiate in a patient with normal renal function for treatment of venous thromboembolism?

- A 15 mg PO BID x 21 days, then 20 mg PO daily
- B 20 mg PO BID x 7 days, then 10 mg PO daily
- C 20 mg PO daily
- D 10 mg PO daily

Q1 Answer: C Q2 Answer: A

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ACCURACY OF SINGLE POST-FIRST DOSE VANCOMYCIN SERUM CONCENTRATION TO DETERMINE MAINTENANCE DOSING REGIMEN

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Purpose: Subtherapeutic serum vancomycin concentrations in the first one to two days of therapy may result in suboptimal treatment outcomes such as higher failure rates, slower eradication of bacteremia, and promotion of growth of vancomycin-intermediate bacteria. Conversely, supratherapeutic serum vancomycin concentrations could result in nephrotoxicity. Though vancomycin clearance correlates with estimated creatinine clearance, wide interpatient variability exists and serum concentration monitoring is typically performed at steady-state. The purpose of this study is to determine the accuracy of using a post-first dose vancomycin serum level for dosing regimen design and prediction of vancomycin clearance and steady-state serum concentration. This will allow for an earlier adjustment in the dosing regimen and quicker therapy optimization. **Methods:** This study is a prospective cohort review of adult patients on intravenous vancomycin maintenance therapy from December 2017 to present. Patients are included if they are started on vancomycin for an active infection, have stable renal function and have received no more than one vancomycin dose prior to inclusion into the study. Patients are excluded if they have changing renal function (serum creatinine change >25%), are on dialysis, or are on vancomycin for surgical prophylaxis only. After the initial vancomycin dose (per pharmacy protocol), a vancomycin serum level will be drawn roughly 2 hours prior to the second dose. Using a Bayesian kinetic model incorporating both the first dose serum concentration and local population pharmacokinetics, an estimation of the patient's vancomycin clearance is calculated. This estimated clearance is used to predict each patient's steady-state vancomycin level which will then be compared to the actual steady state serum level (single data point level or midpoint level). **Results:** The results and conclusions of this study are pending and will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the target vancomycin 24-hour area-under-the-curve (AUC) and trough concentration as stated in the 2009 vancomycin therapeutic monitoring guidelines

Describe a favorable outcome of vancomycin AUC monitoring as compared to trough level monitoring

Self Assessment Questions:

What trough (pre-dose) steady-state vancomycin level range accurately predicts a 24-hour AUC of 400 in all patients?

- A: <10 mg/L
- B: 10-15 mg/L
- C: 15-20 mg/L
- D: Trough levels do not accurately predict AUC in all patients

Which vancomycin pharmacokinetic parameter is most associated with nephrotoxicity?

- A: Auc
- B: C_{max} (peak concentration)
- C: C_{min} (trough concentration)
- D: T > nephrotoxic concentration

Q1 Answer: D Q2 Answer: A

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IMPACT OF STANDARD VERSUS PROLONGED COURSES OF ANTIBIOTICS FOR THE TREATMENT OF UNCOMPLICATED STAPHYLOCOCCUS AUREUS BACTEREMIA IN PATIENTS WITH HEMATOLOGIC MALIGNANCIES: MICHIGAN MEDICINE EXPERIENCE

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Purpose: Staphylococcus aureus bacteremia is associated with significant morbidity and mortality. The Infectious Diseases Society of America recommends 2 weeks of antibiotic therapy for uncomplicated S aureus bacteremia for the general population. However, the National Comprehensive Cancer Network recommends at least 4 weeks of therapy for the treatment of S. aureus bacteremia in patients with febrile neutropenia and malignancy. There is a lack of studies assessing appropriate duration of antibiotic therapy in this at-risk population. Thus, the primary objective of this study is to evaluate the impact of antibiotic duration on global clinical cure in patients with hematologic malignancy and S. aureus bacteremia. **Methods:** This is a multi-center, retrospective, propensity-matched cohort study conducted at the University of Michigan Health System and the University of Kentucky HealthCare. Patients with hematologic malignancies treated for less than 4 weeks for S. aureus bacteremia are compared to those treated for at least 4 weeks. The primary outcome is a composite for global clinical cure, defined as the absence of relapse infection, disease progression, and mortality within 60 days of diagnosis of index infection. Secondary outcomes include the individual components of the primary outcome, unplanned readmission, hospital length of stay, and vancomycin-induced nephrotoxicity. Descriptive statistics will be used for analysis. Additionally, multivariate logistic regression analysis will be used to explore independent predictors for global clinical cure. Site-specific data and conclusions from the University of Michigan Health System will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the epidemiology of S. aureus bacteremia in patients with hematologic malignancies.

Explain the current IDSA and NCCN recommendations and supporting evidence for the duration of treatment for S. aureus bacteremia.

Self Assessment Questions:

Which of the following is NOT a known risk factor for bacteremia in patients with hematologic malignancies?

- A: Long-term central venous catheter
- B: Increased use of implanted prostheses
- C: Neutropenia
- D: Mucositis

Which of the following is true regarding IDSA and NCCN guideline recommendations for the treatment of S. aureus bacteremia?

- A: IDSA guidelines recommend 2 weeks of antibiotic therapy for uncomplicated
- B: IDSA guidelines recommend daptomycin as preferred therapy, while NCCN
- C: Both the IDSA and NCCN guidelines recommend 2 weeks of antibiotic therapy
- D: Both the IDSA and NCCN guidelines cite high quality evidence supporting 4 weeks of antibiotic therapy

Q1 Answer: B Q2 Answer: A

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EVALUATION OF A WEIGHT AND INDICATION-BASED HEPARIN PROTOCOL

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Background: A previous non-indication based heparin protocol found that not all patients were achieving therapeutic goals. Upon evaluation, it was found that with increasing weight, the time to first therapeutic adjusted partial thromboplastin time (aPTT) increased, and time to two consistently therapeutic aPTT was greater than 40 hours. The American College of Chest Physicians recommends indication and weight-based heparin dosing along with weight-based infusion rate adjustments to decrease mortality by achieving therapeutic aPTT within 24 hours. The protocol was revised to reflect these recommendations. **Purpose:** The primary objective is to evaluate the revised heparin protocol to determine the percentage of patients who achieve therapeutic aPTT within 24 hours and mean time to two consistently therapeutic aPTT. **Methods:** This single centered, observational, quality improvement study will be conducted after implementation of the revised heparin protocol. Adult patients who receive the revised heparin protocol for at least 48 hours, without a break in therapy of greater than 6 hours will be included. All data will be collected via the electronic medical record. Predefined secondary outcomes are number of dose adjustments needed to achieve a therapeutic aPTT and time with therapeutic aPTT within 48 hours. Weight and indication based subgroup analyses will be conducted. **Results and Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Select a guideline recommended heparin dosing regimen to match the indication

Identify limitations of a non-weight and indication-based heparin protocol based on efficacy data

Self Assessment Questions:

Which of the following matches the indication with the CHEST guideline recommendation for a heparin protocol?

- A Venous thromboembolism: 70 units/kg bolus followed by 15 units/kg
- B Acute coronary syndrome: 70 units/kg bolus followed by 15 units/kg
- C Acute coronary syndrome with fibrinolytic: 70 unit/kg bolus followed by 15 units/kg
- D Acute coronary syndrome: 80 units/kg bolus followed by 15 units/kg

Which of the following is TRUE regarding a non-weight and indication-based heparin protocol?

- A Fewer patients who weighed 70 – 100 kg reached therapeutic aPTT
- B Mean time to two consistently therapeutic aPTT was less than 24 hours
- C Patients who weighed greater than 100 kg had more time with a therapeutic aPTT
- D Fewer dose adjustments were required for patients who weighed greater than 100 kg

Q1 Answer: B Q2 Answer: A

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EVALUATION OF DRUG ALERTS TO OPTIMIZE CLINICAL DECISION SUPPORT FOR PHARMACISTS

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Purpose: Various clinical decision support systems (CDSS) have been implemented to assist healthcare professionals with therapeutic decisions and reductions in errors when ordering medications. Although built with the intention to provide additional layers of protection for patient safety, too many drug alerts can contribute to alert fatigue. As a result, this may cause important alerts to be ignored along with the clinically insignificant ones causing desensitization. Therefore, CDSS becomes a dynamic resource that must be continuously updated to adjust alerts to an appropriate sensitivity and specificity that minimizes medication errors. A review of commonly overridden drug alerts during pharmacist review upon order verification was performed to determine any modifications or changes that can be made in order to reduce alert fatigue. **Methods:** This is a quality improvement evaluation using retrospective data and did not require Institutional Review Board approval. Data was collected from the health system's electronic health record of all drug alerts fired during September 2017. The following drug alert types were reviewed: dose, drug-drug interaction, allergies, duplicate medication, duplicate therapy, lactation, and pregnancy. Filters were placed to allow review of drug alerts only shown to pharmacists upon order verification, and the top forty-five alerts in each category with at least an 80% override rate were included for consideration. The drug alerts with potential for modification or suppression were reviewed by a pharmacy task force and approved by relevant stakeholders. These recommendations were presented at the health system's Pharmacy and Therapeutics committee, and an evaluation of alert firing rate as well as override rate will be conducted post-implementation. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe drug alert fatigue

Identify opportunities to improve clinical decision support systems by reducing alert fatigue

Self Assessment Questions:

What is drug alert fatigue?

- A Whenever a drug has more than two associated alerts
- B Whenever a drug alert is incorrect
- C Desensitization to drug alerts after exposure to a large number of alerts
- D The computer is too slow to display drug alerts because it is overwhelmed

An appropriate method to effectively combat alert fatigue is to:

- A Ignore alerts because they can be overridden
- B Review and refine alerts with high firing and override rates
- C Ask your colleague to review your drug alerts toward the end of your shift
- D Turn off all alerts in your clinical decision support system

Q1 Answer: C Q2 Answer: B

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TIME TO ANTIMICROBIAL DE-ESCALATION AFTER IMPLEMENTATION OF CEREBROSPINAL FLUID POLYMERASE CHAIN REACTION

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Purpose: Last year, a cerebrospinal fluid (CSF) polymerase chain reaction (PCR) was implemented at this 457 bed facility which can detect 14 different pathogens known to cause meningitis and encephalitis, including bacteria, viruses, and yeast. This PCR is known as the meningitis/encephalitis (ME) panel. Until now, research regarding the rapid diagnostic ME panels has focused on the sensitivity and specificity of the results rather than the clinical impact. The goal of this study is to examine the clinical impact on de-escalation of inappropriate antimicrobials to provide concrete evidence of success in providing better patient care and quicker de-escalation of unnecessary antibiotics.

Methods: This is a single-center, retrospective cohort analysis with a primary objective focusing on time to de-escalation or discontinuation of inappropriate antimicrobials before and after implementation of the ME panel at this facility. Secondary outcomes include positive and negative predictive values between ME panel results and culture results as well as overall length of stay. The pre-implementation group, containing 84 patients, examines individuals who had a CSF culture done between 12/15/15 and 8/31/16. The post-implementation group, containing 88 patients, examines individuals who had an ME panel done between 10/1/2016-8/15/17. Other inclusion criteria included hospitalized patients that were started on empiric antimicrobial therapy for meningitis/encephalitis. Patients were excluded if they had infections in sites other than the central nervous system and if they did not have CSF cultures, analysis, or PCR results (post group only). This research project is IRB approved with full evaluation comparing pre and post-PCR results to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the common causative pathogens involved in meningitis/encephalitis and their role in selecting appropriate empiric therapies in certain patient populations

Recognize the potential impact of rapid diagnostic tests, such as the ME panel, on de-escalation/discontinuation of inappropriate antimicrobials

Self Assessment Questions:

Based on IDSA Practice Guidelines for the Management of Bacterial Meningitis, what empiric therapy is most appropriate for a 62-year-old female presenting with symptoms consistent with meningitis?

- A: Vancomycin + Ampicillin
- B: Vancomycin + Ceftriaxone
- C: Vancomycin + Ceftriaxone + Ampicillin
- D: Ampicillin + Gentamicin

The meningitis/encephalitis panel can test for which of the following?

- A: Bacteria
- B: Viruses
- C: Yeast
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-353-L01-P

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IMPROVING ONCOLOGY CLINIC THROUGHPUT AT AN ACADEMIC MEDICAL CENTER

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Purpose: Extensive wait times in outpatient cancer treatment centers can be a considerable source of dissatisfaction for patients and can lead to significant negative sequelae. The purpose of this study is to increase oncology chemotherapy clinic throughput at an academic medical center using two approaches: 1. redesign hazardous drug product preparation workflows to standardize turnaround time and increase efficiency and 2. work together with nursing and scheduling leadership to determine adjustments to patient scheduling practices and templates to better factor in nursing and pharmacy workload. **Methods:** A workgroup was established comprised of pharmacy managers, oncology pharmacists and oncology pharmacy technicians. Industrial engineering strategies, including an affinity diagram, interrelationship digraph and tree diagram were performed in order to identify factors, root causes and bottlenecks inhibiting efficient hazardous drug output as well as determine and prioritize strategies to mitigate these issues. Within the pharmacy hazardous sterile products area, workflows were redesigned based on workgroup recommendations. Data from bar code medication preparation technology was analyzed to establish standardized turnaround times. Standardized turnaround times were then applied to provide standards for pharmacist timing of medication orders. Pharmacy turnaround times and estimates of nursing workload were then embedded into patient scheduling templates to account for pharmacy and nursing workload in patient clinic visits. Additionally, a monitoring system was developed within the hazardous operation to provide transparency on hazardous drug throughput and pharmacist workload.

Results and Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Describe the benefits of application of industrial engineering tools to complex healthcare processes

Describe strategies that can be utilized to improve patient throughput in a chemotherapy infusion clinic

Self Assessment Questions:

1. Which of the following is a potential benefit of decreased patient wait times in a chemotherapy infusion clinic?

- A: Improved patient throughput
- B: Improved patient and nursing satisfaction
- C: Improved pharmacy-nursing relations
- D: All of the above

Application of select industrial engineering tools can provide the following information when analyzing issues with processes:

- A: Contributing factors
- B: Root causes
- C: Potential solutions to key issues
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-704-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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A RETROSPECTIVE COHORT STUDY ON LONG-ACTING INJECTABLE ANTIPSYCHOTICS AND THEIR EFFECTS ON READMISSION AND ADHERENCE RATES

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Purpose: At Southwest General, there are seven different long acting injectable (LAI) antipsychotics on formulary. Currently, medication adherence rates and 30-day readmission rates on oral antipsychotics and LAI antipsychotics are not collected for patients who are discharged from and readmitted to Oakview Behavioral Health Center. Therefore, a retrospective study was completed to determine if discharging patients on LAI antipsychotics increased medication adherence and decreased readmission rates. **Methods:** This study was approved by the University Hospitals' Institutional Review Board. Data was collected for patients diagnosed with schizophrenia, bipolar disorder, or schizoaffective disorder and discharged from Oakview Behavioral Health Center between January 1st, 2016 and June 30th, 2017. The patient's chart was reviewed to see how many readmissions to Oakview Behavioral Health Center occurred 90 days prior to the start of the injectable and 90 days after the initiation of the injectable. The number of patients who returned to Oakview Behavioral Health Center for follow up LAI antipsychotic injections was determined. LAI antipsychotic adherence was verified through external refill history and/or follow-up in physician's office, which can be seen through Cerner (electronic medical records). Oral antipsychotic adherence was also verified through external refill history. **Results/Conclusion:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the difference between schizophrenia, schizoaffective, and bipolar disorder.

Recognize the various long acting injectable antipsychotics and dosing regimens associated with them.

Self Assessment Questions:

Which of the following symptoms are associated with schizophrenia?

- A Hallucinations, mania, depression
- B: Flat affect, hallucinations, depression
- C: Thought disorders, mania, hallucinations
- D: Hallucinations, flat affect, thought disorders

Which of the following long-acting injectable antipsychotics does require co-administration of an oral dose during the initial start of the injection?

- A Olanzapine
- B Paliperidone (1 month)
- C Paliperidone (3 month)
- D Risperidone

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-354-L01-P

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

IMPACT OF NOCTURNAL ANTIPSYCHOTIC DOSAGE STRATEGIES ON DURATION OF DELIRIUM TREATMENT IN CRITICALLY ILL PATIENTS

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Purpose: Delirium in the intensive care unit (ICU) is recognized as a serious complication and is associated with increased mortality, prolonged hospital length of stay, long-term cognitive impairment, and substantial healthcare costs. Current guidelines do not provide strong recommendations for or against antipsychotic use in managing delirium. The existing literature evaluating atypical antipsychotic use has great variability in dosing and titration schedules. With no general consensus in guiding therapy, it is difficult to recommend an optimal dosing strategy for these agents. The objective of this study is to compare antipsychotic nocturnal and even daily dosing strategies on duration of delirium treatment. **Methods:** This study was a retrospective chart review approved by the Institutional Review Board. Charts were reviewed for patients admitted to four critical care units at a tertiary community medical center between June 2015 and June 2017. All patients were eligible for inclusion if they were greater than 18 years of age and were initiated on an antipsychotic during their ICU stay. Patients were stratified into two groups for comparison based on the antipsychotic dosage regimen received: nocturnal or even daily dosing strategies. The primary outcome was to determine the duration of delirium treatment among patients managed with a nocturnal dosing strategy as compared to those on an even daily dosing strategy. Additional outcomes included the average ICU and hospital length of stay, duration of mechanical ventilation following first dose of antipsychotic, and incidence of resolution of delirium with antipsychotics. Data points will be extracted from the electronic medical record and compared between the two dosing strategy groups. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe guideline recommendations for the treatment of delirium in the ICU

Identify possible treatment options for delirium and appropriate monitoring parameters

Self Assessment Questions:

Which of the following is recommended for treatment of delirium in the intensive care unit?

- A Haloperidol
- B: Quetiapine
- C: Midazolam
- D: Early mobilization

Which of the following is an adverse effect associated with the use of atypical antipsychotics?

- A Ototoxicity
- B Hypothermia
- C QTc interval prolongation
- D Xerostomia

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-355-L01-P

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

CARBAPENEMS VERSUS ALTERNATIVE ANTIBIOTICS FOR INFECTIONS CAUSED BY ORGANISMS WITH INDUCIBLE AMPC BETA-LACTAMASES

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Purpose: Several gram-negative organisms can develop resistance to beta-lactam antibiotics through inducible AmpC beta-lactamase production. AmpC beta-lactamases are chromosomal encoded enzymes that can hydrolyze penicillins, cephalosporins, and monobactams. Organisms carrying genes encoding for AmpC beta-lactamases are often referred to using the acronym "SPACE," which includes *Serratia*, *Pseudomonas* or *Providencia*, indole-positive *Proteus*, *Acinetobacter*, *Citrobacter*, and *Enterobacter*. Antibiotic exposure, especially to extended-spectrum cephalosporins, has been shown to select for organisms that constitutively produce AmpC beta-lactamases. High level expression of AmpC beta-lactamase will usually demonstrate clinical resistance to all beta-lactams except carbapenems, and, in some organisms, cefepime. To avoid treatment failure, clinicians will often start empiric therapy with a carbapenem. However, some studies suggest that antibiotics such as cefepime or piperacillin-tazobactam may not be inferior to carbapenems. There continues to be a lack of definitive data regarding use of alternative antibiotics for treatment of infections caused by SPACE organisms, particularly species outside of *Enterobacter*. The objective of this study is to determine whether use of alternative antibiotics for bacteremia and/or pneumonia caused by AmpC beta-lactamase producing Enterobacteriaceae impacts clinical outcomes compared to carbapenems. **Methods:** This is a retrospective cohort study in which patients are divided into two groups: carbapenem vs. non-carbapenem therapy. Adults ≥ 18 years old admitted to Beaumont Legacy hospitals (Royal Oak, Grosse Pointe, Troy) from January 1, 2013 to January 1, 2017 with blood or respiratory cultures growing *Serratia marcescens*, *Citrobacter freundii*, or *Enterobacter* spp. are included. Patients with an untreated or inappropriately treated concomitant infection caused by other organisms or with antibiotic duration < 48 hours are excluded. The primary endpoint is 30-day mortality, with secondary endpoints being development of resistance or recurrence of infection within 3 months and treatment failure. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe challenges in treating infections caused by SPACE organisms
Discuss currently available literature regarding non-carbapenem therapy for infections caused by SPACE organisms

Self Assessment Questions:

Upon exposure of *Enterobacter* spp. to ceftriaxone, which of the following may occur?

- A: Decrease in production of AmpC beta-lactamase
- B: Selection of isolates with stable de-repression of ampC gene
- C: Selection of isolates with inducible ampC gene
- D: Decrease in production of extended-spectrum beta-lactamase

Which of the following are limitations of currently available literature on non-carbapenem therapy for infections caused by SPACE organisms?

- A: Retrospective, observational data
- B: Small sample size
- C: Focus on *Enterobacter* spp. and bacteremia
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-357-L01-P

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

EFFECTS OF A PHARMACIST DOUBLE CHECK OF HEPARIN INFUSION DOSE ADJUSTMENTS ON THE NUMBER OF RATE RELATED HEPARIN MEDICATION ERRORS IN A COMMUNITY HOSPITAL

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Purpose: The purpose of this study is to determine the medication safety impact of a recently implemented pharmacist double check process for heparin rate adjustments. The primary endpoints are to evaluate if pharmacist intervention at the time of heparin dose adjustments reduces the number of rate-related heparin medication errors, and to determine the severity of medication errors before and after the implementation of a standardized pharmacist double check process. Additional endpoints will be used to identify other factors that may lead to the occurrence of heparin medication errors. **Methods:** This study is a retrospective chart review that evaluated patients age 18 or older who were admitted to an inpatient medical unit at OhioHealth Marion General Hospital during the 15-month period of July 1, 2016 through September 30, 2017 and received a continuous heparin infusion. The study evaluated outcomes of patients during two time frames: July 1 – September 30, 2016 (before implementation of the standardized double check process) and July 1 – September 30, 2017 (after the standardized process was put into place). Patients in Group 1 (before implementation) were managed solely by nursing staff, and patients in Group 2 (after implementation) were monitored by both nursing staff and pharmacists. As part of the process, nursing calculated dose adjustments per OhioHealth policy and then called the pharmacist to independently verify the dose adjustment prior to making any changes to pump settings. The variables of interest during data collection were patient demographic information, the medical unit where the patient received heparin therapy, whether or not a dosing error occurred, the severity of the dosing error, and if the patient experienced any adverse events associated with the incorrect rate. Results and conclusions are in progress and will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize potential causes of heparin infusion dosing errors

Identify potential negative outcomes associated with heparin infusion dosing errors

Self Assessment Questions:

Which of the following is not a common contributing factor to heparin infusion dosing errors?

- A: Time constraints for nursing staff
- B: Calculation requirements for dose adjustments
- C: Manual pump programming
- D: IV pump/EMR interoperability

Which of the following is/are potential consequences of heparin infusion dosing errors?

- A: Prolonged hospitalization
- B: Increased cost of treatment
- C: Negative clinical outcomes
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-859-L05-P

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

IMPLEMENTATION OF REDUCED DOSE ALTEPLASE FOR CENTRAL VENOUS CATHETER CLEARANCE

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Purpose: In today's environment of capitated reimbursement coupled with rising drug costs, hospitals should investigate different strategies of cost savings and containment. Pharmacy accounts for 10-20% of the total hospital budget with drug and operational costs increasing annually. Pharmacy leadership should continuously balance benefits and costs of medications without compromising clinical outcomes. Utilizing reduced dose alteplase for central venous catheter (CVC) clearance is one cost savings initiative. This study aims to evaluate current literature on reduced dose alteplase to restore clearance to CVCs. The goal is to implement this reduced dose alteplase at this institution. Methods: A literature review utilizing reduced dose alteplase for restoration of CVCs from 2000 onward will be performed. Studies determining the efficacy of doses lower than conventional 2mg per 2ml dose will be included and evaluated for the following criteria: dose preparation and storage, dose escalation procedures, and percentage of successful restoration of catheter clearance after the first dose. A retrospective electronic medical record review of alteplase 2mg per 2ml doses from October 2016 to September 2017 will be conducted. Data collected will include the total number of doses administered during the study period with focus on patients requiring greater than a single dose for non-patent CVCs. All alteplase orders will be reviewed to assess documentation and success of catheter patency. A presentation to the Pharmacy and Therapeutics Committee will include a hospital specific practice change based on literature review and this study. Implementation will involve training of pharmacy personnel in preparation and storage of doses, nursing and medical staff education of dose escalation guidelines, and education of CVC management. Results: In progress. Conclusion: In progress.

Learning Objectives:

Describe challenges encountered during the implementation of reduced dose alteplase for central venous catheter clearance.

Explain important factors involved in alteplase dosing for central venous catheter clearance.

Self Assessment Questions:

Which of the following are challenges encountered during the implementation of reduced dose alteplase for central venous catheter clearance?

- A: Multiple protocols in different departments
- B: Clean room considerations for preparation of reduced dose alteplase
- C: Considerations for refrigerator and/or freezer stability
- D: A, B, and C

What factors are important to consider when dosing alteplase for central venous catheter clearance?

- A: Repeating a dose after the first 4mg
- B: Dwell time
- C: Intraluminal volume
- D: B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-705-L04-P

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

EVALUATION OF PHARMACY TECHNICIAN OBTAINED MEDICATION HISTORIES

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Purpose: There are opportunities for medication errors during transitions between inpatient and outpatient settings. Adequately trained pharmacy technicians have been shown to effectively document the best possible medication history. At our institution, medication reconciliation technicians (MRTs) are actively involved in interviewing patients and updating the electronic health record (EHR) with the most up-to-date medication histories. The purpose of this study is to evaluate the quality of the MRT program by assessing the accuracy and completeness of MRT-obtained medication histories. Our goal is to promote overall MRT competency and development. Methods: This study was approved by the Institutional Review Board at Franciscan Health Hammond. Patients will be included if they are 18 years of age or older and had a medication history obtained by a MRT at Franciscan Health Hammond or Dyer between August 1, 2017 and June 30, 2018. Patients admitted to the psychiatric unit will be excluded. Patients will be arbitrarily selected to have a second medication history collected by a pharmacist within 24-hours of the first interview. The following data will be collected: patient demographics, medication history obtained by a MRT, medication history collected by a pharmacist, source of each medication history, number and type of interventions made due to errors or omissions, and number and type of errors occurring during the admission reconciliation due to incomplete or inaccurate histories. Errors will be assigned a National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) category based on severity of outcome. Based on the results, opportunities for additional MRT education will be identified. A QA tool is being developed for continuous monitoring and improvement. Results/Conclusion: Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the rationale for utilizing pharmacy technicians to complete medication histories

Identify common pharmacist interventions made in medication histories completed by MRTs

Self Assessment Questions:

Which of the following describes the rationale for utilizing pharmacy technicians to complete medication histories?

- A: Published literature does not support role of pharmacy technicians
- B: Pharmacy technicians are the only members on the healthcare team
- C: Pharmacy technicians can effectively document the best possible medication history
- D: Pharmacy technicians can replace pharmacists to oversee medication reconciliation

What type of medications showed highest medication error rates in medication histories completed by MRTs?

- A: Over-the-counter medications
- B: Anti-hypertensives
- C: Antibiotics
- D: Anti-glycemic agents

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-860-L05-P

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

MEASURING CLINICAL AND ECONOMIC OUTCOMES IN A COMMUNITY PHARMACY HYPERTENSION MANAGEMENT PROGRAM

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Purpose: The purpose of this study is to demonstrate improvement in blood pressure control and medication adherence in patients with hypertension through a pharmacist-led hypertension management program that is economically sustainable in a large chain retail pharmacy setting. **Methods:** This prospective cohort study involves a pharmacist providing monthly counseling sessions lasting approximately 20-30 minutes over the phone or face-to-face. On the initial visit, pharmacists perform interventions intended to help improve blood pressure control through medication counseling, adherence counseling, and hypertension disease state education. On the first follow up visit, patients are counseled, given a home blood pressure monitor, and instructed on its use. The primary outcome is the difference in hypertensive patients' systolic and diastolic blood pressures pre-and post-management program. Secondary outcomes include the proportion of patients achieving their goal blood pressure post-program, improvement in patient-reported medication adherence, and proportion of patients receiving miscellaneous pharmacist interventions (immunization, MTM, etc.). A paired student's t-test will be used to analyze the primary outcome and to analyze adherence. Descriptive statistics will be used to analyze other secondary outcomes. **Preliminary Results:** Seventeen patients were enrolled in the study and completed their initial visit. Data collection is ongoing, with 5 patients having completed the study. Preliminary results for the primary outcome show an average decrease in systolic blood pressure of 5.1 mmHg and an average decrease in diastolic blood pressure of 2.5 mmHg after completion of the program. Results for the secondary outcomes will be evaluated after data collection is completed.

Conclusions: Preliminary results suggest a pharmacist-led hypertension management program in a large chain retail pharmacy setting can help improve patient blood pressure control.

Learning Objectives:

Recognize the differences in blood pressure goals between the 2014 Eighth Joint National Committee (JNC8) guideline and the 2017 ACC/AHA Hypertension Guideline

Identify ways community pharmacists can help patients with hypertension management

Self Assessment Questions:

What is the blood pressure goal recommended by the 2017 ACC/AHA Hypertension Guideline?

- A: Less than 130/80 mmHg
- B: Less than 140/80 mmHg
- C: Less than 140/90 mmHg
- D: Less than 150/90 mmHg

Which of the following is a way community pharmacists can help patients manage their hypertension?

- A: Encourage patients to be adherent to their blood pressure medication
- B: Counsel patients about blood pressure goals
- C: Educate patients on how to monitor their blood pressure
- D: All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-358-L01-P

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

IMPLEMENTATION OF OSTEOPOROSIS SCREENING SERVICES FOR WOMEN AT AN OUTPATIENT PHARMACY WITHIN A HEALTH SYSTEM

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Purpose: The National Osteoporosis Foundation reports that 10 million people are living in the United States with osteoporosis and nearly 80% are female. An additional 44 million people in the US have low bone mineral density (BMD), and it is probable that no intervention will be initiated until a fracture occurs. This screening service will increase patient awareness, allow collaboration among healthcare providers within the health system, and connect patients to receive proper preventative treatment before a fracture occurs. **Methods:** Patients will be included if they are women receiving care within the health system and > 65 years old or between 40 and 65 years old with at least 1 clinical risk factor. Women will be excluded if they are currently receiving treatment for osteoporosis or if they received a BMD order within the past 2 years. The community pharmacy resident will administer the FRAX risk assessment tool and facilitate the osteoporosis screening to patients using the Hologic Sahara Bone Sonometer, a validated qualitative ultrasound device of the calcaneus. Estimated BMD, corresponding T-score result, FRAX score, and bone health education will be discussed with each patient. If the results warrant further diagnostic testing, an electronic message will be delivered to the patient's physician via the health system's electronic medical record. The primary outcome is successful identification of patients indicated for intervention follow-up with their physicians, evidenced by order for a DXA scan or new prescription for osteoporosis medication within 3 months of screening. Secondary outcomes include patient perception of awareness and understanding of osteoporosis as well as likelihood and initiation of lifestyle modifications and/or supplementation through administration of a post-screening survey. **Results/Conclusions:** Pending data collection. These results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify women who are indicated for osteoporosis screening based on age and/or presence of clinical risk factor(s).

Recognize lifestyle modifications that may improve bone health.

Self Assessment Questions:

Which of the following is a clinical risk factor for osteoporosis in women?

- A: Mental illness
- B: Systolic heart failure
- C: Type 2 diabetes mellitus
- D: Age of 65 years or older

Which of the following lifestyle modifications can improve bone health?

- A: Annual influenza vaccination
- B: Calcium and/or vitamin D supplementation
- C: Regular sleep schedule
- D: Restriction of sodium intake < 2 grams per day

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-359-L01-P

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

EFFECTIVENESS OF A PHARMACIST-LED PRIMARY CARE SERVICE IN PATIENTS WITH UNCONTROLLED DIABETES THROUGH UTILIZATION OF POPULATION HEALTH DATA ANALYTICS

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Diabetes is a major cause of cardiovascular disease among adults in the United States and is associated with high healthcare costs. Hemoglobin A1c (A1c) is an average blood glucose over 8-12 weeks and is a strong predictor of diabetes complications. Complications can be prevented and averted by taking patients from poor control (A1c > 9) to good control (A1c < 8). Through Henry Ford Health System's population health data analytics, over 6,000 patients have been identified with an A1c > 9% leading to unnecessary complications and high healthcare expenditures. Research has demonstrated the ability of pharmacists' interventions to reduce mean A1c and cardiovascular risk factors in adults with diabetes as compared with standard care. However, the utilization of population health data analytics to target high risk patients has not been rigorously evaluated. This study aimed to demonstrate the clinical and economic impact of ambulatory pharmacists' interventions on patients with uncontrolled diabetes through utilization of population health data analytics. This was a quasi-experimental study conducted at Henry Ford Health System (HFHS) outpatient family medicine clinics. The study population was identified by a population health data analytic tool and included primary care patients who were at least 18 years of age with a diagnosis of type 2 diabetes and an A1c > 8% who were already managed by a family medicine clinic provider within HFHS. The identified patients were enrolled into a pharmacists'-led primary care service. Mean change in A1c, cardiovascular risk-reduction variables, rate of hospitalizations, and rate of pharmacists' intervention were compared between pre-pharmacists' interventions (August 2017-August 2018) and post-pharmacists' interventions (August 2017 – August 2018). Continuous data will be analyzed using Mann-Whitney U-tests or T-tests. Categorical data will be analyzed using Chi-squared tests or Fischer's exact tests. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify glycemic targets and cardiovascular risk factors in patients with type 2 diabetes mellitus
Review standard of care for patients with type 2 diabetes mellitus

Self Assessment Questions:

Which of the following statements is true?

- A A1c reflects glycemic variability and hypoglycemia over the previous 3 months
- B: Aspirin is not recommended for atherosclerotic cardiovascular disease
- C: A1c < 7% is associated with reduced microvascular complications
- D: Hypertension and dyslipidemia are not risk factors for atherosclerosis

What referral should be made in diabetic patients for initial care management?

- A Cardiologist for cardiovascular disease management
- B Eye care professional for annual dilated eye exam
- C Dentist for comprehensive dental and periodontal examination
- D Both B and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-360-L01-P

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

EVALUATION OF NON-HEPARIN ANTICOAGULANT USE IN PATIENTS WITH SUSPECTED HEPARIN-INDUCED THROMBOCYTOPENIA (HIT)

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Purpose: Utilizing the 4T score to guide laboratory testing and prescribing of non-heparin anticoagulants for patient with suspected HIT presents an opportunity for clinical improvement that could have a substantial economic impact within our institution. The purpose of this study is to evaluate laboratory testing and non-heparin anticoagulant prescribing in this population, and identify gaps in diagnosis and treatment of HIT. Methods: This is a retrospective, single-center cohort of 130 patients ≥ 18 years of age initiated on continuous infusion argatroban or subcutaneous fondaparinux for suspicion of HIT between June 1, 2016 through June 1, 2017. The electronic medical record was used to collect age, type of heparin exposure, criteria for calculating 4T score, type and frequency of laboratory HIT testing conducted, results of laboratory HIT testing, time to discontinuation of non-heparin anticoagulants, and bleeding events. The primary objective of this study is to evaluate prescribing of non-heparin anticoagulants in patients at low risk of developing HIT based on 4T score. The secondary objectives are to evaluate appropriateness of HIT testing with respect to the 4T score, evaluate total duration of non-heparin anticoagulants, and assess time to discontinuation of non-heparin anticoagulation following negative laboratory results. Summary/Conclusions: Summary and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the 4 factors that make up the 4T score and understand how to assess each factor.

Identify proper diagnosis and treatment for HIT based on calculated 4T score.

Self Assessment Questions:

Which of the following factors does not impact on the 4T score?

- A timing of platelet decrease
- B: degree of thrombocytopenia
- C: type of heparin exposure
- D: presence of other causes of thrombocytopenia

Select the best course of therapy for a patient with a 4T score of 6?

- A Wait for laboratory testing to prove HIT prior to transitioning to non-heparin anticoagulant
- B Assume HIT, transition to a non-heparin anticoagulant, and do not order laboratory testing
- C Continue heparin as prescribed and do not order laboratory testing
- D Transition to a non-heparin anticoagulant while awaiting laboratory results

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-362-L01-P

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

EVALUATION OF A PHARMACIST-MANAGED INPATIENT WARFARIN PROTOCOL

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Purpose: Warfarin has significant interpatient variability, numerous drug and food interactions, and a narrow therapeutic index requiring close monitoring via an international normalized ratio (INR). Thrombotic and hemorrhagic adverse events due to poorly managed warfarin can have serious and even fatal implications for patients. Joint Commission Hospital National Patient Safety Goal 03.05.01 describes reducing the risk of patient harm associated with anticoagulant therapy through the use of an approved protocol for the initiation and maintenance of anticoagulant therapy. An automatic pharmacist-managed inpatient warfarin protocol was implemented in June 2013 at Community Health Network (CHNw). A follow-up study had not been completed to evaluate the protocol since shortly after its initiation. The primary objective of this study was to evaluate the safety and efficacy of an inpatient pharmacist-managed warfarin protocol compared to physician-managed warfarin. **Methods:** A retrospective chart review was completed to evaluate outcomes of patients newly initiated on warfarin at four hospitals within CHNw between August 22, 2012 to June 23, 2013 before protocol implementation and July 1, 2016 to June 30, 2017 after protocol implementation. Patients were excluded if they were a protected population, had an international normalized ratio (INR) goal other than 2.5, 2-3, or 2.5-3.5, on warfarin prior to admission, on warfarin for an orthopedic indication, managed by a pharmacist prior to the automatic protocol, did not follow-up with a network-affiliated anticoagulation clinic within one week, or received less than four doses of warfarin during admission. The primary endpoint compared the average time to therapeutic INR of pharmacist and physician-managed inpatient warfarin. Secondary endpoints compared out of range INR values, INR values at the first outpatient follow-up appointment, and incidence of bleeding and thrombotic events throughout the admission and 30 days post-discharge. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the variety of roles pharmacists can have in warfarin management.

Discuss differences in safety and efficacy of pharmacist-managed compared to physician-managed warfarin.

Self Assessment Questions:

Which of the following are common roles for pharmacists in warfarin management?

- A: Dosing per protocol
- B: Medication administration
- C: Patient education
- D: A and C

Studies have shown which of the following outcomes when pharmacists manage warfarin in various healthcare settings?

- A: Decreased job satisfaction
- B: Decreased percentage of out of range INR values
- C: Increased length of stay
- D: Increased time to therapeutic INR

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-361-L01-P

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

EVALUATING SECONDARY FRACTURE PREVENTION AT EDWARD HINES, JR. VA HOSPITAL

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Purpose: Fragility fractures are often the first opportunity to treat osteoporosis. Without proper follow-up and secondary prevention strategies, low-energy fractures are strongly associated with an increased risk of future fractures, mortality, and a reduction in quality of life. Evidence suggests less than 24 percent of Veterans receive appropriate treatment and/or evaluation for osteoporosis within six months of index fractures. With the aim of reducing gaps in care, the purpose of this quality improvement initiative is to serve as preliminary data to evaluate the need for and justify the establishment of a pilot Fracture Liaison Service (FLS) at Edward Hines, Jr. VA Hospital. **Methods:** A Veterans Integrated Service Network (VISN) database will be used to identify Veterans who are greater than 50 years old, not currently on treatment for osteoporosis, but have a prior history of a hip, pelvic, or femur fragility fracture. An in-depth analysis of each Veteran will be conducted and individualized therapy recommendations will be presented to their primary care providers. The primary endpoint of this project is the number of patients started on treatment for osteoporosis. A retrospective, electronic chart review will be performed to determine if patients are candidates for osteoporosis treatment and recommendations will be made for the initiation of oral bisphosphonate therapy as clinically appropriate. Secondary endpoints to be analyzed include the number of patients started on calcium and/or vitamin D supplements, the total number of pertinent labs ordered/performed, and the number of patients counseled on new bisphosphonate therapy. Recommendations made which were not implemented will be monitored in an effort to evaluate and optimize future communication strategies. **Results/Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall the National Osteoporosis Foundation recommendations for when to consider initiation of osteoporosis therapy based upon age and fragility fracture history.

Identify the National Osteoporosis Foundation recommendations for when to treat osteoporosis based upon an individual's FRAX score.

Self Assessment Questions:

According to the NOF Clinicians Guide to Prevention and Treatment of Osteoporosis, which of the following patients should be treated for osteoporosis with a bisphosphonate?

- A: All patients with low bone mineral density
- B: Men < 50 years old who have sustained a hip or vertebral fracture
- C: Men > 50 years old who have sustained a hip or vertebral fracture
- D: Men > 50 years old who have sustained a hip or vertebral fracture

According to the NOF Clinicians Guide to Prevention and Treatment of Osteoporosis, the treatment of osteoporosis is recommended for individuals with a 10-year absolute risk for major osteoporotic frac

- A: $\geq 20\%$ major osteoporotic fracture risk or $\geq 3\%$ hip fracture risk
- B: $\geq 15\%$ major osteoporotic fracture risk or $\geq 2.5\%$ hip fracture risk
- C: $\geq 10\%$ major osteoporotic fracture risk or $\geq 2\%$ hip fracture risk
- D: $\geq 5\%$ major osteoporotic fracture risk or $\geq 1.5\%$ hip fracture risk

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-363-L01-P

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

IMPLEMENTATION OF A PHARMACY-DRIVEN PROCALCITONIN PROTOCOL AT A COMMUNITY HOSPITAL

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Purpose: Procalcitonin is an amino acid precursor that is released as an acute-phase reactant during the inflammatory process. The use of procalcitonin as a predictive biomarker for bacterial infection is emerging as a tool to determine appropriateness of antibiotic therapy and assist with discontinuation. It has primarily been studied in the setting of sepsis and pneumonia. Some medical centers have implemented procalcitonin protocols, and studies have shown a decrease in overall antibiotic duration for these patients. This study will evaluate patient outcomes following implementation of a pharmacy-driven procalcitonin protocol to assist in early antibiotic de-escalation and discontinuation. **Methods:** Patients admitted to the medical intensive care unit, progressive care unit, surgical/trauma intensive care unit and cardiac intensive care unit were eligible for inclusion. Patients were targeted for protocol-based recommendations by the pharmacist if they had a diagnosis of pneumonia, sepsis or septic shock and a consult for pharmacy to dose antibiotics. All clinical pharmacists in these areas were educated on the procalcitonin protocol prior to implementation. The control group was composed of matched patients that were analyzed following the availability of a procalcitonin assay, prior to implementing the pharmacy-driven protocol. Patients were matched on diagnosis, age and simplified acute physiology score (SAPS II). The primary outcome measure was length of antibiotic therapy. Secondary outcome measures include length of hospital stay, length of ICU stay and occurrence of Clostridium difficile between the two study groups. **Results & Conclusions:** Data analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

List the disease states procalcitonin use has been most widely studied in and has shown benefit in guiding treatment

Describe the impact that can result from having pharmacy involved in assessing procalcitonin levels and making recommendations for early de-escalation or discontinuation

Self Assessment Questions:

The use of procalcitonin as a predictive biomarker has most extensively been studied in which disease states?

- A: Bacteremia and upper respiratory tract infections
- B: Sepsis and lower respiratory tract infections
- C: Cellulitis and sepsis
- D: Meningitis and UTI

Which of the following could result from using procalcitonin levels to assist in guiding antibiotic therapy?

- A: Increased cost
- B: Decreased need for physician monitoring of microbiology cultures
- C: Increased ICU length of stay
- D: Decreased length of antibiotic therapy

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-364-L01-P

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

IMPACT OF THE UIC ON-CALL PROGRAM ON PGY1 PHARMACY RESIDENCY ALUMNI

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Pharmacy residency programs provide practical training for residents and help them develop into their role as clinical pharmacists. On-call programs are innovative learning opportunities within pharmacy residencies to assist residents in fostering critical thinking skills, communication skills, and clinical autonomy. A 2011 national survey revealed only 26.5% of pharmacy residency programs had some type of on-call learning experience. Expansion, since this study, of clinical pharmacy practice and interprofessional collaboration have challenged pharmacy residency on-call programs to adapt. The objective of this study is to determine the educational and professional impact of the University of Illinois at Chicago (UIC) on-call program on PGY1 pharmacy residency alumni. This prospective, cross-sectional study consists of PGY1 pharmacy residency alumni who graduated between 2000 and 2017 and participated in the UIC on-call program during their residency year. This electronic, survey-based study will use Qualtrics® software where PGY1 pharmacy residency alumni will receive an email invitation to participate in the study followed by 2 reminder emails to non responders at weekly intervals. All survey responses, partial or complete, will be anonymous and included in analysis. The primary outcomes are the educational impact of the on-call program on pharmacotherapeutic knowledge, professional skills, and the value within residency training. The secondary outcomes are the professional impact of the on-call program on career trajectory and interprofessional outcomes. Qualitative results will be analyzed using grounded theory method where data collected is coded by theme and organized into categories. Quantitative results will be characterized using descriptive statistics. **Results:** Not Applicable **Conclusions:** Not Applicable

Learning Objectives:

Recognize how the change in clinical pharmacy practice can affect the structure of clinical pharmacy residency on-call programs.

Identify the educational and professional impact a pharmacy residency on-call program may have on PGY1 pharmacy residents.

Self Assessment Questions:

Which of the following statements is true?

- A: Previous studies showed that seventy-five percent of the consults/
- B: The on-call clinical pharmacist does not respond to emergency rec
- C: Implementing a 24-hour in-house on-call program can meet the ne
- D: The on-call clinical pharmacist only provides recommendations to

Which of the following factors may be impacted for a PGY1 pharmacy resident by participating in an in-house pharmacy on-call program?

- A: Communication skills
- B: Attitude toward other healthcare professions/specialties
- C: PGY2 residency interest
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-706-L04-P

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

TIME TO ANTIBIOTIC OPTIMIZATION AFTER POSITIVE BLOOD CULTURE RESULTS

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Optimization of antibiotics plays a significant role in antimicrobial stewardship. Timely streamlining of appropriate therapy is essential to optimizing antibiotics. De-escalation of therapy limits proliferation of multi-drug resistance, and escalation of therapy can adequately cover multi-drug resistant organisms. Proper antibiotic optimization can reduce antibiotic utilization, cost of therapy, incidence of adverse drug events and opportunistic infections, and improve patient safety. This study aims to identify time to antibiotic optimization after an isolate is identified from positive blood culture results and then identify focused interventions to reduce the time to antibiotic optimization as appropriate. Data was retrospectively collected by identifying patients with a positive blood culture, discovered via the Matrix Assisted Laser Desorption/Ionization Time of Flight (MALDI-TOF), who were empirically treated with antibiotics from January 1 to July 30, 2017 at Presence Saints Mary and Elizabeth Medical Center (PSMEMC). The time of a positive result to the time of appropriate modification to the antibiotic regimen will quantify the primary outcome. Secondary outcomes to be assessed include the impact of pharmacist interventions and the necessity to change antibiotic therapy after initial optimization. Secondary outcomes to be assessed include the impact of pharmacist interventions, an ID consult, physician service, and unit of admission on time to optimization, in addition to appropriateness of the intervention and the necessity to change antibiotic therapy after initial optimization. Preliminary results show that the time to antibiotic optimization is quicker when Infectious Diseases, a Teaching Service, or ICU admission is involved. Additionally, the majority of interventions after a positive blood culture, or lack thereof, were appropriate. The most common source of infection was the urinary tract. The MALDI-TOF aids in rapid and accurate identification of pathogens in the blood, which often leads to prompt and appropriate optimization of antibiotics.

Learning Objectives:

Explain the importance of the antimicrobial stewardship.
Discuss the benefits from timely antibiotic optimization.

Self Assessment Questions:

Which of the following is a reason why hospitals should perform antimicrobial stewardship to improve patient safety?

- A Hospitalization costs
- B: Drug costs
- C: Length of stay
- D: Drug resistance

Timely administration of appropriate antibiotics is essential because

- A Studies showed an increased hospital length of stay when there is
- B There is a higher mortality risk associated with a delay in appropriate
- C Appropriate antibiotics improve cost efficiency
- D Medicare will not pay for the hospitalization if there is a delay in ar

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-365-L01-P

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

DUAL ANTI-PSEUDOMONAL COVERAGE: THE ROLE AND UTILITY OF LEVOFLOXACIN

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In 2016, the United States Food and Drug Administration (FDA) approved a new warning on fluoroquinolones. This warning advises that fluoroquinolones be reserved for conditions in which there are no other options available due to their potentially permanent side effects. The objective of this study is to determine whether levofloxacin is providing additional benefit when used in combination for dual anti-pseudomonal coverage or potentially unnecessary exposure. The microbiology lab at Frankfort Regional Medical Center (FRMC), compiled a list of all *P. aeruginosa* specimens collected from August 2016 to August 2017. The antimicrobial susceptibilities for each specimen will be used to determine the in-vitro susceptibility for all specimens against *P. aeruginosa*. The percent in-vitro coverage against *P. aeruginosa* will then be calculated for levofloxacin, ciprofloxacin, piperacillin/tazobactam, tobramycin, meropenem and cefepime, in combination and as monotherapy. FRMC's most common regimen for double coverage of *P. aeruginosa* is piperacillin/tazobactam plus levofloxacin. Patient specific data along with the regimen's percent in-vitro coverage against *P. aeruginosa* will be used to determine if levofloxacin is the best agent to be used in combination with piperacillin/tazobactam for empiric dual anti-pseudomonal coverage or whether an alternative antimicrobial should be considered. Although analysis is ongoing, preliminary results suggest the addition of tobramycin to piperacillin/tazobactam increases coverage against *P. aeruginosa* to nearly 100% per FDA susceptibilities. Utilizing the CLSI susceptibilities, tobramycin in combination with piperacillin/tazobactam still provides the greatest coverage against *P. aeruginosa* at 96.6%. The most common regimen used at FRMC for empiric dual anti-pseudomonal coverage provides 91.7% coverage against *P. aeruginosa*. Based on the FDA susceptibility breakpoints, the addition of a fluoroquinolone does not significantly increase empiric coverage against *P. aeruginosa*, especially when considering the risks of fluoroquinolone administration. Meropenem and tobramycin should be

Learning Objectives:

Recognize when dual anti-pseudomonal treatment is recommended in the treatment of pneumonia
Identify the risks and benefits of using a fluoroquinolone for dual anti-pseudomonal coverage

Self Assessment Questions:

Which situation warrants the use of two anti-pseudomonal agents when empirically treating hospital-acquired pneumonia?

- A Patient's antimicrobial susceptibility test results are not available
- B: Patient history of cirrhosis and diabetes
- C: Patient received chemotherapy in the past 90 days
- D: Patient's white blood cell count >25,000 cells/mm³

Which of the following is a benefit of using levofloxacin as part of a dual anti-pseudomonal combination?

- A Limited side effects
- B No renal dose adjustment
- C Broad spectrum of activity
- D Low rates of resistance

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-366-L01-P

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

COMPARISON OF POSTOPERATIVE ACUTE KIDNEY INJURY IN PATIENTS WHOSE ANGIOTENSIN CONVERTING ENZYME INHIBITOR OR ANGIOTENSIN RECEPTOR BLOCKER WAS ADMINISTERED VERSUS HELD THE DAY OF SURGERY

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Purpose: Postoperative acute kidney injury (AKI) is a common complication of surgery and is associated with increased mortality, length of hospital stay, and health care costs. Studies evaluating the impact of angiotensin converting enzyme inhibitor (ACEi) or angiotensin receptor blocker (ARB) therapy on perioperative hypotension and subsequent AKI have shown conflicting outcomes. As a result, clear preoperative administration recommendations are lacking. The objective of this study was to compare the incidence of postoperative AKI in patients with glomerular filtration rate (GFR) less than 45 mL/min/1.73m² whose ACEi or ARB was administered versus held the day of surgery. **Methods:** Gundersen Health System's electronic medical record was used to identify patients for this retrospective review. Patients were divided into two groups: those whose ACEi or ARB was held the day of surgery and those whose ACEi or ARB was continued. Patients were included if they underwent an elective inpatient surgery at Gundersen Lutheran Medical Center, were 18 years or older, were prescribed an ACEi or ARB prior to surgery, received preoperative administration instructions regarding ACEi or ARB, had a baseline GFR less than 45 mL/min/1.73m² confirmed by serum creatinine (SCr) documented within six weeks prior to surgery, and postoperative SCr documented within 72 hours. Patients were excluded if they were pregnant or receiving dialysis prior to surgery. The primary endpoint was incidence of stage one AKI, defined as an increase in SCr by greater than or equal to 0.3 mg/dL or 1.5 times the patient's baseline SCr. Secondary endpoints included incidence of stage two AKI, defined as an increase in SCr 2.0 to 2.9 times baseline, and AKI requiring renal replacement therapy. **Results:** Data collection is ongoing. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify risk factors for postoperative acute kidney injury

Recognize stages of acute kidney injury based on KDIGO criteria

Self Assessment Questions:

Which of the following are risk factors for postoperative acute kidney injury?

- A: Blood loss
- B: Chronic kidney disease
- C: Perioperative hypotension
- D: All of the above

A patient's pre-surgery baseline SCr is 0.4 mg/dL. Labs obtained 24 hours postoperatively reveal SCr 0.6 mg/dL. Based on KDIGO criteria, which stage of acute kidney injury has occurred?

- A: No acute kidney injury has occurred
- B: Stage 1
- C: Stage 2
- D: Stage 3

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-861-L05-P

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

COMPARISON OF DIRECT ORAL ANTICOAGULANTS VERSUS WARFARIN FOR THE TREATMENT OF VENOUS THROMBOEMBOLISM IN OBESE AND HIGH BODY WEIGHT PATIENTS: A RETROSPECTIVE ANALYSIS

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Venous thromboembolism (VTE) is a significant cause of morbidity and mortality; however, data regarding the safety and efficacy of direct oral anticoagulants (DOACs) in the obese population is limited. The purpose of this retrospective chart review is to compare the rates of recurrent VTE and major bleeding amongst obese patients treated with a DOAC versus warfarin for an objectively confirmed VTE. Obese patients 18 – 89 years of age who underwent treatment for VTE with a DOAC (apixaban, dabigatran, edoxaban, or rivaroxaban) or warfarin at The Ohio State University Wexner Medical Center between January 1, 2013 and July 31, 2017 were included. Obesity was defined as a body mass index (BMI) ≥ 40 kg/m² or high body weight as ≥ 120 kg. Key exclusion criteria included VTE treated with thrombectomy or thrombolytic therapy; requirement for dual antiplatelet therapy; indication for treatment with a DOAC or warfarin other than VTE; a creatinine clearance < 30 mL/min or a serum creatinine ≥ 2.0 mg/dL; initiation of anticoagulation > 1 week following the diagnosis of VTE; the absence of ≥ 2 documented follow-up encounters; and a platelet count $< 50,000$ μ L⁻¹. Data was collected for 24 months from the date of the index VTE diagnosis and included baseline patient demographics, clinical characteristics and anticoagulation therapy, major bleeding, and clinically relevant non-major bleeding (CRNMB). The primary outcome was a composite of recurrent VTE and major bleeding. Secondary outcomes included each individual component of the primary outcome, CRNMB, and a composite of major bleeding and CRNMB. Univariate and multivariate logistic regression were used to identify associations between baseline demographics, clinical characteristics, and the primary composite outcome. Two-tailed statistical tests were utilized with a significance level set at $p < 0.05$. Data collection is ongoing and final results will be presented at the 33rd Annual Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define the rates of recurrent venous thromboembolism and major bleeding amongst obese and high body weight patients treated with a direct oral anticoagulant or warfarin for an objectively confirmed venous thromboembolism.

Relate study outcomes with the existing literature to guide clinical application and risk stratification of direct oral anticoagulants in obese and high body weight patients with venous thromboembolism.

Self Assessment Questions:

1. Which of the following statements regarding the use of direct oral anticoagulants in obese populations is correct?

- A: An open label, single dose study comparing the pharmacokinetics
- B: Pharmacokinetic data guiding the use of dabigatran and edoxaban
- C: Peak plasma concentrations and the area under the concentration
- D: None of the above are true.

2. Which of the following statements regarding current Scientific and Standardization Committee of the International Society on Thrombosis and Haemostasis guideline recommendations on the use of direct

- A: Based on pharmacokinetic data, apixaban should be administered
- B: Direct oral anticoagulants should be used for the treatment of VTE
- C: A drug-specific peak and trough anti-Xa level is recommended in p
- D: None of the above are true.

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-367-L01-P

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

EVALUATION OF ANTIMICROBIAL OVERUSE FOR THE PATIENT WITH PERCEIVED URINARY TRACT INFECTION AND ITS CLINICAL AND ECONOMIC IMPACT

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PURPOSE: The Infectious Disease Society of America (IDSA) guidelines do not recommend antimicrobial treatment or urine screening in the majority of asymptomatic adults. The clinical diagnosis of urinary tract infection (UTI) is made when a patient has symptoms of urinary tract infection and is supported by laboratory evidence. The main objective of this study is to describe the incidence of inappropriate use of antimicrobials for the treatment of perceived UTI according to IDSA guidelines. The clinical and economic impact of inappropriate antimicrobial use will be assessed as well as any potential factors leading to deviation from guideline recommendations. **METHODS:** This single-center, retrospective chart review evaluated patients admitted to our facility between September 1, 2016 and September 1, 2017. The electronic medical record was used to identify patients initiated on antimicrobials for the diagnosis of UTI. Patients with the following characteristics were excluded: urologic procedures, antimicrobials prior to admission, initiated on antimicrobials for other infectious source, severe sepsis/septic shock, neutropenic, encephalopathy, pyelonephritis or genitourinary anatomical abnormality, pregnant, intensive care unit, catheter present prior to admission. Provider documentation was reviewed to determine the incidence of inappropriate initiation and continuation of antimicrobials as well as inappropriate urine screening according to IDSA guidelines. The following data was then collected from patients identified as having inappropriate antimicrobial initiation or continuation: age, gender, documented UTI symptoms, residency prior to arrival, admission type, prescribing team/unit, antimicrobial agents for UTI, urinalysis and urine culture results, reported *Clostridium difficile* infection, reported adverse medication events, duration of antimicrobials total cost of inappropriate therapy including antimicrobials and laboratory tests. Data will be analyzed in SPSS v. 25.0 using descriptive statistics. **RESULTS/CONCLUSIONS:** Results and conclusions are pending and will be presented at the 2018 Great Lakes Pharmacy Resident Conference from April 24-27.

Learning Objectives:

Report the incidence of inappropriate antimicrobial treatment for urinary tract infections and identify any potential predictive patient factors leading to IDSA guideline deviation

Recognize the potential consequences of inappropriately screening for, and treating, urinary tract infections when treatment is not indicated

Self Assessment Questions:

Which of the following scenarios would warrant antimicrobial treatment for asymptomatic bacteriuria?

- A A 66 y/o male who was admitted for a fall
- B: A 26 y/o female who is 26 weeks pregnant
- C: A 71 y/o female growing *E. coli* on urine culture
- D: A 30 y/o female found to have a positive urinalysis

What is a consequence of screening for, and treating, urinary tract infections when not indicated?

- A Under-prescribing antibiotics
- B Less adverse drug events
- C Increased antimicrobial resistance
- D Decreased costs for the patient

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-368-L01-P

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

EVALUATION OF THE T2 BIOSYSTEMS'S MAGNETIC RESONANCE TECHNOLOGY FOR RAPID DETECTION OF CANDIDEMIA

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Purpose: *Candida* species account for the majority of fungal-mediated bloodstream infections. Candidemia is the fourth leading cause of hospital-acquired bloodstream infections and has a high associated mortality. Automated blood cultures require up to six days to finalize and are not sensitive for invasive candidiasis. A recently developed nanodiagnostic method using magnetic resonance detects five species of *Candida* and has been reported to have a result time of three to five hours with high sensitivity and specificity. The purpose of this study was to evaluate effects of faster culture results on resource utilization and antimicrobial stewardship. **Methods:** This was a multi-center, prospective cohort study of patients receiving the rapid diagnostic assay for candidemia. Patients over the age of 18 receiving the assay between June 2017 and January 2018 were included. Exclusion criteria included: patients not receiving the assay within 72 hours of blood culture collection, fungemia caused by non-candida species, death before result time, and patients transitioning to comfort care before results available. The case group was compared to a control group with candidemia confirmed by automated blood culture. The primary endpoint was defined as time to appropriate antifungal therapy after result. Secondary endpoints included total length of stay, length of stay in intensive care unit, 30-day readmission for candidemia, and inpatient mortality. Chi-squared and student's t-tests were utilized for data analysis. **Results/Conclusion:** Full results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the challenges associated with detection of invasive candidiasis.

Discuss the effects faster detection of candidiasis has on patient outcomes.

Self Assessment Questions:

Blood cultures for invasive candidiasis are ___ sensitive for invasive candidiasis.

- A 30-40%
- B: 50-60%
- C: 70-80%
- D: 85-95%

The T2Candida panel is reported to have a result time of _____.

- A 30 minutes-1 hour
- B 3-5 hours
- C 8-10 hours
- D 14-18 hours

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-369-L01-P

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

ATTITUDES TOWARD NALOXONE IN A VETERANS AFFAIRS MEDICAL CENTER PATIENT POPULATION

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Purpose: Veterans receiving care within the Veterans Health Administration (VHA) have almost twice the rate of accidental overdose when compared with adults from the general United States population. Fatal overdose caused by opioids can be prevented with the use of the opioid receptor antagonist, naloxone. There are several studies examining provider attitudes toward prescribing naloxone, however, patient attitudes toward naloxone have not been studied as extensively, especially in the veteran population. Therefore, the objective of this study is to characterize attitudes toward naloxone based on patient-specific factors in veterans admitted to substance abuse treatment programs at the Lexington Veterans Affairs Medical Center (VAMC). This study aims to identify areas that may require more focus when providing overdose prevention education to these veterans. **Methods:** Veterans admitted to residential or outpatient substance abuse programs at the Lexington VAMC were offered participation in this prospective survey study. Participants were given a twenty-question survey addressing history of substance abuse, perceived level of social support, history of past experiences with naloxone, knowledge of opioid overdose prevention, and opinions regarding the prescribing of naloxone rescue kits to lay persons. Additional pertinent information was collected from the electronic medical record including demographic information (age, gender, race), active mental health diagnoses, active substance abuse diagnoses, history of hospital admission related to substance use disorders, and current or past prescriptions for treatment of substance use disorders. Responses collected from the surveys will be reported as ordinal data on a 5-point Likert Scale. Attitudes toward opioid overdose prevention and the use of naloxone will be characterized with descriptive statistics based on survey responses. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify risk factors for fatal overdose from opioids.
Review essential elements of education to provide to patients concerning opioid overdose prevention.

Self Assessment Questions:

Which of the following patients is at highest risk for a fatal overdose from opioids?

- A: A 52-year-old male with hypertension taking hydrocodone/acetaminophen
- B: A 34-year-old male recently discharged from an opioid detoxification program
- C: A 21-year-old female with a prescription for oxycodone/acetaminophen
- D: A 45-year-old female with a history of alcohol use disorder

Which of the following counseling points should be included when dispensing a prescription for naloxone?

- A: How to identify various opioid tablets
- B: Place the individual in a cold shower after naloxone administration
- C: Avoid calling 911 until all illicit substances have been cleared from the system
- D: Signs to look for when determining if someone is experiencing an overdose

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-707-L04-P

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

IMPACT OF EDUCATIONAL AND FEEDBACK INTERVENTIONS ON ANTIBIOTIC PRESCRIBING FOR ACUTE UPPER RESPIRATORY TRACT INFECTIONS (URIS) IN THE AMBULATORY CARE SETTING

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BACKGROUND Antimicrobial resistance among community-acquired bacterial infections has increased worldwide due in part to suboptimal use of antibiotics, particularly in the outpatient ambulatory setting. Acute upper respiratory tract infections (URIs) result in significant outpatient prescriptions and are targets for antimicrobial stewardship efforts given they are often of viral origin and may not require treatment with antibiotics. In 2016, the CDC published the Core Elements of Outpatient Antimicrobial Stewardship which highlighted the need for the implementation of effective antimicrobial stewardship interventions in the ambulatory setting. Additionally, some studies have suggested that certain behavioral interventions, including peer comparison, can result in lower rates of inappropriate antibiotic prescribing for URIs. The aim of this research is to evaluate the impact of ongoing quality assurance and education initiatives on the proportion of URIs treated with antibiotics within an ambulatory care setting at the University of Illinois Hospital & Health Sciences System. **METHODS** This is an ongoing, observational, quality assurance study designed to identify the proportion of antibiotics that are being prescribed for the treatment of URIs, specifically acute bronchitis, as well as influenza and unspecified viral infections, in an ambulatory setting before and after implementation of quality assurance and education initiatives at the patient and prescriber level. Quality assurance and education initiatives include educational posters and commitment letters in patient waiting areas and exam rooms, provider education, and periodic provider feedback regarding their prescribing patterns in comparison to their peers. The primary endpoint is the proportion of antibiotics prescribed for the treatment of acute bronchitis, influenza, and unspecified viral infection collectively. Secondary endpoints include proportion of antibiotics prescribed for the infections independently, as well as proportion of antibiotics prescribed for acute sinusitis and pharyngitis. **RESULTS AND CONCLUSION** Preliminary results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the goals of antimicrobial stewardship.
Discuss the impact of behavioral interventions on antibiotic prescribing for URIs.

Self Assessment Questions:

The goal of antimicrobial stewardship includes all of the following EXCEPT:

- A: Minimize toxicity and other adverse events
- B: Achieve suboptimal clinical outcomes
- C: Minimize toxicity and other adverse events
- D: Minimize antimicrobial resistance

This behavioral intervention in the study Effect of Behavioral Interventions on Inappropriate Antibiotic Prescribing Among Primary Care Practices continued to result in lower rates of inappropriate an

- A: Suggested alternatives
- B: Accountable justification
- C: Educational posters
- D: Peer comparison

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-370-L01-P

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

EFFECTIVENESS AND SAFETY OF AN ANTIMICROBIAL STEWARDSHIP INTERVENTION TO IMPROVE PRESCRIBING FOR COMMUNITY ACQUIRED PNEUMONIA: INITIAL DATA

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Purpose: Antimicrobial stewardship programs (ASPs) help prevent the development of multidrug-resistant organisms and reduce unnecessary drug use and costs associated with broad-spectrum therapies used to treat healthcare-associated infections. However, optimal ASP interventions for CAP remain poorly defined. The purpose of the study is to determine the impact of an ASP driven CAP algorithm with education and prospective intervention on CAP-specific prescribing and evaluate the relationship between the intervention and clinical outcomes of adult, non-critically ill, CAP patients. **Methods:** We conducted a quasi-experimental interventional study at an academic medical center. An interrupted time series comparing pre-intervention (January 1, 2014 - March 1, 2016) to post-intervention (July 1, 2017 - November 27, 2017) will be conducted to evaluate the efficacy of the intervention. The impact of the algorithm implementation on temporal changes in CAP-specific antimicrobial days of therapy, hospital length of stay, 30-day readmissions, hospital-onset CDI, and all-cause mortality will be quantified. Safety will be evaluated with a nested cohort. All adult inpatients who received at least one antibiotic dose for CAP are eligible except those with a positive *C. difficile* test within the past 90 days, cystic fibrosis, ICU admission, or expire within 48 hours of admission. Segmented regression analysis will be utilized to determine the change in temporal trends. Descriptive and univariate statistics will be calculated for the safety cohort. **Results:** In progress **Conclusions:** N/A

Learning Objectives:

Recognize patient factors that may increase risk of drug-resistant pathogens in community-acquired pneumonia
Describe the impact an antimicrobial stewardship intervention can have on antimicrobial use in patients with community-acquired pneumonia.

Self Assessment Questions:

Which of the following are patient factors that may increase risk of drug-resistant pathogens in community-acquired pneumonia?

- A History of coronary artery disease
- B: Hospitalization for > 2 days in the last 90 days
- C: Antibiotic use in the last 90 days
- D: B and C

Which of the following is a negative patient outcome of antibiotic overuse?

- A Decreased hospital length of stay
- B Increased risk of *Clostridium difficile* infection
- C Decreased risk of in-hospital mortality
- D Increased severity of illness scores

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-371-L01-P

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

THE IMPACT OF PHARMACIST LED ANTIMICROBIAL STEWARDSHIP ON CULTURE REVIEW OF DISCHARGED PATIENTS FROM A COMMUNITY HOSPITAL EMERGENCY DEPARTMENT.

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Purpose: The objective of this study is to determine the impact of pharmacist intervention in the review of cultures and sensitivities and subsequent adjustment of antibiotics for patients discharged from the emergency department (ED). The effect on the number of patients on appropriate therapy and the time to appropriate antibiotic recommendation will be compared to historical controls. **Methods:** A retrospective chart review will be conducted to determine historical data from October 1, 2016 to March 31, 2017, of patients discharged from the ED on antibiotics with positive cultures. For concurrent data collection, a process has been developed and implemented in which a pharmacist will obtain all finalized cultures for patients that have been discharged from the ED. The pharmacist will then evaluate the appropriateness of current therapy and, if current therapy is inappropriate for the culture results, will make recommendations to the ED physician. The pharmacist will document any accepted or declined recommendations in the electronic medical record. If the recommendation is accepted, the pharmacist may offer to verbally send a new prescription to the patient's pharmacy and to contact the patient in regards to the change of therapy. A chart review will be conducted from October 1, 2017 to March 31, 2018, for concurrent data. The historical and concurrent groups will be compared for several metrics including number of changes in therapy, number of inappropriate interventions, and time to intervention. Appropriateness of antibiotic therapy will be determined using microbiological susceptibilities, patient specific data and clinical guidelines relevant to the infection.

Learning Objectives:

Recognize the importance of antimicrobial stewardship programs in the emergency department
Identify potential benefits of pharmacist involvement in emergency department culture review

Self Assessment Questions:

Which of the following statements is correct? Antimicrobial stewardship programs:

- A Have no impact on microbial resistance rates
- B: Are required by CMS
- C: Have historically been well developed in Emergency Departments
- D: Are of declining importance

Pharmacist involvement in culture review has previously been shown to:

- A Increase readmission rates at 72 hours
- B Increase the rate of inappropriate revisions to antimicrobial regime
- C Decrease time to appropriate antibiotics
- D Decrease interventions in antibiotic therapy

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-708-L04-P

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

IMPROVING MEDICATION RECONCILIATION FOR PATIENTS ACROSS CARE TRANSITIONS: WHAT IS THE IMPACT?

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Purpose: The Improving Medication Reconciliation for Patients Across Care Transitions (IMPACT) Program was developed by pharmacists at St. Vincent in 2014 to help decrease medication discrepancies and hospital readmissions for high risk patients being discharged from the hospital. The program utilizes an internally developed trigger tool to identify high risk patients for referral to the IMPACT pharmacists. The pharmacist reviews patient documents, performs telephone evaluation if needed, develops a plan, and communicates interventions to the patient and/or provider. Since beginning the IMPACT Program, pharmacists' role in the ambulatory care setting have evolved and expanded. The objectives of this project were to describe the change in source of referral for the service as the role of the pharmacist in the outpatient setting has evolved, characterize the number and type of interventions, and evaluate 30 day readmission rates for appropriate patients.
Methods: This retrospective quality improvement study reviewed and compared adult patients referred to the program before and after re-promotion occurred in May 2016. Data collected and compared include age, sex, insurance status, disease states, number of medications, source of referral, number and type of interventions, time taken on interventions, if the patient or provider were contacted, and readmission information within 30 days from the day of discharge for appropriate patients. The results of this study will be used to determine the most common source of referral and to identify opportunities where the IMPACT service can be further promoted. Future plans include updating and distributing marketing materials to areas identified for service expansion. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the significance of medication errors and adverse drug events.
Identify outcomes of pharmacist involvement in medication reconciliation

Self Assessment Questions:

Which of the following is true?

- A Transitions of care do not include transferring inpatient floors or g
- B: Medication discrepancies are less common in patients with compli
- C: A majority of adverse events after discharge are medication relate
- D: Medication errors earn the US billions of dollars each year.

Pharmacist involvement in medication reconciliation has been shown to result in:

- A Less medication discrepancies identified
- B Higher rates of hospital readmissions
- C Reductions in emergency department visits
- D All of the above

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-862-L05-P

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

IDOC PORT: THE IMPACT OF DRUG COMPLEXITY ON PROSPECTIVE ORDER REVIEW TIME

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Purpose: Many patient care demands require the attention of a pharmacist and a substantial amount of pharmacist time is devoted to prospective order review and verification. Currently, there is no established evidence evaluating how much time could potentially be saved if standardized, low-risk orders were automatically verified, allowing the pharmacist to optimize their time to the most important patient-related activities. The study objective is to quantify the time required to verify medication orders and characterize pharmacist behaviors affiliated with order verification and information retrieval behavior. Reallocation of time could allow pharmacists to focus their efforts on more complex patient-related activities. Representation of the order verification process will illustrate how pharmacists review drug orders stratified into low to high complexity categories, while documenting the time utilized to complete the task at UMHS.
Methods: This study analyzes the order-review time of experienced pharmacists verifying medications in real-life environments. All experienced (>1 year of pharmacist experience and >6 months of University of Michigan or Epic experience) pharmacists verifying medication orders within a determined 30-day period at the adult, cardiovascular, and children's hospitals will be observed in the study. The pharmacists are monitored via Morae usability software but blinded to which computers are performing the data collection and retrieval. Complexity is prospectively defined by using a classification system including the degree of order variability, ISMP high-alert classification and a pharmacist perception survey. Statistical analysis will use a mixed model as there are correlations within each drug that can be captured.

Results/Conclusions: Results and conclusions will be presented at Great Lakes Conference.

Learning Objectives:

Explain the demands and workflow of a pharmacist when assessing patient and clinical information in all practice settings

Describe the rationale for developing a drug complexity criterion to prospectively stratify medication orders when examining pharmacist order review time

Self Assessment Questions:

What is the activity that is both a legal and regulatory practice standard mandated by ASHP, the Joint Commission and state boards of pharmacy that requires intentional examinations of the details of

- A Prospective order review
- B: Prior authorization
- C: Retrospective chart review
- D: None of the above

A pharmacist perception survey, the ISMP high-alert list for acute care settings and unique drug order sentence data was utilized to prospectively categorize selected drugs by:

- A Medication safety
- B Drug complexity
- C Order variability
- D All of the above

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-709-L04-P

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

PERCEPTIONS OF WORKPLACE CONTROL FOR CONTROLLED SUBSTANCES IN A COMMUNITY TEACHING HOSPITAL: AN ASSESSMENT FOR QUALITY IMPROVEMENT

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Purpose: It is vital that healthcare institutions identify their greatest risks for diversion, implement appropriate controls and effectively monitor for diversion. Current literature demonstrates a correlation between nursing perceptions of workplace control and the incidence of prescription misuse and abuse; this suggests that healthcare workers may be a valuable resource to identify risk for diversion. The purpose of this study is to assess associate perception of workplace control for controlled substances within procedural areas of a large community hospital and subsequently identify risk-points for diversion within the organization.

Methods: A failure mode and effects analysis (FMEA) was conducted in August 2017 with a multidisciplinary focus-group to identify processes at risk for diversion within hospital procedural areas during the dispensing phase of the medication-use process. The FMEA utilized frequency, severity and detectability ratings for discrete steps in the dispensing phase to stratify risk for diversion. A 14-item paper questionnaire was then developed for an extended cohort to assess overall understanding of diversion, perception of current diversion prevention strategies, incidence of diversion, and urgency to address risk-points as identified by the FMEA. The questionnaire includes both multiple-choice and open-ended questions. Eligible participants included hospital employees practicing in a procedural area as a RN, CNP, CRNA, MD or DO. A hospital procedural area was defined as an area that utilizes the hospital's electronic medical record to document the order, dispense, and administration of a medication simultaneously. The questionnaire was distributed to 299 eligible participants through unit managers and office administrators at team meetings in January 2018. Questionnaire results were collected for two weeks from distribution. Descriptive statistics will be used to summarize data. This study was determined exempt by the Ohio State University Institutional Review Board. **Results/Conclusion:** Data collection in process. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the ability of front-line associates to both identify and prevent controlled substance diversion within an institution.

Discuss approaches used at a community teaching hospital to facilitate open discussion regarding controlled substance management and gather front-line associate feedback.

Self Assessment Questions:

What resources are available to help pharmacy leaders identify areas of risk for controlled substance diversion?

- A ASHP Guidelines for Preventing Diversion of Controlled Substances
- B Automated reports for hospital usage patterns
- C Front-line associate expertise
- D All of the above should be used as a comprehensive effort to identify risk

The biggest barrier to assessing front-line associate perception of controlled substance risk-management is:

- A Limited knowledge regarding controlled substance diversion
- B Fear of retaliation
- C Time to round with front-line associates
- D There is no need to assess front-line associate perceptions

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-710-L04-P

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

OUTCOME ANALYSIS OF PHARMACIST INTERVENTIONS IN THE OUTPATIENT SETTING AT THE RICHARD L. ROUDEBUSH VA MEDICAL CENTER: A PROCESS IMPROVEMENT INITIATIVE

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Purpose: Medication interventions by pharmacists provide valuable input in the patient care process resulting in reduced medication errors, optimization of medication use, and reduced cost of therapy. A close-call project was conducted in May 2015 with 721 of 918 reports due to order entry errors (78.5%). This notes the importance of not only the clinical aspect of pharmacy in having the most optimal medication regimen, but also safety in preventing medication errors and related adverse events. The objective of this project is to review the number of interventions performed by outpatient pharmacists at the Richard L Roudebush VA Medical Center, classify the interventions, and address those that may be eliminated through process improvement activities.

Methods:

A list of patients with interventions made on their prescriptions from November 1 to November 30, 2016 was generated via electronic report. Inclusion criteria included orders modified via telephone, policy, or pharmacy rejection. Interventions were documented in an excel spreadsheet, evaluated in the electronic medical record, and classified by type. The list was sorted to determine the most frequently changed items and to determine if these interventions could be eliminated by process improvement activities. After implementing a process improvement, another data collection period was completed to compare intervention rates. **Preliminary Results:** From November 1 to November 30, 2016, there were 6087 interventions made by outpatient pharmacists. A variety of interventions were made including 407 interventions to prescription directions. Of these changes, 135 (33.2%) were for insulin orders. Initial results indicate opportunities for development of outpatient order sets similar to those used in the inpatient setting at our facility. Opportunities for improvement will be shared with pharmacy staff and prioritized by impact. Additional results will be presented at the Great Lakes Pharmacy Residency Conference. **Conclusions Reached:** Conclusions to be presented at Great Lakes Pharmacy Residency Conference

Learning Objectives:

Identify and classify the most common prescription interventions made by outpatient pharmacists at the Richard L Roudebush VA Medical Center.

Discuss methods used for process improvement of order entry to reduce errors and pharmacist workload.

Self Assessment Questions:

Which of the following is true of pharmacist interventions in the outpatient pharmacy?

- A All interventions must be documented per Standard of Practice in the outpatient setting
- B Interventions related to the discharge process are not managed by pharmacists
- C Many interventions are related to dose, directions, or drug interactions
- D Medication adjustments may be made based on renal function with pharmacist input

Which of the following is true of medication errors?

- A Reporting of errors is mandatory
- B They are costly and may lead to adverse drug events
- C They are not preventable with pharmacist interventions
- D The Iceberg Phenomenon related to medication errors refers only to preventable errors

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-863-L05-P

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

EFFECT OF PROCALCITONIN ON LENGTH OF ANTIMICROBIAL THERAPY IN MECHANICALLY VENTILATED ACUTE COPD AND HEART FAILURE EXACERBATION PATIENTS

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Background: Inappropriate and unnecessary use of antibiotics has led to an increase in multi-drug resistant organisms and adverse effects such as *Clostridium difficile* infections. Chronic obstructive pulmonary disease (COPD) exacerbations are one of the many drivers of antibiotic resistance, as an estimated 50% of exacerbations are caused by bacterial infections. Procalcitonin, a biomarker specific for bacterial infections, has been shown to safely guide clinicians toward more judicious use of antibiotics for both COPD exacerbations and critically ill patients. However, a gap in procalcitonin literature exists for mechanically ventilated acute COPD exacerbation patients. Patients who present with symptoms of a COPD exacerbation often present similarly to that of a heart failure exacerbation, and many patients have COPD and heart failure. Procalcitonin may be valuable in determining the need for antibiotics in these patients. **Purpose:** The purpose of this study is to determine if procalcitonin is associated with a decrease in antimicrobial use in mechanically ventilated patients with an acute COPD or heart failure exacerbation. **Methods:** This is a single center, retrospective, comparative cohort study. Mechanically ventilated patients greater than or equal to 18 years of age admitted to an adult ICU for acute COPD or heart failure exacerbation will be eligible for inclusion. Patients will be selected retrospectively from October 1, 2015 through September 30, 2017. The primary outcome is defined daily doses of antibiotics in patients with a procalcitonin drawn compared to patients without a procalcitonin drawn. A secondary outcome looks at defined daily doses of antibiotics in patients with a procalcitonin of >0.25 mcg/L compared to patients with a procalcitonin of <0.25 mcg/L. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the utility of obtaining a procalcitonin level.
Identify limitations of procalcitonin.

Self Assessment Questions:

How may procalcitonin be used to decrease unnecessary antibiotics?

- A Low procalcitonin helps clinicians to de-escalate or discontinue an
- B: Elevated procalcitonin helps clinicians to initiate antibiotics in lowe
- C: Elevated procalcitonin helps clinicians to de-escalate or discontinue
- D: A and B

Which of the following is a limitation of procalcitonin?

- A Limited data with corticosteroid use.
- B Does not identify a pathogen.
- C May be falsely elevated in certain situations like surgery, trauma, &
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-372-L01-P

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

MODIFIED UNFRACTIONATED HEPARIN INFUSION NOMOGRAM IN PATIENTS UNDERGOING TARGETED TEMPERATURE MANAGEMENT

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Purpose: Patients cooled to temperatures less than or equal to 34 degrees Celsius when receiving targeted temperature management (TTM) may experience slowed enzymatic activity and decreased platelet function. This change in physiologic function predisposes patients who require concomitant therapeutic anticoagulation to potentially receive excessive intravenous unfractionated heparin and experience adverse sequelae. The objective of this study is to evaluate the difference in efficacy and safety between a standard unfractionated heparin infusion nomogram and a modified heparin infusion nomogram in patients receiving therapeutic anticoagulation while undergoing TTM. **Methods:** This study was granted exemption status by the Institutional Review Board on October 19th, 2017. This study is a multi-center, retrospective analysis of standard versus modified intravenous unfractionated heparin infusion nomogram utilization in patients requiring concomitant therapeutic anticoagulation and TTM from September 3rd, 2011 to October 21st, 2017. The electronic medical record was utilized to identify all patients 18 years of age or older who received TTM and received a systemic intravenous heparin infusion prior to rewarming. Patients with at least one thromboplastin time (aPTT) level drawn following heparin infusion initiation were included in the study analysis. Pregnant patients, patients less than 18 years of age and patients who received inappropriate initial boluses prior to their respective heparin infusions were excluded. The primary objective of this study is to determine if time to therapeutic range of aPTT is shorter for patients managed with a modified heparin infusion nomogram in comparison to a non-modified heparin infusion nomogram. The secondary endpoint will be to determine if patients undergoing TTM with a modified heparin infusion nomogram experience fewer critical aPTT levels in comparison to patients managed with a non-modified heparin infusion nomogram. Descriptive statistics will be utilized to analyze the difference in efficacy and safety between the former and current heparin nomograms. Results and conclusions to be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the potential risks associated with the use of standard dosing of intravenous unfractionated heparin in patients undergoing targeted temperature management.

Explain the impact pharmacists possess regarding the safe use of intravenous unfractionated heparin in patients undergoing targeted temperature management.

Self Assessment Questions:

Which of the following is a potential adverse event related to receiving standard dosing of intravenous unfractionated heparin while undergoing targeted temperature management?

- A Cardiac arrhythmia
- B: Acute respiratory distress syndrome
- C: Gastrointestinal bleeding
- D: Deep vein thrombosis

SG is a 73 year-old male with a PMH significant for atrial fibrillation, hypertension, hyperlipidemia and osteoarthritis. SG is scheduled to undergo a right total knee arthroplasty tomorrow and is rec

- A Order a stat aPTT level
- B Decrease the heparin infusion rate
- C Order a stat INR
- D Both A and B

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-374-L01-P

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

THE ROLE OF THE PHARMACIST IN APPLYING THE STROKE PROPHYLAXIS GUIDELINES IN PATIENTS WITH ATRIAL FIBRILLATION

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Purpose: The 2014 American Heart Association/American College of Cardiology/Heart Rhythm Society (AHA/ACC/HRS) Guideline for the Management of Patients with Atrial Fibrillation (AF) recommend oral anticoagulation (OAC) for patients with AF who have more than one risk factor for thromboembolism based on CHA2DS2-VASc score. The purpose of this study is to determine if patients with nonvalvular AF and a CHA2DS2-VASc score greater than or equal to 2 are prescribed OAC for stroke prophylaxis based on guideline recommendations. Exclusion criteria include patients less than 18 years of age, stage 5 chronic kidney disease (GFR less than 15 ml/min or hemodialysis), ischemic stroke upon admission, presence of mechanical heart valve, hemodynamically significant valvular heart disease (mitral or aortic stenosis), atrial flutter, pregnancy, active cancer, post-operative AF or OAC use for another indication. The primary endpoint is the number of patients prescribed OAC. Secondary endpoints include selection of OAC based upon patient characteristics, ability to afford the prescribed oral anticoagulant, disease/drug interactions and to assess the impact of a pharmacist-led intervention to optimize therapy. Potential clinical outcomes would be to improve the prescribing of OAC in patients with a high risk of stroke with the assistance of pharmacist involvement with the healthcare team. **Methods:** This is an open, non-controlled, single center retrospective and interventional study conducted at St. Joseph Mercy Oakland from July 2017 to December 2017. Data collection includes CHA2DS2-VASc score, oral anticoagulant used, age, gender, estimated creatinine clearance, use of rate control or antiarrhythmic medications, and comorbidities such as congestive heart failure, hypertension, diabetes mellitus, prior transient ischemic attack or stroke peripheral or coronary artery disease, and chronic kidney disease. **Results:** Data collection currently in progress.

Conclusion: Results to be presented at Great Lakes Pharmacy Resident Conference 2018.

Learning Objectives:

Review guideline recommendations for the prevention of stroke in patients with atrial fibrillation based on CHA2DS2-VASc score.
Discuss the options for oral anticoagulation based on the 2014 AHA/ACC/HRS guideline recommendations and primary literature.

Self Assessment Questions:

The 2014 AHA/ACC/HRS guidelines recommend oral anticoagulation for patients with atrial fibrillation with a CHA2DS2-VASc score equal to or greater than

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

Selection of antithrombotic therapy should be based on which of the following?

- A The pattern of atrial fibrillation (paroxysmal, persistent, or permanent)
- B The use of antiarrhythmic therapy
- C The risk of thromboembolism
- D Advanced age and risk of bleeding

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-373-L01-P

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

PROVIDERS' CONSIDERATIONS TO IMPLEMENTING A TRANSITION OF CARE CLINIC IN A FEDERALLY QUALIFIED HEALTH CENTER

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Statement of the purpose: To identify medical professionals' considerations, perceived benefits, and perceived barriers to implementing a Transitions of Care (TOC) Clinic in a Federally Qualified Health Center (FQHC). **Statement of the methods used:** Participants were selected via purposive sampling within a network of FQHCs of Northwest Indiana. Participants will include physicians, nurse practitioners, team care nurses, pharmacists, and social workers.

The investigators will conduct focus groups during the structured, one hour provider meetings that take place at each clinic. Each provider meeting was split into two, 30-minute group sessions that consisted of (1) licensed providers and (2) other medical staff. During the focus groups, investigators will explore past experiences of care provided to patients recently discharged from hospitalizations, and the perceived benefit, barriers and workflow for a new Transitions of Care Clinic. Questions utilized are based on the Consolidated Framework for Implementation Research (CFIR). CFIR is a published, pragmatic structure with multiple constructs designed to create a theoretical framework to guide an implementation process. Focus groups will be audio recorded and transcribed verbatim (any identifiers removed) by a professional transcriptionist. The investigators will take notes during the focus group to record nonverbal communication and body language to ensure proper interpretation of speech and thought during analysis. Transcriptions will then be coded using a secured transcription software by two investigators independently. Initial codes will be based on the CFIR constructs to identify themes in responses, while remaining adaptable for any themes or discussion the participants found important. This study was granted exemption by Purdue IRB on 9/26/2017. Summary of (preliminary) results to support conclusion: Focus groups have been scheduled for February 7th, 12th, 22nd, and March 1st. Conclusions reached: In progress

Learning Objectives:

Identify the type of patients a Federally Qualified Health Center serves.
Recall the constructs of the Consolidated Framework for Implementation Research

Self Assessment Questions:

Which of the following is a construct within the Consolidated Framework for Implementation Research?

- A Intervention Characteristics
- B: Characteristics of Individuals
- C: Improvement Cycles
- D: A & b

Which patient population (sorted by insurance provider) are FQHCs allowed to provide care for?

- A Medicaid/Medicare
- B Private
- C Uninsured
- D All the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-711-L04-P

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

THE IMPACT OF DISCHARGE MEDICATION RECONCILIATIONS ON 30-DAY READMISSION RATES

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Purpose: Hospital readmissions are a threat to patient safety as well as a financial burden to the healthcare system. It is believed reducing medication errors could reduce readmission rates, and a standard Discharge Medication Reconciliation (DMR) process is one way to prevent medication errors. Therefore, DMRs performed by pharmacists have the potential to reduce 30-day readmission rates. In 2017, Bronson Methodist Hospital's inpatient pharmacy revamped their discharge medication program. The purpose of this study is to assess the impact of the DMR program on the 30-day readmission rates. **Methods:** Data will be collected retrospectively from an existing electronic medical record report. Patients were included if they were ≥ 18 years old and had a DMR completed by a pharmacist between July-December 2016 or July-December 2017. The study group was comprised of the patients in the 2017 months, and the comparator group the patients in the 2016 months. Patients were excluded if they left against medical advice or expired in house. The primary outcome for this study is 30-day readmission rates to the emergency department or to a hospital floor of patients who had a DMR performed by a pharmacist. Secondary outcomes include overall 30-day readmission rates to the emergency department or to a hospital floor, number and type of interventions performed by pharmacists, 30-day readmission rates of patients coded for COPD/CHF/pneumonia/stroke, subgroup analysis of patients who participate in the meds to beds program, and cost analysis. **Summary/Conclusions:** Data collection and analysis is currently in progress. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify specific patient populations that are at the highest risk for readmission

Describe the cost burden of readmissions

Self Assessment Questions:

Which of the following disease states are a focus for payers in regards to hospital reimbursement?

- A: Heart failure
- B: Diabetes
- C: Pneumonia
- D: A and C

In the 2005 Report to Congress, what was the calculated average Medicare payment for each readmission?

- A: ~\$1,000
- B: ~\$7,000
- C: ~\$20,000
- D: ~\$50,000

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-712-L04-P

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

THE POTENTIAL RISKS AND BENEFITS OF DOSING CHEMOTHERAPY ON BODY SURFACE AREA (BSA) CALCULATED USING ACTUAL BODY WEIGHT COMPARED TO USING A CAPPED BSA.

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In 2012, the American Society of Clinical Oncology published guidelines regarding chemotherapy dosing in obese adults that recommend using actual weight for body surface area (BSA) calculation. Actual BSA is used to calculate chemotherapy doses rather than using a maximum BSA of 2 meters squared (m^2). This project involves patients who received combination chemotherapy with etoposide and carboplatin regimens for treatment of Stage III-IV non-small cell lung cancer (NSCLC). Using this patient population, the project aims to determine if there is an increased incidence of chemotherapy related complications for obese patients with BSA greater than 2 m^2 as compared to patient with BSA less than or equal to 2 m^2 . VA Computerized Patient Record System (CPRS) will be used to identify patients who received parenteral etoposide and carboplatin as a part of their chemotherapy regimen for a diagnosis of NSCLC between January 12, 2013 and January 12, 2017. Patient data to be collected includes: age, gender, height, weight, BSA, body mass index (BMI), diagnosis, stage of cancer, number of diagnosis related to malignancy, chemotherapy regimen and dosing schedule, hemoglobin, hematocrit, platelets, serum creatinine, albumin, liver function tests, emergency department (ED) visits, inpatient admissions, non-routine outpatient visits, non-neutropenic infections, neutropenic fever, eastern cooperative oncology group (ECOG) performance status, date of NSCLC disease progression, and date of death if applicable and as documented by oncology provider. Chemotherapy complications are defined as: known adverse effect of carboplatin or etoposide resulting in delay or discontinuation of chemotherapy or that required treatment, increased length of stay, or caused inpatient admission. Chemotherapy complications will be further described as hematologic, non-hematologic or allergic in nature and the effect of using actual BSA greater than 2 m^2 for chemotherapy dose calculations in obese patients will be evaluated. Results pending.

Conclusions pending.

Learning Objectives:

Describe the potential risks and benefits of dosing chemotherapy on body surface area (BSA) calculated using actual body weight compared to a using a capped BSA.

Recall the recommendation for patient weight to be used when calculating BSA by the American Society of Clinical Oncology (ASCO) 2012 guidelines for appropriate chemotherapy dosing in obese adults with cancer.

Self Assessment Questions:

American Society of Clinical Oncology (ASCO) 2012 guidelines for appropriate chemotherapy dosing in obese adults with cancer recommend to use what type of body weight to calculate BSA?

- A: Adjusted body weight and capped BSA = 2 m^2
- B: Lean body weight and Actual BSA
- C: Actual body weight and Actual BSA
- D: Ideal body weight and capped BSA = 2 m^2

In obese adults with BSA greater than 2 m^2 , which of the following is a potential consequence of using a capped BSA compared to actual BSA for chemotherapy dosing?

- A: Patient may experience more chemotherapy related toxicities due
- B: Patient may experience fewer chemotherapy related toxicities due
- C: Patient may experience fewer chemotherapy related toxicities due
- D: Patient may experience more chemotherapy related toxicities due

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-375-L01-P

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

EVALUATION OF CLINICAL IMPACT AND WORKLOAD OF THE EMERGENCY DEPARTMENT CLINICAL PHARMACY SPECIALIST

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Purpose: The emergency room at the Cincinnati Veterans Affairs Medical Center is currently staffed with a pharmacist from 14:30 to 23:00 Monday through Friday. The objective of this quality improvement project is to quantify the current impact of the emergency department pharmacist. This information will be used to justify how expanding pharmacists' hours in the emergency department will increase access and decrease costs. Data will further be used to create a business plan with the goal of increasing the number of pharmacists' hours dedicated to the emergency department. **Methods:** Prior to initiation, the project was submitted to the University of Cincinnati Institutional Review Board for approval. This quality improvement project will utilize the Veterans Affairs computerized patient record system (CPRS) to conduct a retrospective chart review to track the workload of the emergency department pharmacist. The following data will be collected: prescriptions processed, patient counseling, medication allergies and adverse events, non-formulary consults, drug monitoring and antibiotic stewardship. Data on number of patients presenting to the emergency department each day, including time of day will also be interpreted. All data will be collected and recorded without patient identifiers. The primary hypothesis that pharmacist coverage in the emergency department decreases cost and decreases patient's time spent in the emergency department will be evaluated. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the need for pharmacists in the emergency department
Describe the current standards for pharmacy practice in the emergency department

Self Assessment Questions:

According to the 2008 American Society of Health-System Pharmacists (ASHP) guidelines on Emergency Medicine Pharmacist Services which of the following is a service that should be provided by pharmacist

- A Medication administration
- B: Direct patient care rounds
- C: Physical assessment of patients
- D: Patient intake

In 2007, the Joint Commission published new standards (MM 4.10, EP 1) that required which of the following of medical institutions in the emergency department?

- A 24-hour pharmacy coverage
- B Medication reconciliation for every patient
- C Retrospective medication order review
- D Prospective medication order review

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-713-L04-P

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

EVALUATION OF OUTPATIENT INFUSION MEDICATION SAFETY MONITORING AT A COMMUNITY TEACHING HOSPITAL

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Purpose: To evaluate the appropriateness of safety monitoring for medications administered at an outpatient infusion clinic after implementing pre-infusion checklists. **Methods:** This study is a prospective analysis of laboratory monitoring obtained from newly implemented pre-infusion checklists from subjects receiving high-risk medications at the outpatient infusion clinic. Patients with a scheduled appointment at the infusion clinic to receive abatacept, tocilizumab, vedolizumab, infliximab, zoledronic acid, or rituximab were included in the study. A pharmacist designed checklist was created for each high-risk medication commonly administered at the outpatient infusion clinic. Pre-infusion checklists included recommended safety monitoring such as Hepatitis B surface Antigen (HBsAg) test, tuberculosis (TB) test, liver function test (LFT), complete blood count (CBC), and up-to-date vaccinations. Nursing in-services were given at the outpatient infusion center to introduce the staff to the pre-infusion checklists and encourage their compliance. Once implemented, the infusion clinic nurses completed the pre-infusion checklists approximately 1-2 days before patient's scheduled appointment. The pharmacist reviewed all checklists and lab results to determine compliance with recommended monitoring, contacted providers to obtain missing labs, and coordinated with providers to order lab tests prior to initial and maintenance therapy. The pharmacist communicated to the infusion clinic nurse if an intervention was needed prior to the patient's scheduled infusion. The primary objective of this study was to identify the percentage of medications that were appropriate to dispense before the checklists were implemented compared to the percentage of medications that were appropriate to dispense after the checklist was implemented. **Results and Conclusions:** Data is currently being collected. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize safety monitoring and management for biologic response modifiers and other high-risk medications that are commonly administered in outpatient infusion clinics.

Identify safety concerns and adverse effects associated with tumor necrosis factor (TNF)-alpha inhibitors and other biologic response modifiers (BRMs).

Self Assessment Questions:

Before initiating therapy with a biologic response modifiers (BRMs), the following baseline labs are commonly recommended EXCEPT:

- A Hepatitis B surface Antigen (HBsAg) test
- B: Tuberculosis (TB) test
- C: Hepatitis C Antibody Screen
- D: Liver function test (LFT)

Which of the following adverse effects are associated with tumor necrosis factor (TNF)-alpha inhibitors and other biologic response modifiers (BRMs)?

- A Increase the risk of serious infections
- B Reactivate viral infections
- C Worsen symptoms of congestive heart failure
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-714-L04-P

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

WEAK-SPOT ANALYSIS OF A DIRECT ACCESS PHARMACOGENOMICS PROGRAM TO ENHANCE PATIENT RETENTION

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Purpose: Pharmacogenomics is a focus at our four-hospital community health system. In an effort to expand the availability of testing, a direct access program was developed across the health system. This involved a four step workflow process for patients after the ordering of the test by their clinician: the patient accesses an educational video, the test kit is shipped to the patient, the patient completes the test kit and ships it to the pharmacogenomics laboratory, and the test results are sent from the laboratory to the patient and their providers via the electronic health record. A weak-spot analysis of the workflow process was performed to identify steps that lack patient retention and prompt the initiation of interventions in order to improve patient retention. **Methods:** Data was available for 612 patients whose clinician ordered pharmacogenomics testing via the direct access program from October 1, 2016 to October 31, 2017. The collected data consisted of dates that patients completed each step in the pharmacogenomics workflow process. A weak-spot analysis was performed by calculating the completion percentage of each step in the workflow process. Of the 612 patients assessed, 123 completed the entire process. The completion dates of these patients were assessed in order to determine the average duration of time each step took to complete. These same methods were utilized to assess two interventions made to the workflow process which consisted of making test kits available in physician offices and a reminder message sent to patients. Results of the interventions will be compared to the original workflow analysis to assess for improvements in patient retention and time to complete each step. **Results and Conclusion:** In progress. Results and conclusions are to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the direct access testing process of the pharmacogenomics program at our four-hospital community health system.
Identify areas of improvement in the workflow process of the pharmacogenomics program based on a weak-spot analysis.

Self Assessment Questions:

What area(s) of the pharmacogenomics workflow process are being assessed by the weak-spot analysis?

- A Completion time of each step.
- B: Patient retention throughout the workflow process and patient edu
- C: Patient retention throughout the workflow process and completion
- D: Patient retention throughout the workflow process.

What interventions were implemented and compared to the original workflow process?

- A Reminder message sent to patients and a third party testing serv
- B Making test kits available in physician offices and a reminder mes:
- C Reminder message sent to patients and video counseling for at-hc
- D Physician office testing and patient weekly check-ins.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-715-L04-P

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

EVALUATION AND DEVELOPMENT OF CARDIOTOXICITY MONITORING GUIDELINES AT A COMMUNITY ONCOLOGY CENTER

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Purpose: A significant number of cancer-directed therapies have been associated with cardiotoxicity. This adverse effect is well-established in anthracyclines, trastuzumab, and pertuzumab. While there is currently limited guidance on cardiac monitoring and management of patients who are receiving cardiotoxic therapy, a risk assessment model has been developed by a large research institution. One of the aims of this project is to validate this risk assessment tool. In addition, recent studies suggest that changes in cardiac function can be detected by strain imaging before changes in left ventricular ejection fraction can be seen. At this community oncology center, the recent availability of echocardiograms with strain imaging has prompted an evaluation of current practices for cardiotoxicity monitoring. This project also aims to develop an institutional guideline for monitoring cardiac function in patients receiving potentially cardiotoxic therapy. **Methods:** This is a quality improvement project and is exempt from review by the Institutional Review Board. For the first part of the project, the electronic health record will be used to identify current practices of cardiotoxicity monitoring in patients who started an anthracycline, trastuzumab, or pertuzumab in 2016. This data will be used to analyze cardiotoxicity monitoring including frequency of baseline and follow-up monitoring, modality of cardiac imaging, and rate of cardio-oncology referrals. For the second part of the project, a retrospective chart review of patients who started cardiotoxic therapy in 2012 – 2013 will be conducted. The information will be used to validate a risk assessment tool. Upon completion of data analysis, the results will be used to create institutional guidelines for cardiac monitoring in patients receiving cardiotoxic therapy. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review adverse clinical outcomes associated with anthracyclines and certain anti-HER2 therapies
Discuss the process of developing institutional guidelines for cardiotoxicity monitoring in patients receiving cancer-directed therapy

Self Assessment Questions:

Which of the following is characteristic of trastuzumab-induced cardiotoxicity?

- A Dependent on the cumulative dose of therapy
- B: Generally reversible when treatment is discontinued
- C: Associated with direct myocyte damage secondary to the producti
- D: Dexrazoxane can be used as a cardioprotective agent

Which of the following is a proposed benefit of strain imaging?

- A Requires specialized training to provide accurate results
- B Exposes patients to radiation
- C Incurs additional costs for patients compared to echocardiography
- D Potentially detects myocardial dysfunction before changes in LVEF

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-864-L05-P

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

ASSESSING THE IMPACT OF PHARMACY TELEPHONE VISITS IN THE PATIENT ALIGNED CARE TEAM (PACT)

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Purpose: Telephone visits were created at the Cincinnati Veterans Affairs Medical Center to increase access to care. This project will evaluate the efficiency of the current scheduling model of patient aligned care team clinical pharmacists at the Cincinnati VAMC and assess the impact non-face-to-face care has on the number of patient encounters compared to traditional face-to-face pharmacist appointments. The hypothesis is that the use of telephone visits will increase the number of available patient encounters. Additional review will assess the applicability of adding telephone-based clinics to established face-to-face scheduled clinics and the influence this addition had on patient continuity of care. **Methods:** This project will be submitted to the University of Cincinnati Institutional Review Board and Cincinnati VAMC Research and Development Committee. Data will be collected from two clinical pharmacy PACT services with two different telephone clinic designs. Data will be collected for six months prior to and six months after initiation of the two telephone clinics. Comparisons will be made before and after implementation of the telephone clinics for each clinic individually to remove possible differences between pharmacists. Measures will include the following: total number of patient encounters, total number of unique patients, no-show rate per clinic, number of unscheduled visits compared to scheduled visits. A secondary outcome will evaluate the growth of one of the above telephone clinics by comparing the first six months of the telephone clinic to the last six months of the clinic using the above parameters. **Results and Conclusion:** to be presented at Great Lakes Pharmacy Resident Conference

Learning Objectives:

List the nine principles of the Veterans Health Administration Patient Aligned Care Team (PACT).

Discuss findings of past and current research related to pharmacist-managed telephone clinics within the Veterans Affairs health system.

Self Assessment Questions:

Which of the following statements is correct regarding the criteria for usage of health care delivery modalities in the Patient Aligned Care Team (PACT)?

- A: The modality must be approved by the Veterans Health Administration
- B: The facilities preference for communication and health care delivery
- C: The PACT staff is not required to have received appropriate orientation
- D: PACT staff may employ a range of advanced communication modalities

Which of the following is a strategy to optimize schedules for Clinical Pharmacy Specialist (CPS) on a Patient Aligned Care Team (PACT)?

- A: The CPS should limit use of time spent retrieving population data,
- B: The CPS should take full responsibility for a patient's labs and appointments
- C: Every CPS on the PACT should utilize the same schedule grid, as
- D: When creating a schedule grid, the CPS should take into consideration

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-716-L04-P

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

TREATMENT OF SEPTIC SHOCK WITH INTRAVENOUS ASCORBIC ACID, THIAMINE, AND HYDROCORTISONE

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Purpose: A recently published study demonstrated significant mortality benefit with intravenous (IV) ascorbic acid, thiamine, and hydrocortisone in the treatment of septic shock patients. Due to the limited sample size of this literature, further research is required to support potential benefit in septic shock. This study aims to evaluate a larger patient population to build upon prior findings and establish a stronger association between potential benefits. The objective of this study is to retrospectively evaluate time to complete vasopressor discontinuation in septic shock patients treated with the standard of care vs. patients who received IV ascorbic acid, thiamine, and hydrocortisone in addition to the standard of care. **Methods:** This study will include patients who are admitted to any intensive care unit (ICU) with the diagnosis of septic shock. All patients admitted between May 1, 2017 and October 1, 2017 meeting the inclusion criteria will be analyzed via retrospective chart review. The primary outcome of this study is to compare total time to complete discontinuation of vasopressor therapy in septic shock patients treated with the standard of care compared to those who received the additional combination regimen. Secondary outcomes include ICU length of stay, incidence and duration of renal replacement therapy (RRT), and in-hospital mortality. In order to evaluate primary and secondary outcomes, data collection will include serum lactate, creatinine, white blood cell count, procalcitonin, time of vasopressor initiation, and time of vasopressor discontinuation. **Results and Conclusions:** Preliminary screening identified 88 septic shock patients who received the combination of IV ascorbic acid, thiamine, and hydrocortisone. Data analysis is ongoing. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the current standard of care treatment for sepsis and septic shock

Discuss the possible benefits of IV ascorbic acid, thiamine, and hydrocortisone in septic shock patients

Self Assessment Questions:

What is the recommended initial fluid administration for adequate fluid resuscitation in patients presenting with sepsis?

- A: 10 mL/kg
- B: 1000 mL
- C: 20 mL/kg
- D: 30 mL/kg

What benefit has been associated with ascorbic acid administration in critically ill patients?

- A: Increased arteriolar responsiveness to vasoconstrictors
- B: Reduce systemic inflammation
- C: Lower lactate levels
- D: Restore cardiovascular homeostasis

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-376-L01-P

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

IMPACT OF EDUCATION AND LEGISLATION ON OPIOID PRESCRIBING PATTERNS FOLLOWING CESAREAN DELIVERY

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Purpose: Opioid overprescribing following surgeries, including cesarean delivery, can contribute to patients taking opioids unnecessarily or increase diversion potential through inappropriate storage and lack of disposal of leftover pills. In an effort to curb overprescribing of opioids, the state of Indiana enacted Senate Enrolled Act 226 on July 1, 2017, which prohibits providers from prescribing greater than a seven day supply of opioids to adults receiving their first opioid prescription from that provider. The purpose of this study is to determine if legislation or education presented to providers will decrease the amount of opioids prescribed at discharge following cesarean delivery. **Methods:** The study was divided into three phases based on when the patient was discharged from one of four network hospitals following cesarean delivery: the pre-legislation phase (March 1, 2017-June 30, 2017), the post-legislation phase (July 1, 2017-October 30, 2017), and the post-education phase (February 1, 2018-May 31, 2018). A retrospective chart review was conducted for patients discharged from the hospital during the pre- and post-legislation phases to determine the baseline morphine milligram equivalents and number of opioid pills patients were prescribed following cesarean delivery. Education was presented to providers about the overprescribing of opioids and methods to reduce overprescribing in January 2018. An anonymous survey was distributed at the presentations to assess how the providers anticipated the education to impact their prescribing practices. A chart review will then be conducted for patients discharged from the hospital during the post-education phase. **Preliminary Results:** Two hundred patients were included in each phase of this study. During the pre-legislation phase, providers prescribed an average of 276 morphine milligram equivalents. The average number of opioid pills prescribed was 37.8. **Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify factors contributing to the overprescribing of opioids following cesarean delivery

Review counseling points to provide to patients being discharged on opioid therapy

Self Assessment Questions:

Which of the following may contribute to overprescribing of opioids following cesarean delivery?

- A: Inadequate time to assess patients' pain control prior to discharge
- B: Strong clinical data to guide appropriate post-operative opiate presc
- C: Use of non-opiates as adjunctive therapy
- D: Changes in legislation regarding opioid prescribing

If a patient is being discharged on opioids following cesarean delivery, what would be an appropriate education point to provide?

- A: Store unused opioids in a bathroom cabinet
- B: Dispose of unused pills by mixing them in undesirable products be
- C: Use all prescribed pills until gone
- D: Do not use non-opioid pills in combination with this medication

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-717-L04-P

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

ASSESSMENT OF MENOPAUSAL SYMPTOM MANAGEMENT BY A CLINICAL PHARMACIST IN A VETERAN AFFAIRS MEDICAL CENTER

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There are currently greater than 26,000 veterans who have been diagnosed with menopausal disorders. The average age of menopause onset is 52 years, while the average age of the female veteran population is 44 years. As the number of women veterans and their average age continues to increase, the number seeking treatment of menopausal symptoms will follow. This provides a unique opportunity for pharmacists to manage menopausal symptoms, follow up with patients and assess medications. The primary objective of this study is to assess management of menopausal symptoms in female veterans seen by a designated clinical pharmacist. This study is a retrospective chart review of female veterans receiving care for menopausal symptoms by the clinical pharmacist in the gynecology (GYN) specialty clinic at the Richard L. Roudebush VA Medical Center between of August 1, 2013 and August 31, 2017. Women were included who were seen in person or by phone for menopausal symptoms in the GYN Specialty Clinic by the clinical pharmacist. Women were excluded if they received care from a non-VA provider for menopausal symptom management or were lost to follow up after initial visit. The outcomes and symptom resolution will be compared. Patients were identified based on their ICD-9 or ICD-10 diagnosis of menopausal symptoms during the study period. Primary outcomes include control of menopausal symptoms, including vasomotor symptoms and vaginal atrophy, through the following endpoints: symptom resolution or acceptable resolution defined by patient and number of symptoms pre- and post-appointment. Secondary outcomes include analysis of which therapy was used, average length of treatment and significant adverse effects.

Learning Objectives:

Explain the impact menopause has on a woman's quality of life when symptoms are not managed properly.

Describe the benefit of utilizing a designated clinical pharmacist in a GYN clinic for menopause management.

Self Assessment Questions:

The average age of menopause onset is:

- A: 43
- B: 52
- C: 39
- D: 65

Which of the following is the gold standard treatment of menopause?

- A: Spironolactone
- B: Herbal supplements
- C: Surgery
- D: Hormonal therapy

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-377-L01-P

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

EVALUATION OF AN ARGATROBAN NOMOGRAM AT A COMMUNITY HOSPITAL

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Statement of Purpose: Heparin induced thrombocytopenia (HIT) is an immune mediated disorder that is defined as the decrease of platelets in relation to a heparin infusion. HIT often goes unrecognized due to various factors playing a role in decreasing a patient's platelet count. When HIT develops, it has a greater than 30% mortality rate making early recognition, cessation of heparin and treatment of HIT with a non-heparin based anticoagulant essential. The objective of this study is to retrospectively evaluate the current argatroban infusion nomogram to ensure patient safety, evaluate adequate anticoagulation and implement changes to the current nomogram if necessary.
Statement of Methods used: This study will be a retrospective, chart review evaluating patients who are initiated on an argatroban infusion for more than 24 hours. The protocol for this study will be submitted to the Institutional Review Board for approval. The primary outcome of this study is to evaluate activated partial thromboplastin time (aPTT) data to ensure patients obtained a therapeutic aPTT within 24 hours of therapy. Specific patient factors to be included in the data collection are age, gender, weight, diagnosis for implementation of argatroban, current argatroban dosing nomogram (ICU v. non-ICU), aPTT, total bilirubin, serum creatinine, liver function tests and time to achieve therapeutic aPTT. Patient safety and efficacy will be the secondary endpoint of this study, specifically assessing patient bleeding, clotting and duration of argatroban therapy. Data collected will help guide future improvements to the current argatroban infusion protocol.
Summary of Preliminary results to support conclusion: Preliminary results are pending.
Conclusions: Pending.

Learning Objectives:

Recognize the signs and symptoms of heparin induced thrombocytopenia and understand patients who are at risk for HIT
Discuss the mechanism of action and dosing strategy for argatroban

Self Assessment Questions:

What is one of the components of the 4T score?

- A Toxins
- B: Timing of platelet fall
- C: Tamponade
- D: Tachycardia

What is the mechanism of action of argatroban?

- A Direct thrombin inhibitor
- B Factor Xa inhibitor
- C Antithrombin III inhibitor
- D Protein C and S inhibitor

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-378-L01-P

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

SAFETY AND COST COMPARISON BETWEEN FILGRASTIM AND THE BIOSIMILAR FILGRASTIM-SNDZ IN PEDIATRIC PATIENTS

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Purpose: Filgrastim-sndz, a FDA-approved biosimilar for filgrastim, was approved for addition to the Children's Hospital of Wisconsin medication formulary in June 2017. With this addition, the biosimilar has become the preferred growth-colony-stimulating-factor (GCSF) formulation used in patients requiring filgrastim. Filgrastim is indicated for patients with medication-induced neutropenia, peripheral blood stem cell (PBSC) mobilization, and hematopoietic stem cell transplantation. While filgrastim-sndz has been approved as a therapeutic equivalent to filgrastim, the safety and cost to pharmacy data is lacking in the pediatric population. The purpose of this study is to compare safety and cost of filgrastim-sndz to filgrastim.
Methods: A single-center, retrospective cohort evaluation on patients who have received filgrastim or filgrastim-sndz from July 2017 to March 2018 were evaluated. The Institutional Review Board at Children's Hospital of Wisconsin is reviewing this retrospective chart review. The primary objectives of this study are to assess the cost savings to pharmacy associated with the use of the biosimilar, as well as compare safety of filgrastim-sndz to filgrastim. Patients were identified through a search of the electronic medical record for anyone who received filgrastim or filgrastim-sndz. Patients older than 18 years of age and those who received a GCSF for PBSC were excluded. Data extracted from the medical record include: age, gender, weight, indication for use, dose, and frequency of GCSF, length of therapy, ANC, days until ANC is noted to uptrend, evidence of adverse effects associated with the GCSF post-dose. A medication use analysis was performed between filgrastim and filgrastim-sndz to evaluate cost to pharmacy.
Results: Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review published literature discussing efficacy and economic costs of using filgrastim-sndz
Recognize the decrease in costs associated with switching to a biosimilar from the reference product

Self Assessment Questions:

What is the definition of a biosimilar?

- A A biological product that is highly similar to and has no clinically m
- B: A biological product that is slightly similar to and has some clinical
- C: A biological product that is highly similar to and has many clinically
- D: A biological product that is slightly similar to and has no clinically r

Which resource can you use to determine if a biosimilar is interchangeable with the reference product?

- A Red Book
- B Yellow Book
- C Purple Book
- D Orange Book

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-379-L01-P

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

EVALUATION OF THE INCIDENCE, RISK FACTORS, AND MANAGEMENT OF HYPERTENSION IN PATIENTS RECEIVING IBRUTINIB FOR HEMATOLOGIC MALIGNANCIES

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Ibrutinib is a Bruton's tyrosine kinase (BTK) inhibitor that is Food and Drug Administration approved to treat several hematologic malignancies. In addition to its effect on its target kinase, ibrutinib may inhibit off-target kinases, leading to potential adverse effects. New or worsening hypertension (HTN) has been reported in 10-29% of patients receiving ibrutinib on clinical trials. Recent observational data suggest that this rate may be as high as 40% in clinical practice and resistant to treatment with multiple agents. The purpose of this study is to better characterize the development of HTN in patients treated with ibrutinib, describe the management and complications of ibrutinib-associated HTN, and define risk factors for the development of HTN while on ibrutinib therapy. In order to describe the incidence and management of HTN in patients treated with ibrutinib, a retrospective, single-center cohort study was conducted of patients who started ibrutinib for hematologic malignancies from December 1, 2009 to March 30, 2016. Prisoners, pregnant females, and patients with secondary HTN were excluded, in addition to those who had inadequate records to determine diagnosis and treatment of HTN. Collected data included demographic information, laboratory data, past medical history, and medication history. The primary outcome of this study was the incidence of HTN in patients treated with ibrutinib. Severity of new or worsened HTN was defined according to the Common Terminology Criteria for Adverse Events (CTCAE) and causality assessed using the Naranjo Scale. Secondary outcomes include HTN management and review of cardiovascular events. The Framingham Heart Study 10-year Cardiovascular Disease Risk Calculator was used to estimate baseline risk for cardiovascular events. Risk factors for hypertension were assessed using a competing risks regression model and survival analysis techniques were used to evaluate the association between hypertension and ibrutinib.

Learning Objectives:

Describe the incidence and management of new and worsened hypertension in patients receiving ibrutinib for hematologic malignancies
Identify patient-specific factors that increase the risk of hypertension while on ibrutinib.

Self Assessment Questions:

In clinical trials leading to ibrutinib's FDA approval, what was the approximate incidence of hypertension?

- A 5-10%
- B: 10-30%
- C: 30-50%
- D: 50-60%

According to the 2017 ACC/AHA Blood Pressure Clinical Practice Guideline, what is the lower threshold of Stage 1 Hypertension?

- A 120/80 mmHg
- B 130/80 mmHg
- C 140/90 mmHg
- D 150/90 mmHg

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-380-L01-P

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ASSESSING THE IMPACT OF THE ABCDEF BUNDLE COMPLIANCE AND SEDATIVE USAGE IN THE MEDICAL INTENSIVE CARE UNIT

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Background: The ABCDEF bundle is a collection of quality standards that address the management of pain, agitation, delirium, mobility, ventilator weaning, and family engagement in the intensive care unit (ICU). While each element of the ABCDEF bundle has shown to improve care of patients admitted to the ICU individually, less data exists regarding the collective benefit of bundle compliance. We hypothesized that greater bundle compliance would be associated with reduced sedative and analgesic exposure in mechanically ventilated patients in the medical ICU after implementation of each component of the ABCDEF bundle. **Purpose:** The purpose of this retrospective study is to compare sedative exposure in mechanically ventilated patients in the MICU based on compliance with the ABCDEF bundle. **Methods:** This will be a retrospective cohort study of patients that are greater than 18 years of age and require mechanical ventilation for at least 48 hours. Patients will be excluded from the study if they required continuous use of paralytics, blind or deaf patients, or were not seeking full care. For each day of ICU admission, patients will be assessed for compliance with the bundle by the following previously utilized definitions: full compliance (meeting each of the bundle parameters with 100% completion), partial compliance (meeting any of the bundle parameters but less than 100% completion), and non-compliance (failure to meet any of the bundle parameters). The primary endpoint of this study is the mean difference in sedative and analgesic exposure. Secondary endpoints will include duration of mechanical ventilation, ICU and hospital length of stay, development of delirium, use of anti-psychotics, and in-hospital mortality. **Results/Conclusions:** Results and conclusions are in progress and will be presented at the 2018 Great Lakes Pharmacy Residency Conference

Learning Objectives:

List components of the ABCDEF bundle

Explain the appropriate monitoring tools for use with the ABCDEF bundle

Self Assessment Questions:

Which of these relates to the "B" in the ABCDEF bundle?

- A Ordering fentanyl for analgesia
- B: Consideration of a non-benzodiazepine agent for sedation
- C: Ordering SAT/SBT as clinically appropriate
- D: Including the family in each patient's care

Which of these tools useful when assessing a patient's pain?

- A RASS
- B Cpot
- C SAS
- D Cam-icu

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-381-L01-P

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

TACROLIMUS AND CLOTRIMAZOLE DRUG INTERACTION IN KIDNEY TRANSPLANT RECIPIENTS

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Purpose: Thrush is an oral infection that can be prevented in the immediate post-transplant period with anti-fungal agents such as clotrimazole troches or topical nystatin. Literature suggests that concomitant administration of clotrimazole and tacrolimus (TAC) in transplant recipients leads to increased TAC trough levels, while subsequent discontinuation of clotrimazole leads to decreased TAC levels. Supratherapeutic TAC may lead to kidney injury or toxicity, while subtherapeutic levels may increase risk of graft rejection. The purpose of this study is to determine the extent of this drug interaction, and the impact on kidney graft rejection at 90 days post-transplant. **Methods:** This is a retrospective quasi-experimental study in kidney transplant recipients who received a TAC-based immunosuppressive regimen. All patients received thrush prophylaxis until the day of discharge per the center specific protocol. Clotrimazole was the preferred prophylaxis until the protocol was modified to nystatin starting January 2016. This study will compare the pre- and post- implementation of this protocol change from clotrimazole to nystatin. Data was collected in adult patients who received a kidney transplant between June 2014 and June 2017. Patients with multi-organ transplants, non-TAC regimens, or major CYP3A4 or P-glycoprotein drug interactions were excluded. The dosing and subsequent TAC levels on post-transplant days 3 through 30 were assessed. The primary endpoint is the percentage of patients with one or more subtherapeutic (<8 ng/mL) TAC levels post-discharge. The secondary endpoint is the percentage of patients with supratherapeutic (>15 ng/mL) TAC levels post-discharge. Incidence of thrush proven graft rejection at 90 days post transplant and incidence of thrush will also be evaluated. Continuous, nonparametric variables will be analyzed and compared using the Mann-Whitney U test, while nominal variables will be compared using the chi-squared test. **Results:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the impact of antifungal prophylaxis on tacrolimus trough concentrations in the immediate post-transplant period.
Identify the incidence of graft rejection at 90 days after kidney transplantation in patients who received antifungal prophylaxis with clotrimazole versus nystatin.

Self Assessment Questions:

Tacrolimus levels are significantly impacted by medications that inhibit or induce which two enzymes?

- A CYP 3A4 and P-glycoprotein
- B: CYP 3A4 and CYP 2D6
- C: CYP 2D6 and P-glycoprotein
- D: CYP 3A4 and CYP 2C9

Discontinuation of clotrimazole prophylaxis may lead to subtherapeutic tacrolimus levels in kidney transplant which is thought to lead to which adverse effect?

- A nephrotoxicity
- B neurotoxicity
- C graft rejection
- D hyperkalemia

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-382-L01-P

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

INCREASING PHARMACIST-DRIVEN INTERVENTIONS IN HOSPITALIZED PATIENTS AT INCREASED RISK OF QTc PROLONGATION

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Purpose: Many medications on the market today have the ability to prolong the QTc interval. Prolongation of the QTc interval may result in adverse events, most notably cardiac arrhythmias such as torsades de pointes (TdP). It was identified in a retrospective analysis of QTc drug interaction alerts that there is a lack of documented interventions by pharmacists in this patient population at our hospital. The purpose of this before-and-after study is to increase pharmacist-driven interventions in patients that are at an increased risk for QTc prolongation. **Methods:** Adult patients, 18 years of age and older, are included in this analysis. The "before" data set is comprised of patients who had drug interaction alerts for QTc prolongation fire via the electronic health record during the month of August 2017. The "after" data set will be comprised of patients who had alerts for QTc prolongation fire during the month of February 2018. Patients with documented pharmacist interventions were identified and the frequency of these interventions was determined in the original data set. A process was developed to assist pharmacists in determining which patients with potential QTc prolongation must be intervened on (i.e. those with structural heart disease, low potassium, or low magnesium). Pharmacists were educated on QTc prolongation and on the process to be implemented. The pharmacists were also provided suggestions for intervention strategies – to recommend electrolyte replacement, periodic ECG monitoring and/or substitution or discontinuation of the offending agent(s). After one month, drug interaction alerts will again be analyzed and the number of documented pharmacist interventions will be totaled and compared to the baseline data. **Results:** Preliminary results indicate an increasing number of documented pharmacist interventions since the inception of the process for identifying higher risk patients. **Conclusion:** The conclusion of this study will be presented in depth at the Great Lakes Conference.

Learning Objectives:

Recognize patient-specific risk factors that increase the risk for QTc prolongation and torades de pointes
Identify appropriate options for medication substitutions in patients with risk factors for QTc prolongation who are prescribed a QTc-prolonging agent

Self Assessment Questions:

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

- A Younger age
- B: Male sex
- C: Baseline QTc of 430 ms
- D: Hypokalemia

Electronic orders are received for azithromycin and ceftriaxone in a patient with community-acquired pneumonia. The patient is an 85 YOF with a PMH significant for congestive heart failure, atrial fib

- A Clindamycin
- B Doxycycline
- C Metronidazole
- D Moxifloxacin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-865-L05-P

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

ARGATROBAN DOSING IN CRITICALLY ILL POPULATIONS: FOCUS ON ECMO

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Purpose: Extracorporeal membrane oxygenation (ECMO) is a life support measure that impacts drug pharmacokinetics, contributes to thrombocytopenia, and presents difficult challenges in balancing thrombotic and bleeding risks. In patients with suspected or proven heparin-induced thrombocytopenia, treatment with a direct thrombin inhibitor such as argatroban is indicated. There is limited evidence available guiding the use of argatroban in patients receiving ECMO support and the impact of concurrent organ dysfunction on dosing requirements in this population. It is currently unknown if patients receiving ECMO have different argatroban dosing requirements compared to other critically ill patients, and if alternative dosing strategies may be useful. **Methods:** This was a retrospective, single-center, cohort study that compared argatroban dosing requirements across three groups. Patients initiated on argatroban in the intensive care unit were matched based on Child-Pugh classification at the time of initiation. Weight-based argatroban dosing requirements were compared across three critically ill groups including (1) those who received ECMO, with or without continuous renal replacement therapy (CRRT); (2) those who received CRRT without ECMO; and (3) those who received neither form of extracorporeal support. The primary outcome was the first argatroban infusion dose to achieve three consecutive PTTs within a patient's goal PTT range. Secondary outcomes included mean, minimum, maximum, and final therapeutic argatroban doses; time to first therapeutic dose; number of sub-therapeutic and supra-therapeutic PTTs leading to dose adjustments; and bleeding or thrombotic events. Statistical analyses were performed to compare mean therapeutic doses across groups and to determine if a model of multiple organ dysfunction assessed at the time of argatroban initiation can describe first therapeutic dose. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize pharmacokinetic changes that may occur during extracorporeal membrane oxygenation (ECMO) in adult patients
Identify the recommended parameter that determines initial argatroban dosing in heparin-induced thrombocytopenia

Self Assessment Questions:

Which of the following pharmacokinetic changes is commonly described in adult patients receiving extracorporeal membrane oxygenation?

- A: Decreased volume of distribution
- B: Increased drug absorption
- C: Sequestration of lipophilic drugs
- D: Sequestration of hydrophilic drugs

FDA labeling recommends adjustment of initial argatroban dose in heparin-induced thrombocytopenia based on which of the following parameters?

- A: Creatinine clearance
- B: MELD score
- C: Child-Pugh classification
- D: Alanine aminotransferase (ALT)

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-383-L01-P

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

PHARMACIST EDUCATIONAL OPPORTUNITIES IN THE WORKPLACE

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Purpose: The purpose of this work is to develop and implement a service that allows for clinical pharmacists to attend educational presentations during work hours. The VA provides many continuing education opportunities for its employees. Pharmacists are required to receive 30 CE hours by the time their license is up for renewal, but with high-volume prescription processing and occasional staff shortages, pharmacists are reluctant to complete CE at work. Awareness and implementation of a service to allow clinical pharmacists to complete CE at work will increase pharmacist engagement amongst healthcare professionals in the VA as well as increase job satisfaction as reflected in the annual All-Employee Survey. **Methods:** A base survey was distributed to clinical pharmacists to establish the needs of an educational opportunities service. Gaps in scheduling continuing education opportunities were identified with pharmacy leadership. Based upon results of the base survey, the service was established providing continuing education opportunities for pharmacists to attend during their scheduled work shifts. Continuing education opportunities include on-site presentations, teleconference presentations, and online CE resources. Clinical pharmacists are encouraged to identify other continuing education opportunities to add to the service. Post-attendance surveys are completed by the pharmacist every time continuing education has been completed on their shift, and a recap of the presentation is presented at pharmacy meetings with the rest of the department to facilitate engagement. A midpoint and final survey will be conducted to evaluate pharmacist participation in the service as well as feedback for service improvement. Feedback will be reviewed and implemented into the educational service as deemed beneficial to the pharmacists. The educational service is limited to clinical pharmacists with the intention of expanding to pharmacy technicians once adequate pharmacist participation is obtained. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the rationale for implementing a pharmacist educational service
Identify two barriers for adequate pharmacist participation in the educational service

Self Assessment Questions:

Which of the following statements best describes the rationale for implementing a pharmacist continuing education opportunities service?

- A: Increase pharmacist engagement
- B: Increase patient safety
- C: Increase job satisfaction
- D: Both A and C

Which of the following could be a barrier to pharmacist participation in the educational service?

- A: Staff shortages
- B: Value of service unrecognized
- C: Preference to complete CE outside of work
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-718-L04-P

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

EVALUATION OF ANTIBIOTIC PRESCRIBING PATTERNS IN THE EMERGENCY DEPARTMENT

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Increased antibiotic resistance is a growing concern in infectious disease medicine. According to Zatorski et al and May et al, one impacting factor is inappropriate prescribing. The emergency department (ED) is a vulnerable clinical area for antibiotic resistance due to its connection to the community and to inpatient care. Zatorski et al, Hecker et al, Haran et al, and Donnelly et al studied rates of non-adherence to Infectious Disease Society of America guidelines in the ED. Between the studies non-adherence rates are estimated at 58%-63.1% for urinary tract infections (UTI), 56.8% for soft skin and tissue infections (SSTI), and 47.9% for upper or lower respiratory infections (URTI, LRTI). Among antibiotics inappropriately prescribed are fluoroquinolones (FQs). The Food and Drug Administration released rising concerns in 2017 about FQs including tendon, muscle, joint, and central nervous system effects. Zang et al demonstrated pharmacist interventions increase appropriate antibiotic prescribing. This quality assurance project will evaluate the appropriate use of antibiotics to treat UTI, UTRI, LRTI, and SSTI in the ED at the Dayton VA Medical Center. This is a prospective, observational, quality assurance project. Patients were included based upon discharge diagnosis from the ED of one of the following: UTI, URTI, LRTI, or SSTI. Patients were included based on appropriate documented diagnosis and discharge on antibiotic therapy. Patients were excluded if they were admitted, immunosuppressed, or receiving hospice/palliative care. Patient laboratory values such as basic metabolic panel, complete blood count, culture and sensitivities, and urine analysis were collected along with demographic information, allergies, and comorbid conditions to evaluate appropriateness of therapy. Preliminary data reflect high rates of inappropriate prescribing amongst UTI, UTI, LRTI and SSTI. Future direction includes collaboration with infectious diseases department in development of pharmacist-driven protocol in the ED and the implementation of computer order set to promote appropriate prescribing patterns.

Learning Objectives:

Describe inappropriate antibiotic prescribing patterns that occur in the emergency department
Discuss pharmacist-driven interventions to impact antibiotic prescribing patterns in the emergency department

Self Assessment Questions:

Which antibiotic class is inappropriately overprescribed in emergency departments for various common infections?

- A Penicillins
- B: Cephalosporins
- C: Fluroquinolones
- D: Macrolides

TD is a pharmacist who notices antibiotic prescribing in the emergency department (ED) that is non-adherent to current guidelines without rationale. TD would like to make a pharmacy-driven intervention

- A Confront prescribers on a case by case basis
- B Implement computer order sets to guide prescribing
- C Create a protocol utilizing input from solely pharmacy staff
- D Add alerts for antibiotics that are prescribed inappropriately

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-384-L01-P

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

RETROSPECTIVE REVIEW OF AMBULATORY CARE PATIENTS: CHRONIC CARE MANAGEMENT ELIGIBILITY AND REVENUE

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Purpose: On January 1, 2015, the Centers for Medicare and Medicaid Services (CMS) implemented the Chronic Care Management (CCM) program for providers administering non-face-to-face services for Medicare beneficiaries with two or more chronic health conditions. CCM services include five core activities: recording structured data in the patient's health record; maintaining a comprehensive care plan for each patient; providing 24/7 access to care; comprehensive care management; and transitional care management. CCM is designed to reimburse an average of \$43 per month for a 20 minute non-face-to-face monthly visit. CCM is a significant opportunity for pharmacists to make a difference by providing a model of continuous care through pharmacist-led CCM services. Although pharmacists are not eligible to bill CMS directly, they can deliver clinical services such as optimized medication therapy, follow up with patients, and documentation of interventions. The purpose of this study is to review CMS CCM requirements and identify the potential revenue from providing pharmacist-led CCM services at Sinai Medical Group. Methods: This study is a retrospective medical record review of patients from January 1, 2017 to December 31, 2017 at three of eleven of Sinai Medical Group's freestanding primary care clinics. Patients eligible for inclusion are 65 years of age or older, Medicare beneficiaries, and have two or more chronic conditions. All patients will be identified through the outpatient electronic medical record, NextGen®. Medical records will be reviewed for the following data: number and type of chronic conditions, age, gender, race, insurance type, primary care clinic, number of qualifying encounters and time spent by the pharmacist or the provider, and type of service provided. Results and Conclusion: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review Centers for Medicare and Medicaid Services' Chronic Care Management requirements
Identify the potential revenue from providing pharmacist-led Chronic Care Management services

Self Assessment Questions:

Which of the following is true about Chronic Care Management requirements?

- A Pharmacists must be employed at the clinic providing the service
- B: Patients must have 24/7 access to a member of the care team for
- C: Patients must have a history of 1 year or more with the provider
- D: Consent must be written by the patient before initiating services

How much revenue per month will billing for a complex Chronic Care Management service generate?

- A \$43
- B \$47
- C \$64
- D \$94

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-720-L04-P

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

PHARMACY FACILITATED MEDICATION HISTORIAN PROGRAM AT AN ACADEMIC MEDICAL CENTER: A PRE-POST IMPLEMENTATION STUDY IN THE EMERGENCY DEPARTMENT

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The committee on identifying and preventing medication errors estimates the occurrence of about 1.5 million preventable adverse drug events in the United States yearly and that care transitions are associated with high level of risks, especially during admission. Medication histories and reconciliations are important in patients' transitions of care. One of the Joint Commission's National Patient Safety Goals is to maintain and communicate accurate patient medication information. Thus, the medication historian program was implemented in August 2017 in an academic medical center emergency department. Three medication historian technicians cover the peak hours on Monday through Friday from 1000 to 2330 and Saturday and Sunday from 1100 to 1930. They provide technical assistance with collecting, clarifying and documenting the best possible medication histories into the electronic medical record. The purpose of this project was to create, implement and study the initial impact of a medication historian program in the emergency department with a pre and post implementation study comparing the pharmacy technician collected medication history to the usual multidisciplinary process. The pre implementation period of January 2017 to June 2017 was compared to the post implementation period of August 2017 to January 2018. This study includes patients 18 years of age or older, who were on one or more medications and are admitted to the hospital through the emergency department. The primary objective was to compare the completeness and appropriateness of pharmacy technician collected medication histories to the usual multidisciplinary process. Secondary objectives were to compare the types of incomplete and/or inappropriate medication history errors and predictors of complete and appropriate medication histories. A minimum sample size of ninety one patients for each group was determined using Fisher's exact test. Preliminary results and conclusions are pending at this time.

Learning Objectives:

Define best possible medication history

Discuss the impact of pharmacy facilitated medication historian program on the prior to admission medication list

Self Assessment Questions:

Admissions, transfers, and discharges are what potential level of risk?

- A: No risk
- B: Low
- C: Moderate
- D: High

A medication list that is gathered by an individual whether healthcare professional or technician which includes a thorough history of prescription and non-prescription medication that patients are currently on

- A: Medication history
- B: Best possible medication history
- C: Medication reconciliation
- D: Medication order entry

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-719-L04-P

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

IMPLEMENTATION AND EVALUATION OF A TELEPHONIC MONITORING PROGRAM IN ANEMIA CLINIC FOR PATIENT-ADMINISTERED ERYTHROPOIESIS-STIMULATING AGENTS

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Erythropoiesis-stimulating agents (ESA) are indicated for the treatment of anemia in patients with chronic kidney disease (CKD). Clinical pharmacists at Froedtert and the Medical College of Wisconsin currently provide face-to-face services to patients on ESA for non-dialysis dependent CKD – associated anemia. However, patients who self-administer ESAs were managed by their medical providers whose patient care and documentation processes were highly variable. Providers recognize that anemia clinic pharmacists can provide streamlined and standardized patient care to patients self-administering ESAs. The primary objective of this project is to develop and implement a pharmacy-managed telephonic monitoring program for patients self-administering ESAs who were previously managed by nephrologists. This program aims to optimize the safe and effective use of ESA therapy through standardized treatment, monitoring and documentation. The primary outcome is the percent of time in goal hemoglobin (Hgb) range before and after implementation of the telephonic monitoring program. Additional outcomes include patient and provider satisfaction, patient adherence to labs and appointments, and internal ESA prescription capture. Additionally, the new pharmacist workflow will be assessed and modified during and after implementation of the project to evaluate sustainability and expansion opportunities of the program. Results/conclusions: Based on pre-specified criteria, seven self-administering patients were identified and transitioned to anemia clinic management. Patients ages range from 28 to 90 years, two with CKD stage III and five with CKD stage IV. Two patients use darbepoetin alfa while five patients are on epoetin alfa. Retrospective chart reviews from Jan 1, 2015 to Oct 30, 2017 found that patients spent an average of 26.33% of time in goal Hgb range, 85.7% of patients had Hgb drawn at least every 28 days while no patients had iron labs drawn at least every 90 days as recommended by guidelines. Additional results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain clinical factors that may affect hemoglobin level in patients with Non-Dialysis Dependent Chronic Kidney Disease associated anemia
Describe methods to ensure success of change management in new service development

Self Assessment Questions:

Which of the following reasons could further explain a hemoglobin level dropping below therapeutic goal range despite ESA therapy in anemic patients with CKD?

- A: Improved kidney function
- B: Blood loss
- C: Low ferritin and low % iron saturation
- D: B & C

Which of the following stakeholders did NOT constitute the major guiding coalition for developing the telephonic monitoring program for patients self-administering ESA?

- A: Pharmacy interns and pharmacy technicians
- B: Clinical pharmacy staff and pharmacy managers
- C: Nursing staff and nursing managers
- D: Providers and physician champion

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-385-L01-P

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

IMPROVING TRANSITION OF CARE FOR PATIENTS DISCHARGED ON PARENTERAL NUTRITION

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Purpose: Patients discharged on parenteral nutrition (PN) are at a high risk for readmission. A recent study looking at a population discharged on PN observed a 31.6% readmission rate within 30 days with 21.1% of readmissions related to PN. Internal quality data at Henry Ford Hospital (HFH) shows a high readmission rate for patients discharged on PN. Additionally, Medicare requires documentation of objective evidence to support a clinical diagnosis needing outpatient PN. In May 2017, the HFH Nutritional Support Services implemented a PN discharge checklist to standardize the discharge process and ensure the required Medicare elements are coordinated early in the admission and are met prior to discharge. The purpose of this study is to improve transition of care for patients being discharged on PN by evaluating the effect of a novel PN discharge checklist and identifying patient characteristics related to hospital readmission. **Methods:** This study is an IRB approved, retrospective quasi-experimental study of patients discharged from HFH on PN between January 1, 2014 and May 31, 2018. Patients were excluded if they were transferred to another acute care hospital or discharged against medical advice. The primary endpoint was the completion of a PN discharge bundle which included identification of a responsible provider to monitor PN after discharge, meeting a daily caloric requirement of 20-35 kcal/kg/day, and cycling the PN prior to discharge. The secondary endpoints included documentation of all checklist components, hospital length of stay, frequency of hospital encounters, cause of hospital encounter, and time to readmission. Data collected included electronic medical record documentation of the discharge checklist components, patient demographics, hospital length of stay, reason for hospitalization, PN order information, and time to readmission. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the most commonly cited causes of readmission in patients discharged on parenteral nutrition

Discuss the American Society for Parenteral and Enteral Nutrition (ASPEN) recommendations to prepare patients for discharge on parenteral nutrition

Self Assessment Questions:

Which of the following is a commonly cited cause of parenteral nutrition related readmission?

- A: Heart failure
- B: Wound dehiscence
- C: Infection
- D: Gastrointestinal bleeding

Which of the following is recommended by the ASPEN to prepare patients for discharge on parenteral nutrition?

- A: Peripheral IV access established before discharge
- B: Parenteral nutrition is cycled before discharge
- C: Discharging provider is documented in the electronic medical record
- D: Patient is discharged with the paper prescription to obtain parenteral nutrition

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-866-L05-P

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

OUTCOMES ASSOCIATED WITH 5-HYDROXYTRYPTAMINE3 RECEPTOR ANTAGONIST (5-HT3-RA) THERAPY USE IN CHEMOTHERAPY-INDUCED NAUSEA AND VOMITING

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The purpose of this research is to evaluate the efficacy of ondansetron and palonosetron in preventing chemotherapy-induced nausea and vomiting (CINV) in the high, moderate, and low emetic risk category. Chemotherapy-induced nausea and vomiting can significantly decrease the quality of life for cancer patients. Chemotherapy is categorized based on its emetic risk to patients. The following pre-medications are given to prevent CINV prior to chemotherapy: dexamethasone, a 5-HT3-RA, fosaprepitant, and/or a dopamine receptor antagonist. Two 5-HT3-RAs, ondansetron and palonosetron, have proven similar efficacy for acute CINV; however palonosetron is more effective against delay CINV. Current practice follows the National Comprehensive Cancer Network (NCCN) and Multinational Association of Supportive Care in Cancer (MASCC) guidelines. This retrospective cohort study included patients who received the 5-HT3-RA premedication ondansetron or palonosetron prior to receiving intravenous chemotherapy within the ambulatory setting. Patients eighteen years old and older who received ondansetron or palonosetron prior to receiving one of the ten preselected intravenous chemotherapy regimens from January 1st 2014 – November 1st 2017, were included. The patients were followed to evaluate the pre-medication regimens they received within the time frame. Data collected included general demographic data, chemotherapy treatment plan, cycle number, cancer diagnosis, pre-medications (anti-emetics), 5-HT3-RA premedication used, home antiemetic medication list, Oncology triage clinic encounter date/ diagnosis, emergency department date/diagnosis, hospital admission date/diagnosis, delay in chemotherapy, change in pre-medications (if so what changed), total chemotherapy cycles, and date of last chemotherapy. Treatment failure was defined as: failure of complete management of nausea and vomiting symptoms as demonstrated by changing antiemetic regimen, using rescue therapy, and any encounter to the oncology triage clinic, emergency room, and/or hospital for nausea or vomiting, dehydration, or failure to thrive. A summary of results and conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Review emetic risk potential for intravenous chemotherapy regimens

Identify the most appropriate 5-Hydroxytryptamine3 Receptor Antagonist (5-HT3-RA) Therapy to prevent chemotherapy-induced nausea and vomiting (CINV)

Self Assessment Questions:

An intravenous chemotherapy regimen that contains an anthracycline and cyclophosphamide poses which emetogenic potential?

- A: Minimal emetic risk
- B: Low emetic risk
- C: Moderate emetic risk
- D: High emetic risk

Which antiemetic grouping is correct for the prevention of CINV for high emetic risk intravenous chemotherapy?

- A: Ondansetron only
- B: Fosaprepitant, palonosetron, and dexamethasone
- C: Palonosetron, prochlorperazine, and metoclopramide
- D: Ondansetron and dexamethasone

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-386-L01-P

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

USE OF A PHARMACY RESIDENCY ROTATION TO PILOT AN AMBULATORY PHARMACIST

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Purpose: While the Affordable Care Act has led to more patients having health insurance, this wider access to healthcare has led to a shortage of primary care physicians. Ambulatory care pharmacists working in physician offices can act as medication information resources as well as physician extenders. This study was designed to measure the clinical impact of resident pharmacists in an internal medicine clinic and investigate opportunities for direct billing of pharmacist services.

Methods: A retrospective chart review will be conducted of all patients with a resident pharmacist intervention at the MetroWest Internal Medicine Clinic between 8/1/17 - 1/31/18. Patients will be identified for inclusion based on a pharmacist intervention log maintained by resident pharmacists. The primary outcome is change in patient medication adherence before and after pharmacist intervention. Adherence will be measured as the gap between days supplied and fill dates for all prescription medications. The medication fill dates and day supply filled will be obtained through a reporting function in the clinic electronic medical record. The secondary outcomes are a description and quantification of types of pharmacist interventions performed (medication administration technique education, disease state education, complete medication review etc.) and a cost-analysis comparing billable claims to pharmacist or resident pharmacist full-time equivalent. Billable claims and average reimbursement rates for the cost analysis will be obtained through industry resources (e. g. Outcomes MTM). This study was approved by the Mount Carmel Health System Institutional Review Board. **Results/Conclusion:** Results and conclusion will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review current opportunities for pharmacist billing
Recognize the impact of an ambulatory pharmacist on patient care

Self Assessment Questions:

Which of the following is a current viable option for pharmacist reimbursement in an ambulatory setting?

- A Direct billing as a provider as defined by Centers for Medicare and
- B: Billing medication therapy management services as allowed by inc
- C: Incident-to Physician Assistant
- D: Pharmacists do not currently have any avenues for reimbursemen

In which way can pharmacists positively impact patient care in an ambulatory setting?

- A Proactively identify patients with complex medication regimens for
- B Stay in the pharmacy until consulted
- C Allow prescribers to complete their own prior authorizations for the
- D Depend on prescribers and community (retail) pharmacists to ensi

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-721-L04-P

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

EVALUATION OF GLYCEMIC CONTROL IN PATIENTS UNDERGOING TARGETED TEMPERATURE MANAGEMENT (TTM) POST-CARDIAC ARREST AT A COMMUNITY TEACHING HOSPITAL

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Purpose: Targeted temperature management (TTM) is a process used for unconscious adults who have a return of spontaneous circulation post-cardiac arrest. These patients often experience changes in blood glucose, which is associated with poor neurological outcomes and death. While previous studies have explored this subject, further research is needed to understand insulin dosing and blood glucose trends in this population. This project will identify the patient characteristics that predict the need for insulin therapy, determine the average time to initiate insulin therapy, and evaluate trends in blood glucose. **Methods:** This study is an IRB-approved, retrospective chart review that assesses blood glucose management and trends in patients who were treated with TTM from 2012-2017 at a 361-bed, community teaching hospital. Patients will be included if they underwent TTM post-cardiac arrest and were admitted to the intensive care unit (ICU). Patients will be excluded if they were less than 18-years old, received basal bolus insulin during TTM, or if TTM was interrupted. The data will include various baseline characteristics, targeted temperatures, electrolyte levels, blood glucose levels, insulin infusion rates, frequency of hypoglycemia episodes, and duration of TTM. Primary endpoints will be the average insulin infusion rate in those patients with and without diabetes. Secondary endpoints, such as initial blood glucose at start of TTM, percent of patients with hypoglycemic episode requiring administration of dextrose, initial infusion rate, and mean time to initiation of insulin, will be included. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the changes in blood glucose in patients undergoing TTM.
Recall the recommendations pertaining to TTM in the 2015 ACLS guidelines.

Self Assessment Questions:

Which of the following statements is correct regarding blood glucose trends in patients undergoing TTM?

- A Patients undergoing cooling will typically experience hyperglycemia
- B: Patients undergoing cooling will typically experience hypoglycemia
- C: Patients undergoing cooling will typically experience no changes in
- D: Patients undergoing cooling will typically experience both hypergly

Based upon the updated 2015 ACLS guidelines, what is the goal temperature for TTM?

- A 30 to 34 degrees Celsius
- B 32 to 34 degrees Celsius
- C 32 to 36 degrees Celsius
- D 34 to 36 degrees Celsius

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-387-L01-P

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

ASSESSMENT OF BIOLOGIC DISEASE-MODIFYING ANTIRHEUMATIC DRUG USE AND ABSENTEEISM IN MEMBERS WITH RHEUMATOID ARTHRITIS WITHIN A SELF-FUNDED INSURANCE POPULATION

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Purpose: Rheumatoid arthritis is associated with progressive joint deformity and bone erosion. The disease has been shown to have a negative impact on patient quality of life and work productivity. The 2015 American College of Rheumatology Guidelines suggest early initiation of disease modifying anti-rheumatic drugs (DMARDs) to slow disease progression. The objective of this study is to explore correlations between biologic use and work productivity within a large employer's self insured prescription drug plan, as measured through absenteeism data. Methods: This observational retrospective cohort study will be submitted to the Institutional Review Board for approval. The University of Michigan Prescription Drug Plan's database will be used to identify members with an ICD 9 or 10 diagnosis code for rheumatoid arthritis. Our study will include patients with at least 6 months of continuous enrollment and disease modifying anti-rheumatic drug treatment between 2013 and 2016. Patient cohorts will be defined as those receiving either biologic or non-biologic containing regimens in this treatment class. In addition to pharmacy claim-level data, the following will be collected: patient age, gender, ethnicity, occupational department, comorbidities and employee absentee records. All patient information will be de-identified by an external vendor prior to data retrieval and stored data will be maintained confidentially. Claim-level data will be reviewed to assess the correlation between days absent from work due to illness and rheumatoid arthritis treatment regimens. Differences in concurrent medication utilization, disease associated costs and identifiable risk factors will be assessed across cohorts. In the biologic cohort, data will be further analyzed to explore time between disease diagnosis and biologic index date. Results and Conclusions: Response analysis in progress. Results of this study will be used in the evaluation of medication coverage policies within the prescription drug plan. Results and conclusions to be presented at the Great Lakes Pharmacy

Learning Objectives:

Describe the financial impact of rheumatoid arthritis for various stakeholders.

Recognize current treatment recommendations for patients with rheumatoid arthritis.

Self Assessment Questions:

Which of the following statements best describes the economic burden of rheumatoid arthritis?

- A Direct costs are estimated to be much greater than indirect costs
- B: Rheumatoid arthritis is typically diagnosed in patients 65 years or older
- C: Long-term disability, increased mortality, and decreased quality of life
- D: Rheumatoid arthritis can be a financially burdensome disease for patients

Which of the following is an appropriate recommendation for the treatment of rheumatoid arthritis.

- A Corticosteroids and non-steroidal anti-inflammatory agents can be used
- B All patients should initiate DMARD therapy early in the disease course
- C The treatment goal of rheumatoid arthritis is to reduce disease activity
- D A patient should be evaluated regularly to achieve treatment goals

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-388-L01-P

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

A COMPARISON OF SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) CRITERIA VS. QUICK SEPSIS-RELATED ORGAN FAILURE ASSESSMENT (qSOFA) FOR SEPSIS

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Purpose: More than 1.5 million people in the United States get sepsis each year, and the identification and initial management of sepsis is crucial to patient outcomes. The optimal method of identifying these patients is still in contention. With the emergence of the SEPSIS-3 guidelines, the potential for a shift away from focusing on inflammation to focusing on organ dysfunction. The purpose of this study is to evaluate the comparison between qSOFA and SIRS criteria in the initial evaluation of patients with suspected sepsis. Methods: This is a retrospective, chart review study of adult patients presenting to an emergency department with suspected infection. This will be identified by patients seen in the emergency department from October 2015 through July 2017, with an order for blood cultures to be drawn. Patients included in the study will have data extracted from the electronic medical record. Each patient will have both the SIRS criteria and the qSOFA score applied and will be categorized as positive or negative. Positive for SIRS criteria will be defined as 2 out of 4 criteria, while a positive for the qSOFA will be defined as 2 out of 3 criteria. The primary endpoint will look at the correlation between both SIRS and qSOFA, for positive blood cultures. The secondary endpoint will be correlation with all-cause inpatient mortality for each assessment. Results/Conclusion: Data collection and analysis are currently in progress. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference. Conclusions affecting local practice will also be presented to the appropriate committee at Henry Ford Alliegance Health

Learning Objectives:

List the components of the quick Sepsis-related Organ Failure Assessment (qSOFA).

Recognize the role of qSOFA identified by the SEPSIS-3 guidelines.

Self Assessment Questions:

Which of the following is a component of the qSOFA?

- A Heart rate
- B: Altered mental status
- C: White blood cell count
- D: Temperature

Which of the following represents the role of qSOFA as outlined in the SEPSIS-3 guidelines?

- A To decide if a patient should be admitted to the hospital
- B To identify septic patients
- C To determine the need for broad spectrum antibiotics
- D To identify patients that are high risk of sepsis-related mortality

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-389-L01-P

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

SAFETY AND EFFICACY OF VARENICLINE FOR SMOKING CESSATION IN VETERANS WITH OR WITHOUT A HISTORY OF MENTAL ILLNESS AT JESSE BROWN VA MEDICAL CENTER

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Purpose: Tobacco use disorder affects approximately 1.6 million veterans, which is 20.1% of all VA patients. Patients with mental illness have been associated with increased nicotine dependence, increased intensity of smoking, and decreased success rates with quitting compared to those without mental illness. Varenicline is a smoking cessation agent with superior efficacy in relation to other monotherapies used for smoking cessation. Varenicline's black box warning for neuropsychiatric events was removed due to the findings from the EAGLES trial, which found no significant difference in neuropsychiatric adverse events when comparing varenicline and bupropion to nicotine replacement therapy and placebo. However, patients with a history of mental illness had more neuropsychiatric events overall, regardless of treatment group, than those without mental illness. The aim of this study is to provide more safety and efficacy data in a predominately elderly, male veteran population given the largest trial to date in patients with mental illness was primarily composed of a younger, female population.

Methods: This study is a retrospective, electronic chart review of patients who have been prescribed varenicline at JBVAMC. The aim of the study is to determine if there is a difference between patients with or without a history of mental illness regarding the safety of varenicline for smoking cessation in terms of neuropsychiatric adverse events. This study also evaluates if there is a difference between patients with or without a history of mental illness regarding the efficacy of varenicline for smoking cessation at 3 and 12 months post-treatment. **Results/Conclusion:** Data collection and analysis is ongoing. Results and conclusion will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize neuropsychiatric adverse events reported with the use of varenicline for smoking cessation.

Identify outcomes from the EAGLES trial regarding varenicline in comparison to other agents used for smoking cessation.

Self Assessment Questions:

Which of the following are recognized as neuropsychiatric adverse events reported with the use of varenicline?

- A: Abnormal dreams
- B: Nausea
- C: Suicidal ideation
- D: A & c

Which statement is true regarding outcomes from the EAGLES trial?

- A: Bupropion had significantly more neuropsychiatric adverse effects
- B: Nicotine replacement therapy had significantly more neuropsychiatric adverse effects
- C: There were no significant differences in neuropsychiatric adverse effects
- D: Varenicline had significantly more neuropsychiatric adverse effects

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-390-L01-P

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

EFFECTIVENESS AND SAFETY OF FOUR-FACTOR PROTHROMBIN COMPLEX CONCENTRATE FOR THE EMERGENT REVERSAL OF FACTOR Xa INHIBITORS IN PATIENTS WITH TRAUMATIC INTRACRANIAL HEMORRHAGE

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Purpose: Four-factor prothrombin complex concentrate (PCC) is commonly utilized for the reversal of factor Xa inhibitors (apixaban, rivaroxaban, and edoxaban) in the setting of severe hemorrhage. This off-label indication is based on animal studies and pharmacodynamics studies in healthy volunteers. No study has compared effectiveness and safety in patients who did and did not receive four-factor PCC for the reversal of factor Xa inhibitors. The objective of this study is to determine the effectiveness and safety of four-factor PCC for the reversal of factor Xa inhibitors in patients with traumatic intracranial hemorrhage (ICH). **Methods:** This study was approved by the Institutional Review Board. The study is a retrospective review of patients taking factor Xa inhibitors (apixaban, rivaroxaban, or edoxaban) prior to admission who presented with a traumatic ICH (epidural hematoma, subdural hematoma, subarachnoid hemorrhage, or intracerebral hemorrhage) between March 1, 2015 and August 31, 2017. The primary outcome was in-hospital mortality. Secondary effectiveness outcomes included hematoma expansion on CT scan, amount of blood products given, number of neurosurgical interventions, functional recovery, hospital length of stay, and intensive care unit length of stay. Secondary safety outcomes included venous thromboembolism (defined as a diagnosis of deep venous thrombosis or pulmonary embolism), stroke or transient ischemic attack, and myocardial infarction. Subgroup analyses were performed to assess outcomes based on age, gender, anticoagulant, indication for anticoagulation, site of injury, initial Glasgow Coma Score, hematoma size, injury severity score, antiplatelet use, and neurosurgical intervention. **Results/Conclusions:** Will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define the effectiveness and safety of four-factor prothrombin complex concentrate for the reversal of factor Xa inhibitors in patients with traumatic intracranial hemorrhage.

Select the appropriate anticoagulation reversal strategy based on patient characteristics.

Self Assessment Questions:

Four-factor PCC is FDA approved for the reversal of which of the following anticoagulants?

- A: Rivaroxaban, apixaban, and edoxaban
- B: Dabigatran
- C: Warfarin
- D: B and C

Which dose of four-factor PCC is recommended by the American College of Cardiology for the reversal of severe bleeding in patients taking factor Xa inhibitors?

- A: 25 units/kg
- B: 35 units/kg
- C: 50 units/kg
- D: 1,500 units

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-391-L01-P

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

IMPACT OF A TARGETED TEMPERATURE MANAGEMENT PROTOCOL CHANGE ON SHIVERING INCIDENCE AND THE UTILIZATION OF NEUROMUSCULAR BLOCKERS AFTER CARDIAC ARREST

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Purpose: Mild therapeutic hypothermia has been shown to improve neurological outcomes after cardiac arrest. Due to its potential for increased oxygen consumption and increase in heat production, shivering is a common adverse event that needs to be prevented during therapeutic hypothermia. Many pharmacologic agents, including neuromuscular blockers, may be utilized in the prevention and management of shivering episodes. This study evaluated a new hypothermia protocol at Parkview Health, which implemented scheduled acetaminophen and buspirone for shivering prophylaxis with the addition of as needed meperidine for treatment of shivering. These changes were implemented to help reduce shivering episodes and the use of neuromuscular blocking agents used in patient receiving targeted temperature management. **Methods:** During annual protocol review, changes to the hypothermia protocol included the addition of scheduled acetaminophen and buspirone for prophylaxis and as needed meperidine for treatment of shivering. This retrospective chart review will evaluate the incidence of shivering in patients undergoing therapeutic hypothermia during the pre- and post- protocol change timeframes which are defined as September 1, 2015 – August 31, 2016 and October 1, 2016 – September 31, 2017, respectively. Subjects were eligible for inclusion if they were initiated on the hypothermia protocol in the pre or post protocol change phase at Parkview Regional Medical Center. Patients in the post protocol phase were included if they received acetaminophen, buspirone, and/or as needed meperidine. The primary outcome is the change in frequency of neuromuscular blocker administration for shivering. Quantitative, categorical, and descriptive statistics will describe the frequency of administration of neuromuscular blockers for shivering, the frequency of administration during the cooling maintenance, and rewarming phase, the effects on time to target temperature, and in-hospital mortality. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the need for pharmacological recommendations to prevent potential adverse events associated with therapeutic hypothermia. Describe the impact of acetaminophen, buspirone, and as needed meperidine on shivering in patients being treated with therapeutic hypothermia.

Self Assessment Questions:

1. What is the recommended range from which a temperature should be selected and maintained constantly to achieve targeted temperature management after cardiac arrest?

- A: 32-36°C
- B: 33-38°C
- C: 31-34°C
- D: 34-40°C

2. Which of the following is a possible adverse effect associated with therapeutic hypothermia?

- A: Hypoglycemia
- B: Seizures
- C: Shivering
- D: Thrombocytosis

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-392-L01-P

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

IMPACT OF PHARMACIST-DRIVEN ANTIMICROBIAL STEWARDSHIP ON THE RATE OF CHALLENGING PENICILLIN ALLERGIES IN THE EMERGENCY DEPARTMENT

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Purpose: Penicillin allergies limit the use of first-line antimicrobials and are associated with worse patient outcomes and increased cost of care. One method to challenge a penicillin allergy is to conduct a penicillin skin test. However, this method may not be feasible for all settings/institutions as it is time and resource intensive. Data suggests that the cephalosporin class has a much lower rate of cross-reactivity with penicillins than previously believed and are generally considered safe to administer in non-severe penicillin allergic patients. ED pharmacists are well positioned to conduct antimicrobial stewardship interventions, including allergy clarifications, reviewing previously tolerated antibiotics and recommending allergy challenge. The goal of this study was to compare the rate of penicillin allergy challenge in the emergency department over time and when an ED pharmacist is present compared to absent. **Methods:** A retrospective cohort study was conducted comparing three arms (Jan 1 to Dec 31, 2010 versus 2014 versus 2016), of 120 randomly selected patients with a diagnosis of community-acquired pneumonia, community-acquired intra-abdominal infection, or UTI/pyelonephritis. The primary outcome of this study is to compare the rate of penicillin allergy challenge in the ED over time. Penicillin allergies were considered challenged if the patient received either a penicillin or cephalosporin in spite of a documented beta-lactam allergy. Secondary objectives include comparing allergy challenge rates in the ED when an ED pharmacist is present versus absent, evaluating patient outcomes when challenging penicillin allergies versus using a beta-lactam alternative agent, and determining cost avoidance by challenging penicillin allergies versus using a beta-lactam alternative.

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

Learning Objectives:

Identify first-line antibiotic therapy for community acquired pneumonia, intra-abdominal infections, and UTIs.

Recognize the implications of utilizing a first-line beta-lactam agent over an alternative antibiotic.

Self Assessment Questions:

Which of the following is the most appropriate IV antibiotic for a 68 year old female diagnosed with pyelonephritis that has a documented penicillin allergy consisting of rash as a child?

- A: Ceftriaxone
- B: Levofloxacin
- C: Aztreonam
- D: Ertapenem

Which of the following is a potential benefit of utilizing a beta-lactam agent over an alternative antibiotic?

- A: Decreased costs
- B: Decreased duration of therapy
- C: Improved patient outcomes
- D: A and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-722-L04-P

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

IMPACT OF CIRRHOSIS ON VASOPRESSOR USAGE IN SEPTIC SHOCK

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Purpose: The pathophysiology of cirrhosis predisposes patients to infections and septic shock as well as hemodynamic alterations including an establishment of new baseline blood pressures which are often very low. A goal mean arterial pressures (MAP) above 65 mmHg (recommended by the Surviving Sepsis Campaign guidelines) in the treatment of septic shock may lead to additional vasopressor exposure and possible untoward side effects in a patient group like this with potential lower baseline blood pressure. The objective of this analysis is to compare the duration of vasopressor therapy between cirrhotic and non-cirrhotic patients in septic shock. The results are intended to provide insight on targeted MAP goals in septic shock in cirrhosis. **Methods:** This study is Institutional Review Board approved. A patient list of admissions to the medical intensive care unit for the past 10 years will be used to identify patients determined to have septic shock. In this analysis, septic shock is defined as the combination of the following: blood cultures drawn, initiation of broad-spectrum antibiotics and the use of at least one vasopressor. The following baseline data will be collected: demographics, past medical history, Child Pugh and MELD scores, and current medications. Admission labs (basic metabolic panel, CrCl, lactate and hemoglobin) and Sequential Organ Failure Assessment (SOFA) scores will also be collected. The included patients will be divided into two groups for primary and secondary analyses: those who have cirrhosis and those who do not. The primary comparison is the duration of vasopressors between the groups. Secondary comparisons are length of stay, total vasopressor requirement, in-hospital mortality, change in organ function (based on SOFA scores) and discharge disposition. Safety endpoints include incidence of arrhythmias and tissue ischemia. Included sub group analysis assesses MAP goals within the cirrhotic patients and the use of midodrine to assist with weaning of vasopressors. **Results:** Data Pending **Conclusions:** Data Pending

Learning Objectives:

Describe the pathophysiology of cirrhosis that leads to increased risk for septic shock.
Discuss the effect of cirrhosis on duration of vasopressor use in septic shock patients.

Self Assessment Questions:

Which of the following are factors that increase the risk of septic shock in patients with cirrhosis?

- A: Increased nitric oxide and pro-inflammatory cytokine production
- B: Higher baseline blood pressures due to portal hypertension
- C: Hepatocellular damage leads to decreased portal-systemic shunt
- D: Increased complement production and bacterial phagocytosis

What is a potential complication of prolonged use of vasopressors?

- A: Ventricular arrhythmias
- B: Peripheral ischemia
- C: Decreased gut perfusion
- D: All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-393-L01-P

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

IMPACT OF STANDARDIZING DOSE AND DURATION OF SYSTEMIC CORTICOSTEROIDS IN TREATMENT OF ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (AECOPD) AT A COMMUNITY HOSPITAL

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Purpose: The Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines recommend oral prednisone 40 mg daily for five days to improve lung function and shorten hospital stay for acute exacerbation of chronic obstructive pulmonary disease (AECOPD). The purpose of this study is to evaluate the impact of implementing an AECOPD protocol to standardize the dose and duration of systemic corticosteroid use. **Methods:** This Institutional Review Board approved, single-center retrospective, observational study, included patients who were at least 18 years old and admitted with AECOPD between July 2017 and February 2018. The Pharmacy and Therapeutics Committee approved protocol was implemented in November 2017. Patients diagnosed with asthma, hypersensitivity to steroids, or chronic systemic steroid use were excluded. Electronic medical records were used for patient selection and data collection. Primary outcome measured was hospital length of stay (LOS). Secondary outcomes included: hyperglycemia and insulin requirement after initiation of systemic corticosteroid, average dose and duration of intravenous (IV) or oral systemic corticosteroid, rate of readmission, and percentage of inhalers and nebulizers dispensed before and after implementation of the AECOPD protocol. **Results:** The pre-implementation group consisted of 42 patients. Average hospital LOS was 4.8 days. Hyperglycemia occurred in 40.9% of diabetic patients with a 7.5 unit increase from their home total daily insulin dose, and 30% of patients with no history of diabetes with an average of 2.8 units of insulin per day. Average daily dose of IV and oral corticosteroid was 112.8 mg and 40.8 mg respectively. The average duration of therapy was 4.7 days. A total of six patients were readmitted during the three month follow up. The most commonly used nebulizers were ipratropium/albuterol (32%), followed by albuterol (23%), then ipratropium (17%). Final results and conclusions will be presented at the Great Lakes Pharmacy Resident

Learning Objectives:

Review the current GOLD guideline recommendations for use of corticosteroids in the treatment of AECOPD
Identify the impact of low dose corticosteroid regimen on patients outcomes

Self Assessment Questions:

What is the recommended steroid dose and duration per GOLD guidelines in the treatment of AECOPD?

- A: Methylprednisolone 4 mg PO taper dose pack
- B: Prednisone 40 mg PO daily for 5 days
- C: Prednisone 20 mg PO daily for 7 days
- D: Prednisone PO taper for 10 days

Steroid use is associated with which of the following benefits in an acute exacerbation of AECOPD?

- A: Reduction in the rate of concomitant antibiotic use
- B: Increased patient acceptance of smoking cessation programming
- C: Decreased length of stay
- D: Decreased use of oral bronchodilators

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-394-L01-P

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

IMPACT OF ACCELERATE PHENO SYSTEM ON TIME TO ANTIMICROBIAL STEWARDSHIP INTERVENTION IN PATIENTS WITH GRAM-NEGATIVE BLOODSTREAM INFECTIONS

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Purpose: Rapid diagnostic tests (RDTs) in combination with antimicrobial stewardship interventions (ASTEWS) have been shown to improve antimicrobial therapy-related outcomes in patients with bloodstream infections (BSIs). The Accelerate Pheno™ System (AXDX) has a potential advantage over many currently approved RDTs in that it can quickly provide both identification and antimicrobial susceptibility test (AST) information. This study aimed to explore the impact of utilization of the AXDX when compared to our institutional standard of care (SOC) on time to simulated ASTEW-I, potential antimicrobial optimization in patients with Gram-negative BSIs, and ASTEW team coverage. **Methods:** Patients with Gram-negative rod blood stream isolates were enrolled during a 3 month time frame (February to May 2017). Isolates were analyzed through both SOC measures and the AXDX. The SOC laboratory protocol consisted of matrix-assisted laser desorption/ionization time of flight (MALDI-TOF) for pathogen identification and VITEK® 2 for AST results. The primary outcome was time to ASTEW-I, which was simulated utilizing AST reporting time and availability of personnel based on time of day. **Results:** Twenty-seven patients with Gram-negative rod bloodstream isolates were enrolled in the study. Mean decrease in time to simulated ASTEW-I with AXDX as compared to SOC was 17.9 hours (95% CI, 11.6 to 24.2, $p < 0.001$) for 8-hour stewardship coverage. Though time to simulated ASTEW-I improved with 16-hour and 24-hour stewardship coverage, the differences were not found to be statistically improved over an 8-hour shift ($p=0.443$). **Conclusion:** In a cohort of patients with Gram-negative bacteremia, ASTEW-I guided by AXDX significantly shortened the time to potential antimicrobial optimization when compared to our SOC. This improvement occurred when ASTEW support was limited to an 8-hour work day.

Learning Objectives:

Describe the advantages of the Accelerate Pheno System in comparison to other rapid diagnostic tests currently on the market

Discuss the rationale for antimicrobial stewardship service support when utilizing rapid diagnostic tests in the care of patients with bloodstream infections

Self Assessment Questions:

Which of the following statements regarding the Accelerate Pheno System is FALSE?

- A: Performs testing directly from positive blood cultures
- B: Performs simultaneous testing with multiple samples on the same
- C: Utilizes automated fluorescence in-situ hybridization technology to
- D: Generates phenotypic antimicrobial susceptibility results within an

Which of the following statements most accurately describes the impact of rapid diagnostic testing with antimicrobial stewardship support in patients with bloodstream infections?

- A: Exposure to broad spectrum therapy is increased
- B: Time to administration of effective therapy for multidrug resistant c
- C: Benefits on patient outcomes may be attenuated if there is no me
- D: Potential increases in operational expenses are not justifiable

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-723-L04-P

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

EVALUATING FLUOROQUINOLONE USE AFTER IMPLEMENTATION OF AN ANTIMICROBIAL STEWARDSHIP INITIATIVE FOR HEALTHCARE ASSOCIATED PNEUMONIA (HCAP) AND HOSPITAL-ACQUIRED PNEUMONIA (HAP)

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Background: Fluoroquinolone resistance rates have been increasing since the 2005 IDSA/ATS guidelines for treating hospital-acquired pneumonia (HAP), healthcare associated pneumonia (HCAP), and ventilator-associated pneumonia (VAP) were released. These guidelines recommended empiric double coverage for *Pseudomonas aeruginosa* in HAP and HCAP, overestimating the incidence of multi-drug resistant organisms. The 2016 IDSA/ATS guidelines and more recent studies suggest that not all patients require double coverage for *Pseudomonas*. At Borgess Medical Center, *Pseudomonas* resistance rates increased in 2014 due to excessive intravenous and oral fluoroquinolone use. To address the rising resistance rates, BMC removed ciprofloxacin from all HCAP and HAP order sets, leaving levofloxacin as an option for patients who had failed empiric B-lactam therapy or had true B-lactam allergies. **Purpose:** The purpose of this study is to evaluate the effectiveness of an antimicrobial stewardship initiative aimed at reducing unnecessary double coverage of *Pseudomonas* in HAP and HCAP, with the goal of decreasing unnecessary fluoroquinolone antibiotic use. **Methods:** The study is a retrospective chart review comparing patients pre- and post-implementation of new HCAP and HAP order sets. The pre-implementation group included patients from July 1, 2014 to June 30, 2015, whereas the post-implementation group included patients from July 1, 2016 to June 30, 2017. The study's primary outcome is reduction in fluoroquinolone use, in terms of defined daily dose. Secondary outcomes include: determining current fluoroquinolone resistance rates at BMC, the number of patients receiving empiric double coverage for *Pseudomonas* within 24 hours of hospitalization, rates of *Clostridium difficile* infection, hospital and ICU lengths of stay, duration of antibiotic therapy, readmission rates within 30 days of hospital discharge, in-hospital mortality, and time to appropriate antimicrobial therapy in patients with known bacterial infection. **Results & Conclusions:** Data collection is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify patients who are eligible for single antibiotic coverage for *Pseudomonas* when admitted to the hospital for HCAP or HAP.

Discuss ways to reduce unnecessary fluoroquinolone usage in your own institution.

Self Assessment Questions:

Which of the following is a risk factor for multi-drug resistant organisms that would indicate a need for empiric double coverage of *Pseudomonas* per the 2016 IDSA/ATS guidelines?

- A: Structural lung disease
- B: Oral antibiotic use within the previous 6 months
- C: Resident of an assisted living facility
- D: Patients with controlled type 2 diabetes

Which of the following was a method discussed in the study to reduce the use of fluoroquinolone antibiotics?

- A: Elimination of ciprofloxacin from the hospital formulary
- B: Restricting the use of levofloxacin to patients whose cultures have
- C: Educating physicians on recent changes to IDSA/ATS guideline re
- D: Limit the prescribing of fluoroquinolone antibiotics to infectious dis

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-395-L01-P

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

RETROSPECTIVE REVIEW OF ANTIEMETIC USE IN CARBOPLATIN DOSES WITH AN AREA UNDER THE CURVE (AUC) GREATER THAN OR EQUAL TO FOUR

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Purpose: Carboplatin has historically been classified as a moderate emetogenic potential agent in the National Comprehensive Cancer Network (NCCN) guidelines since US Food and Drug Administration approval in 1989. The updated 2017 antiemesis guidelines reclassified carboplatin doses with an AUC greater than or equal to four as a high emetic risk and doses with an AUC less than four as moderate emetic risk. The purpose of this study is to determine if antiemetic regimen escalation from moderate to high risk was clinically necessary for patients receiving carboplatin doses with an AUC greater than or equal to four. **Methods:** Retrospective chart review will be completed by utilizing electronic medical records to identify patients who have received at least one dose of carboplatin with an AUC greater than or equal to four at OhioHealth Riverside Methodist Hospital or Bing Cancer Center during the enrollment period. The primary objective of this study is to evaluate the number of patients that required the addition of at least one supplemental antiemetic agent that warrants a progression from a moderate to a high antiemetic regimen. Other data points will include determining the proportion of patients that required any additional supplemental antiemetic agent whom were treated with multiple chemotherapy based regimens, and the proportion of patients that had ovarian cancer versus other primary cancer origins. Additionally, the total and average cost per patient with the addition of supplemental antiemetic agents will be evaluated. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the classification of high emetic risk chemotherapy agents according to the National Comprehensive Cancer Network.

Review the current recommendations from the National Comprehensive Cancer Network for the treatment regimens indicated for high emetic risk chemotherapy agents.

Self Assessment Questions:

What is the rate of emesis associated with chemotherapy agents that are categorized as high emetic risk?

- A 50%
- B: 60%
- C: 75%
- D: Greater than 90%

Which of the following antiemetic agents is a NCCN category 1 recommendation in high emetic risk regimens?

- A Fosaprepitant
- B Metoclopramide
- C Prochlorperazine
- D Haloperidol

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-724-L01-P

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

EVALUATING THE IMPACT OF WEEKEND ANTIMICROBIAL STEWARDSHIP

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Purpose: To compare antibiotic utilization following implementation of a formal, pharmacist-led antimicrobial stewardship program on weekends compared to an historic control group with stewardship services limited to weekdays. **Methods:** This pre-post controlled quasi-experimental study will evaluate the impact of expanding antimicrobial stewardship services from Monday through Friday to seven days per week. Adult and pediatric hospitalized patients treated with restricted antimicrobial agents between August 1, 2016 and January 30, 2017 or between August 1, 2017 and January 30, 2018 will be included. Data will be collected from the electronic health record and will include patient demographics, comorbidities, and antimicrobial agent-specific and infection-specific data. The primary outcome will include overall and individual antimicrobial days of therapy (DOTs) per 1,000 patient days present. The secondary outcomes of the study will be drug cost, number of restricted antimicrobial orders, and mean duration of restricted antimicrobials. Interrupted time series analysis will assess the primary outcome. Statistical significance and effect size will be calculated by segmented regression analysis of interrupted time series drug utilization for the 6-month period before and after start of the intervention. Chi-square tests will evaluate differences in DOTs and mean duration of therapy between groups, matching by day of service. Data will also be stratified by age classification (pediatric or adult) and similar statistical testing will be performed to evaluate the statistical effect of program implementation in each group. **Preliminary Results:** Data is being collected through January 30, 2018. 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:

Recognize the positive impacts of antimicrobial stewardship programs on clinical outcomes and health care costs

Describe the effects of weekend antimicrobial stewardship pharmacy services on drug utilization at Michigan Medicine

Self Assessment Questions:

Which of the following is a goal of antimicrobial stewardship programs?

- A To optimize clinical outcomes
- B: To minimize consequences of antimicrobial use
- C: To reduce unnecessary health care costs
- D: All of the above

Which of the following is an accurate definition of days of therapy (DOTs)?

- A The total number of calendar days during which a patient receives
- B The total number of calendar days during which a patient receives
- C The total number of calendar days during which a patient receives
- D The total number of calendar days during which a patient receives

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-396-L01-P

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

CLINICAL OUTCOMES WITH ACID SUPPRESSION AND PAZOPANIB IN RENAL CELL CARCINOMA AND SOFT TISSUE SARCOMA

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Background: Many targeted oral anti-cancer therapy medications show pH dependent absorption. Oral bioavailability of tyrosine kinase inhibitors can be decreased when pH is increased by acid reducing agents. Many patients undergoing cancer treatment frequently use acid suppressing agents such as proton pump inhibitors (PPIs) or H2-receptor antagonists (H2RA) for symptomatic relief of gastroesophageal reflux disease, dyspepsia or gastritis that is typically related to disease treatment. This interaction is documented in prescribing information, but is largely ignored by medical professionals. There currently is a small body of evidence that demonstrates clinically significant drug interactions of PPIs and H2RAs. Pazopanib is a multi-tyrosine inhibitor that is indicated for the treatment of renal cell carcinoma and soft tissue sarcoma. This study aims to further identify clinical outcomes acid suppression in patients with soft tissue sarcoma and renal cell carcinoma. **Methods:** This study will be a retrospective study using existing identified patient data in medical records. Patients will be included in this study based on history of pazopanib prescription along with a diagnosis of soft tissue sarcoma or renal cell carcinoma. Patients will be included that are greater than 18 years or older. This study will evaluate concomitant therapy with pazopanib and acid suppression with proton pump inhibitors or H2 receptor antagonists including omeprazole, esomeprazole, pantoprazole, lansoprazole, dexlansoprazole, rabeprazole, famotidine, nizatidine, ranitidine, and cimetidine. Concomitant acid suppression and pazopanib therapy will be considered clinically significant if therapy overlap occurs for greater than 20% of treatment duration. The primary outcome will be overall survival per cohort with secondary outcome being progression-free survival.

Results/ Conclusion: Currently in progress, data will be presented at Great Lakes Pharmacy Research Conference

Learning Objectives:

Explain oral targeted therapy treatment options for soft tissue sarcoma and renal cell carcinoma

Describe the mechanism of acid suppression and drug interactions with tyrosine kinase inhibitors

Self Assessment Questions:

Which of the following is a tyrosine kinase inhibitor that is used for the treatment of soft tissue sarcoma and renal cell carcinoma?

- A: Erlotinib
- B: Gefitinib
- C: Osimertinib
- D: Pazopanib

Which of the following medications decreases bioavailability of tyrosine kinase inhibitors?

- A: acetaminophen
- B: ketoconazole
- C: pantoprazole
- D: valacyclovir

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-397-L01-P

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

RISK OF DEVELOPING ACUTE KIDNEY INJURY IN HOSPITALIZED PATIENTS TREATED WITH THE COMBINATION OF VANCOMYCIN PLUS PIPERACILLIN-TAZOBACTAM VERSUS PIPERACILLIN-TAZOBACTAM ALONE

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Purpose: Vancomycin and piperacillin-tazobactam are two antimicrobials commonly used for the empiric coverage of Gram-positive and Gram-negative pathogens, respectively. However, the combination of both medications has been associated with an increased risk for developing acute kidney injury (AKI). The primary objective of this study is to evaluate the difference in the incidence of AKI with the combination of vancomycin plus piperacillin-tazobactam versus piperacillin-tazobactam alone in hospitalized patients. **Methods:** This study has been submitted to the hospital's Institutional Review Board for approval. A retrospective chart review of the electronic medical record (EMR) at the hospital will be conducted on 100 adult patients. Inclusion criteria include at least 48 hours of therapy with piperacillin-tazobactam alone or vancomycin with concomitant piperacillin-tazobactam, between July 1, 2017 and September 30, 2017, and a baseline serum creatinine (SCr) concentration value within 24 hours of hospital admission. Patients will be excluded from the study if they are less than 18 years, pregnant, or underwent renal replacement therapy. Patients will be assessed for AKI sustained during hospitalization and the time to development. The following data will be collected: age, gender, ethnicity, blood urea nitrogen (BUN), baseline SCr, hypotension, evidence of a systemic inflammatory response syndrome (SIRS), indication for antibiotic, and current medications including: angiotensin converting enzyme inhibitors (ACEi), angiotensin receptor blockers (ARBs), IV contrast exposure, acyclovir, aminoglycosides, calcineurin inhibitors, loop diuretics, non-steroidal anti-inflammatory drugs (NSAIDs), sulfonamides, and tenofovir. All data will be reviewed without patient identifiers and maintained confidentially. Changes in renal function will be evaluated using the RIFLE criteria (Risk, Injury, Failure, Loss of kidney function, and End-stage kidney disease). The RIFLE criteria will serve as an assessment tool for the development of AKI. **Results/Conclusions:** Data collection is currently in progress. Results will be presented at the Great Lakes Pharmacist Resident Conference.

Learning Objectives:

List three additional risk factors for the development of acute kidney injury while a patient is on vancomycin and piperacillin-tazobactam

Discuss two signs that indicate the development of acute kidney impairment

Self Assessment Questions:

Which of the following is a risk factor for the development of acute kidney injury?

- A: Combination of piperacillin-tazobactam and scopolamine
- B: History of migraine headaches
- C: Combination of piperacillin-tazobactam and vancomycin
- D: History of creatinine clearance greater than 100 mL/min

Which combination therapy has the highest risk for the development of acute kidney injury?

- A: metronidazole + linezolid
- B: IV contrast dye + gentamicin
- C: clindamycin + piperacillin-tazobactam
- D: vancomycin + micafungin

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-867-L01-P

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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Purpose: Due to limited efficacy and safety data of Direct Oral Anticoagulants (DOACs) in patients with obesity, this study aims to describe the prescribing pattern of oral anticoagulants in patients with a BMI greater than 40 kg/m² and/or weight greater than 120 kg at our institution and determine the efficacy and safety of oral anticoagulants in this patient population. **Method:** This is a retrospective, observational study that includes patients 18 years or older with a history of venous thromboembolism (VTE) and/or atrial fibrillation with an outpatient prescription for either warfarin or a DOAC. Patients will be included if they have a BMI > 40 kg/m² and/or weight >120 kg. Pregnant women and patients on anticoagulation for orthopedic VTE prophylaxis or any off label indication will be excluded from this study. Patients with an electronic prescription order in Cerner for a DOAC or warfarin and an ICD 9 or ICD 10 code for obesity will be screened for eligibility by performing a chart review. The primary outcome is the number of warfarin or DOAC prescriptions in patients with obesity. Secondary outcomes include any recurrent VTEs or strokes to assess efficacy and any major or minor bleeding events to assess safety. **Preliminary results and conclusion:** Between August 2014 and August 2017, 332 patients with a BMI > 40 kg/m² and/or weigh >120 kg were prescribed an oral anticoagulant. Of these patients, 59% (196) were prescribed warfarin and 41% (136) were prescribed a DOAC. Further data collection and analysis on outcome data of DOACs compared to warfarin are ongoing and results will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe how obesity can influence the pharmacokinetics properties of direct oral anticoagulants (DOACs)

Discuss current guidance regarding the use of DOACs in patients with obesity

Self Assessment Questions:

Current guidance from the International Society on Thrombosis and Haemostasis (ISTH) suggests DOACs should not be used in the following patients due to limited clinical data

- A: Patients with a BMI 25 kg/m² and/or weight 90 kg
- B: Patients with a BMI 30 kg/m² and/or weight 100 kg
- C: Patients with a BMI 35 kg/m² and/or weight 110 kg
- D: Patients with a BMI 40 kg/m² and/or weight 120 kg

In a pharmacokinetic study of apixaban in patients at extremes of body weight, all of the following are true of patients in the high body weight group compared to patients in the reference group, except

- A: Patients in the high body weight group had a lower peak apixaban
- B: Patients in the high body weight group had a higher volume of distribution
- C: Patients in the high body weight group had a longer half-life of apixaban
- D: Patients in the high body weight group had lower drug exposure

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-398-L01-P

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

EVALUATION OF URINE CULTURES IN PATIENTS DISCHARGED FROM THE EMERGENCY DEPARTMENT (ED)

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Purpose: Urinary tract infections (UTIs) are commonly treated empirically in the emergency department (ED). Many of the patients treated will have a urine culture collected before they are discharged. The most common pathogen in UTIs is *Escherichia coli* (*E. coli*), but other pathogens may be found. Commonly prescribed empiric treatment includes cephalexin, nitrofurantoin, ciprofloxacin, and sulfamethoxazole-trimethoprim (SMZ-TMP). One study found the following risk factors for emergency room return visits (ERVs) within 30 days in patients treated with UTIs: age ≥ 65, skilled nursing facility resident, pregnancy, dementia, psychiatric disorder, obstructive uropathy, healthcare exposure, temperature ≥ 38 Celsius degrees, heart rate > 100, and bacteremia. Another study found that the following factors were associated with extended-spectrum beta-lactamase (ESBL)-producing *E. coli* in community-acquired UTIs: genitourinary pathology, previous bacterial infection, intravenous antibiotic treatment, hospitalization in the previous 12 months, and previous exposure to second generation cephalosporins. The aim of this study was to evaluate urine cultures in patients discharged from the ED and to determine risk factors for resistance to the four most commonly prescribed antibiotics for UTIs. **Methods:** This was a retrospective chart review of patients from October 2017 through November 2017 who had a urine culture collected in the ED prior to being discharged from the ED. **Objectives:** The primary objective of this study was to determine the incidence of positive urine cultures in patients discharged from the ED. The primary endpoint is percentage of patients with positive urine cultures in patients discharged from the ED. Secondary endpoints include proportion of patients with both positive and negative cultures treated with empiric antibiotics, incidence of empiric antibiotic resistance, and predictors for empiric therapy resistance. **Results and conclusions:** to be reported at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the most common pathogens associated with urinary tract infections.

Select appropriate empiric therapy for patients discharged from the ED.

Self Assessment Questions:

What is the most common pathogen associated with UTIs?

- A: *Proteus mirabilis*
- B: *Staphylococcus aureus*
- C: *Klebsiella pneumoniae*
- D: *Escherichia coli*

Which of the following is an appropriate empiric antibiotic for a UTI in a patient with an anaphylaxis penicillin allergy?

- A: Sulfamethoxazole-trimethoprim
- B: Clindamycin
- C: Azithromycin
- D: Cephalexin

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-399-L01-P

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

ADHERENCE RATES TO RISK EVALUATION AND MITIGATION STRATEGIES LAB MONITORING REQUIREMENTS FOR ENDOTHELIN RECEPTOR ANTAGONISTS AND SOLUBLE GUANYLATE CYCLASE AGONISTS IN OUTPATIENT CLINICS

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Purpose: The Food and Drug Administration (FDA) Amendments Act of 2007 allowed the FDA to require Risk Evaluation and Mitigation Strategies (REMS) from drug manufacturers to ensure that high-risk medications have benefits that outweigh the risks. While the FDA requires participation in REMS requirements, the adherence is largely unknown. The objective of this study is to describe adherence rates to REMS lab monitoring requirements for bosentan, ambrisentan, macitentan, and riociguat in the outpatient setting. The findings will fill the gap in the literature regarding REMS adherence, and may identify gaps in safety management of REMS at this institution. **Methods:** This study is Institutional Review Board Approved. This will be a retrospective chart review of approximately 100 patients seen at outpatient clinics from 1/1/2008 until 6/29/2017. The electronic medical record system will identify patients who were prescribed bosentan, ambrisentan, macitentan, or riociguat. Baseline characteristics including patient age at date of study entry and gender will be collected. If the patient gender is female, documentation in the medical record that the patient is of reproductive potential will also be collected. Prescriber specialty will be collected. Medication data that will be collected includes name, dose, frequency, prescription order date, dispense quantity, indication, and date of discontinuation. Pregnancy tests, liver function tests, and dates associated with the lab tests will also be collected. Adherence rates will be calculated by dividing the time on medication in months that is associated with a required lab test by the total time on medication in months. Secondary outcomes include REMS adherence rates stratified by medication, clinic intervention when lab is not done or is abnormal, provider adherence, patient adherence, trends in adherence, interruptions in therapy due to REMS requirements not being met, pregnancy outcomes, and liver function outcomes. **Results:** Data pending **Conclusions:** Data pending

Learning Objectives:

Describe the REMS lab monitoring requirements for bosentan, ambrisentan, macitentan, and riociguat.

Explain the purpose of Elements to Assure Safe Use (ETASU).

Self Assessment Questions:

Which statement is true about the REMS lab monitoring requirements for bosentan, ambrisentan, macitentan, and riociguat?

- A: All four medications require monthly pregnancy tests and liver function tests
- B: Only bosentan requires monthly liver function test monitoring
- C: After baseline labs are obtained, there is no need for monthly lab tests
- D: Monthly pregnancy testing is required for all females

Which is true regarding Elements to Assure Safe Use (ETASU)?

- A: Aims to reduce a specific risk associated with a drug
- B: Can include specific training, certification, laboratory testing, monitoring
- C: Are required medical interventions or actions that need to be completed
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-868-L05-P

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

COMPARATIVE EFFICACY OF SUGAMMADEX VERSUS NEOSTIGMINE FOR REVERSAL OF NEUROMUSCULAR BLOCKADE IN OPERATING ROOMS

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Purpose: Within the Cleveland Clinic Health System (CCHS), the use of sugammadex (Bridion®; Merck & Co., Inc.) has increased markedly over the past year for neuromuscular blockade reversal in operating rooms. Because there are currently no health system protocols, guidelines, or formulary restrictions describing whether neostigmine or sugammadex should be used for neuromuscular blockade reversal, it is largely the anesthesiologist's discretion as to which drug is administered. The majority of current published literature defines adequate neuromuscular blockade reversal by a train of four ratio (TOFR) measured by acceleromyography; however, acceleromyography is not widely used by anesthesiologists. This study aims to examine extubation rate as a marker of neuromuscular blockade reversal, which would allow for a greater real-world understanding of the effectiveness of sugammadex versus neostigmine for neuromuscular blockade reversal. **Methods:** This is a retrospective, non-inferiority trial including patients within the CCHS. Patients will be identified into the study based upon the administration of neostigmine between May 1, 2015–April 30, 2016 or sugammadex between June 1, 2016–May 31, 2017 in the operating rooms. The primary objective is to compare the rate of extubation in patients who received sugammadex versus neostigmine in operating rooms. Secondary objectives include evaluating adverse effects and comparing the time to complete reversal following administration of sugammadex versus neostigmine. Non-inferiority will be concluded if the 2-sided lower bound of the 95% CI for the differences in extubation rate is no greater than 10% lower than sugammadex. An estimated 384 patients are required to achieve 80% power to detect the non-inferiority margin. The primary endpoint will be analyzed using a paired Chi-square test and secondary endpoints will be analyzed using descriptive statistics, the student's t-test, and the Kaplan-Meier survival analysis. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify potential adverse effects associated with neostigmine.
Describe the mechanism of action of sugammadex.

Self Assessment Questions:

Which potential adverse effect is associated with neostigmine?

- A: Tachycardia
- B: Itching
- C: Bradycardia
- D: Dizziness

Which of the following describes the mechanism of action of sugammadex?

- A: Blocks acetylcholine from binding to the motor endplate
- B: Encapsulates aminosteroid neuromuscular blocking agents
- C: Inhibits destruction of acetylcholine by acetylcholinesterase
- D: Prevents neuromuscular blocking agents from binding to the motor endplate

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-725-L01-P

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

ONCOLOGY SPECIALTY PHARMACISTS TARGETING FINANCIAL TOXICITY

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The purpose of this study is to evaluate the impact of financial assistance interventions at the University of Chicago Medicine (UCM) Oncology Specialty Pharmacy. The objective of this study is to evaluate how an Oncology Specialty Pharmacy at a large academic medical center helped patients obtain high cost specialty oncology medications through cost savings and prompt benefits investigation. In this study, we retrospectively analyzed the financial impact of the Oncology Specialty Pharmacy from January 2017 to June 2017. The pharmacy staff identified patients with high copays and helped facilitate applications to Patient Assistance Programs (PAPs), trial and copay cards, and foundations to reduce financial toxicity. The secondary endpoint was the number of days from the physician's initial referral date to prior authorization (PA) approval, as well as financial assistance approval if applicable. Inclusion criteria for this study were an oncology ICD-10 diagnosis and at least one specialty prescription filled at the UCM Pharmacy in the six-month timeframe. Exclusion criteria were prescriptions not filled due to out-of-network prescription insurance and medications directly received from PAPs. In six months, the UCM Oncology Specialty Pharmacy filled prescriptions for 233 patients, in which 75 patients required financial assistance. A total of \$312,028 was saved among the 75 patients (range of \$5 – \$13,138) with an average of \$15,229 saved per patient using a trial card or PAP (n=14), and \$1,594 saved per patient using a copay card or foundation grant (n=61). The most common medications were peg-filgrastim, dasatinib, abiraterone, filgrastim, and palbociclib. The average turnaround time from start of referral to PA or appeal approval was 2 days, and 1.2 days from insurance to financial assistance approval. Our findings demonstrate that the UCM Oncology Specialty Pharmacy reduced patients' financial toxicity, and improved access to medications with timely insurance and financial assistance approval.

Learning Objectives:

List three types of financial assistance pharmacists can utilize to help their patients afford specialty medications.
Identify potential barriers to obtaining a specialty medication for patients with cancer.

Self Assessment Questions:

What are three types of financial assistance programs that pharmacists can utilize to help their patients afford specialty medications

- A: Manufacturer patient assistance programs, trial/copay cards, 340E
- B: Trial/copay cards, foundation grants, 340B drug pricing
- C: Manufacturer patient assistance programs, 340B drug pricing, four
- D: Trial/copay cards, manufacturer patient assistance programs, four

What are potential barriers for patients with cancer to obtain specialty oncology medications?

- A: Obtaining prescription prior authorization
- B: Lack of time and familiarity
- C: Prescription, provider, transportation
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-726-L04-P

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

THE URGENT NEED FOR URGENT CARE ANTIMICROBIAL STEWARDSHIP: EVALUATING PRESCRIBING APPROPRIATENESS AND PATIENT OUTCOMES ASSOCIATED WITH A PHARMACIST-LED CULTURE FOLLOW-UP PROGRAM

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Purpose: Antimicrobial resistance has been recognized as one of the most serious threats to public health. The Joint Commission (TJC) has implemented antimicrobial stewardship standards for acute care hospitals that became effective January 1, 2017. Although the initial TJC antimicrobial stewardship program standards are directed towards healthcare organizations such as acute care hospitals and nursing homes, attention to implementing antimicrobial stewardship initiatives is starting to expand to other practice settings such as ambulatory care. While there are many programs that have highlighted antimicrobial stewardship successes in the emergency department (ED) and primary care centers, there is a paucity of literature exploring antimicrobial stewardship initiatives within urgent care sites. This study aims to determine the impact of implementing a pharmacist-led urgent care culture follow-up program on total antimicrobial prescribing appropriateness. Methods: This Institutional Review Board approved quasi-experimental study was conducted using Mercy Health Saint Mary's (MHSM) electronic medical records database. In April 2015, the MHSM infectious diseases (ID) and ED pharmacists, with support from urgent care, ED, and ID providers, developed and initiated a collaborative practice agreement (CPA) which allows for pharmacist-led culture follow-up to the hospital's two affiliated, free-standing urgent care facilities. This study reviewed the appropriateness of antibiotic prescribing for 300 patients evaluated at Mercy Health urgent care facilities: 150 patients pre-CPA and 150 patients post-CPA. Prescribing appropriateness is defined as the combination of drug selection and duration of therapy according to institutional guidelines and chosen dose based on patient-specific characteristics. Patients were excluded if they had a culture other than wound or urine or required inpatient admission. Outcomes measured on a nominal scale will be assessed using a Chi-square test while those measured on a continuous scale will be assessed using a student's t-test. Results and Conclusion: To be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

List the antimicrobial stewardship standards The Joint Commission has implemented for acute care hospitals.
Discuss the impact of implementing a pharmacist-led culture follow-up program.

Self Assessment Questions:

1. Which of the following is not an implemented standard set by The Joint Commission for antimicrobial stewardship programs in acute care hospitals?
 - A: A. Maintained document indicating how each core element is addressed
 - B: B. An improvement opportunity plan for surveyors based on collected data
 - C: C. An accountability document describing the formal chain of responsibility
 - D: D. Specific, outlined antimicrobial stewardship data points used to monitor progress
2. Which of the following is a measurable benefit of implementing a pharmacist-led culture follow-up program?
 - A: A. Increased healthcare costs
 - B: B. Reduced 96-hour emergency department revisit rate
 - C: C. Increased inappropriate antimicrobial prescribing
 - D: D. Longer median time to culture review

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-727-L04-P

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

EVALUATION OF A PHARMACIST-LED ORAL CHEMOTHERAPY EDUCATION AND MONITORING PROGRAM IN A COMMUNITY CANCER CENTER

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Purpose: The purpose of this study is to evaluate the influence of a pharmacist-led education and monitoring program has on patients starting oral cancer medicines. At Cowell Family Cancer Center, a 46-chair ambulatory infusion center in northern Michigan, a pharmacist led education and monitoring program was implemented starting October 1st, 2017. In this new process, the pharmacist reviews the prescription sent to the specialty pharmacy, performs a medication reconciliation, completes a 1-hour in person education appointment, and approximately 1 week after starting cycle 1 and 2 a pharmacist contacts the patient by phone and assesses adherence and tolerability of the new oral chemotherapy. **Methods:** Data will be collected via the electronic health record for patients starting therapy between November 1st, 2017 and March 1st, 2018. **Inclusion criteria:** patients starting abiraterone, capecitabine, enzalutamide, erlotinib, and temozolomide for the first time during the study period. **Exclusion Criteria:** medication discontinued prior to starting medication, previously received the prescribed medication, or education not performed by a pharmacist. Additionally, data will be collected from a retrospective comparison group meeting the same inclusion and exclusion criteria from the same period 1 year prior. Data collected includes patient demographics, diagnosis, oral chemotherapy medication, type of intervention identified, number of missed doses and the reason, number of grade 3 or higher adverse events, number of prescription medications, number of complementary medications, and incidence of hospital or emergency department visits. The primary objective is to measure the number of interventions identified by a pharmacist. Secondary objectives include number of interventions accepted by the provider and number of emergency department visits and/or hospital admissions. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify common pharmacist interventions in patients initiating an oral chemotherapy medication

Recognize the role pharmacists play in educating and monitoring patients initiating an oral chemotherapy medication

Self Assessment Questions:

Which of the following are common interventions that pharmacists make for patients taking an oral cancer medication?

- A Drug-drug interactions
- B: Missing supportive care medications
- C: Reporting, monitoring, and managing side effects of medications
- D: All of the above

What is the most common time that pharmacists made interventions?

- A While review the prescription
- B After scanning for drug-drug interactions
- C When counseling the patient
- D When performing follow-up calls

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-400-L01-P

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

IMPLEMENTATION OF A PATIENT-EDUCATION TOOL: EFFECT ON THE ABILITY OF RENAL TRANSPLANT RECIPIENTS TO ACCURATELY REPORT MEDICATIONS AT FIRST POST-OPERATIVE CLINIC VISIT

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Purpose: The objective of this study is to determine if the MedActionPlan™ medication list improves patient understanding of medication regimens. **Methods:** Post-operative kidney transplant patients will receive the standard of care patient medication list at discharge or the standard of care plus MedActionPlan™. A protocol for this study was approved by the Indiana University Health Institutional Review Board. Kidney transplant patients without previous transplants will be enrolled into the prospective study following informed consent. Patients will be randomized into one of two arms, standard of care discharge medication list or a MedActionPlan™ medication list in addition to the standard of care medication list. Patient understanding of medication instructions and indications will be evaluated at their first post-operative clinic visit. Results will be compared to determine if the education tool is more effective than current standard of care medication list in helping patients understand their medications. Primary endpoints include number of mistakes patients make with reporting medication instructions and indications. Secondary endpoints include patient self-reported confidence score and 7 day readmission rate. **Results:** Based on results from 48 patients, the control group had an average of 0.3 medication instruction mistakes while the intervention group had an average of 0.04, which was a statistically significant difference ($p < 0.02$). As far as reporting indications correctly, the control group had an average of 2.2 mistakes whereas the intervention group had an average of 0.3 mistakes, which was also statistically significant ($p = 0.004$). Baseline characteristics were similar in both groups. Secondary outcomes will be evaluated after more patients are enrolled.

Conclusion: Preliminary results suggest that MedActionPlan™ improves patient understanding of medication instructions and indications for post-operative kidney transplant patients. This tool may be helpful for other types of transplant patients or any patients with complex medication instructions.

Learning Objectives:

Describe a novel medication patient education tool, MedActionPlan™.

Report results of previous literature that supports the use of MedActionPlan™.

Self Assessment Questions:

Which of the following functions does MedActionPlan™ provide?

- A Ability for healthcare provider to see patients' wearable data.
- B: Ability for healthcare providers to print or push a medication schedule
- C: Ability to track 7 day readmission rate.
- D: Insight on patient ability to fill pill box correctly.

Which of the following is correct in regards to data published from previous MedActionPlan™ studies?

- A 48% reduction in 30-day readmissions.
- B 48% improvement in HCAP scores.
- C 48% improvement in patient understanding of medications.
- D 48% reduction in length of stay for transplant patients.

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-869-L05-P

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

PRE-TRANSPLANT VACCINATION ADHERENCE IN PEDIATRIC SOLID ORGAN TRANSPLANT PATIENTS AT A LARGE ACADEMIC MEDICAL CENTER

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Purpose: Adherence rates for recommended pre-transplant vaccinations in pediatric patients is variable and practice-dependent. Cleveland Clinic Children's Hospital (CCCH) employs an interdisciplinary team approach to optimize care for pediatric solid organ transplant (SOT) patients, however, adherence rates for select pre-transplant vaccinations in this population has not been described. The primary objective of this study is to describe pre-transplant vaccination adherence rates to the following recommended vaccines: hepatitis B, influenza, pneumococcal conjugate, and pneumococcal polysaccharide. Secondary objectives include defining the pre-transplant adherence rate to hepatitis A vaccination for at-risk patients, identifying the reason for partial adherence to vaccinations, identifying the percentage of patients with an infectious disease pre-transplant evaluation, and describing adherence rates across the different solid organs. The results of this evaluation will be used to identify opportunities to improve pre-transplant rates at CCCH. **Methods:** This retrospective cohort study includes patients undergoing initial pediatric heart, kidney, liver, or multi-visceral/intestinal transplantation at CCCH between January 1, 2014 and July 31, 2017. Data collection includes manual chart review and the Ohio Department of Health ImpactSIS (Statewide Immunization Information System). Data collected will include demographics, transplant-related data, immunization administration history, and laboratory quantitative or qualitative values for titer/serology pertaining to vaccine efficacy. Statistics will be descriptive in nature and data will be reported as number (percent), median (interquartile range), or mean \pm standard deviation, as appropriate. **Results and conclusions:** 64 pediatric SOT recipients met criteria for inclusion. The median age was 7.9 years (2.1, 15.6). The majority of patients were male (62.5%) and American (73.4%). The most common transplant performed was heart (41.2%), followed by liver (25%), kidney (20.6%), and intestine/multi-visceral (13.2%). Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize barriers of vaccination in the pediatric pre-transplant population.

Identify risk factors that will establish the indication for hepatitis A vaccination in a pediatric patient receiving a solid-organ transplant.

Self Assessment Questions:

Which of the following is a potential barrier to vaccination in pediatric transplant patients?

- A Pediatric patients are not at-risk for infections pre-transplant and t
- B: Children receive the most advanced care physicians and caregiver
- C: Vaccines are believed to be as effective post-transplant as they ar
- D: Concern that the patient is too ill to receive a vaccine

Which of the following patients should receive Hepatitis A vaccination prior to transplant?

- A A 3-year old Ohio native patient undergoing liver transplant evalua
- B A 6-month old patient from Saudi Arabia undergoing heart transpl
- C A 5-year old Indiana native patient undergoing intestinal transplan
- D A 6-year old Pennsylvania native patient undergoing kidney transp

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-908-L06-P

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

IMPLEMENTATION OF A PEDIATRIC PHARMACY EDUCATION PROGRAM AT A COMMUNITY REGIONAL MEDICAL CENTER

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Background: Most pharmacists receive limited formal training in pediatric pharmacotherapy. Parkview Health currently does not have a formal training program for staff that verify or dispense pediatric medication orders. Numerous studies have demonstrated the benefit of additional pharmacist training and education in pediatric and neonatal pharmacotherapy. These studies have shown educational programs in pediatric and neonatal pharmacotherapy decrease medication errors and improve patient outcomes. In addition, the American Society of Health System Pharmacists and the Pediatric Pharmacy Advisory Group recommends that pharmacy departments should provide adequate training for all staff members who may be called upon to provide care to pediatric patients. The educational program in this study was designed with a goal of improving patient outcomes, decreasing medication errors and ensuring pharmacists have baseline knowledge required to care for pediatric and neonatal patients safely and effectively. **Purpose:** The purpose of this study is to implement a pediatric education program designed for this institution and to evaluate the success through measuring outcomes related to both comfort and competence of pharmacists in pediatric and neonatal pharmacotherapy. **Methods:** Eight educational modules were designed to provide education. Topics were chosen based on the most prevalent admission diagnoses within the health network for pediatric and neonatal admissions from 2015 to 2017. This prospective quality improvement study will assess changes in confidence and competence pre to post-education. All pharmacists were eligible for inclusion throughout the health system. Time in the verification queue for pediatric and neonatal orders will also be compared pre to post-education as an objective surrogate marker for comfort and competence. Additionally, a provider survey was conducted pre and post-education to assess the providers' perspective of the quality and necessity of pharmacist-provider interactions.

Results/Conclusions: Results and conclusions will be presented at the 2017 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define the importance of pharmacist education in pediatric and neonatal pharmacotherapy

Describe the impact of a pediatric educational program designed for pharmacists

Self Assessment Questions:

Which of the following is a potential benefit of additional pharmacist training in pediatric and neonatal pharmacotherapy as demonstrated in previous studies?

- A Increases medication errors
- B: Increases pharmacist workload
- C: Ensures pharmacists have baseline knowledge required to care fo
- D: Increases physician satisfaction

Which of the following statements is correct?

- A Most pharmacists receive extensive formal training in pediatrics
- B ASHP/PPAG recommend adequate training for pharmacists for pe
- C Additional education in pediatrics is rarely needed
- D Pharmacists do not play a role in pediatric pharmacotherapy

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-728-L04-P

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

IMPACT OF VANCOMYCIN-RESISTANT ENTEROCOCCUS COLONIZATION IN HEMATOPOIETIC STEM CELL TRANSPLANT PATIENTS

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PURPOSE: Bloodstream infections due to vancomycin-resistant Enterococcus (VRE) are an established complication following hematopoietic stem cell transplant (HSCT) and some studies have shown increased morbidity and mortality. For this reason, screening for VRE colonization is standard practice among HSCT centers but there is no consensus on the association between VRE colonization and bloodstream infections or overall outcomes. Various HSCT sites have published their single-center data in the past ten years; however, variations in practices make extrapolations difficult among transplant centers. In addition, our center is interested in the gram-negative overgrowth that can be seen on a subset of VRE swabs to determine if there is a correlation with extended-spectrum beta lactamase (ESBL) infections. There is no published literature in the HSCT population on this topic to our knowledge. The purpose of this research is to examine possible correlation between VRE or gram-negative colonization and incidence of VRE or ESBL bloodstream infections and associated outcomes in HSCT patients. **METHODS:** This is an IRB-approved, retrospective study of HSCT patients at Northwestern Memorial Hospital. Study period will be from January 1, 2013 to December, 31 2016. Patients will be divided into three cohorts based on VRE swab results during admission for HSCT. The primary outcome will be to compare rates of VRE bloodstream infections in patients who are colonized versus those who are not. For the secondary outcome of interest, incidence of ESBL bloodstream infections, the study population will be split between those with gram-negative overgrowth on VRE screening and those without. Additional secondary outcomes will include incidence of other multidrug resistant infections, rate of VRE or ESBL directed antibiotic therapy, in-hospital mortality, time to neutrophil engraftment, and length of stay. **RESULTS/CONCLUSION:** To be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the possible correlation between vancomycin-resistant enterococcus (VRE) colonization and bacteremia.
Discuss the risk of infection in patients undergoing a hematopoietic stem cell transplant.

Self Assessment Questions:

What type of bacteria is enterococcus?

- A Gram-positive cocci
- B: Gram-negative cocci
- C: Gram-negative rod
- D: Gram-positive bacilli

Which of the following is true?

- A Patients undergoing autologous transplant are not at risk of infecti
- B The intensity of the transplant conditioning regimen does not affec
- C The source of hematopoietic stem cells does not affect a patient's
- D Patients undergoing HSCT may be at risk for bacterial, viral and fu

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-401-L01-P

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

COST-EFFECTIVENESS ANALYSIS OF INJECTABLE EXTENDED RELEASE NALTREXONE VERSUS BUPRENORPHINE-NALOXONE FOR TREATMENT OF OPIOID DEPENDENCE IN THE UNITED STATES: A PRIMARY CARE PERSPECTIVE

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Purpose: The objective of the study is to evaluate the cost-effectiveness of long-term office-based extended-release naltrexone (XR-NTX) treatment for opioid-dependent patients compared to buprenorphine-naloxone (BUP-NX) from a primary care perspective. BUP-NX orally daily is a μ -receptor partial agonist that can be prescribed by primary care physicians who have obtained special training and licensing to treat opioid dependence. XR-NTX once a month intramuscular injection is a μ receptor antagonist that requires no special licensing to treat opioid dependence in a primary care setting. However, the cost for XR-NTX can be as high as three time of BUP-NX and insurance coverage varies. To date, there has not been a study that investigates cost-effectiveness of XR-NTX compared to BUP-NX from the providers perspective. Such study is especially timely since models of care that integrate Medication-Assisted Treatment (MAT) in the primary care have the potential to expand access to opioid dependence treatments and decrease the personal and societal impact opioid dependence to address the current United States opioid dependence epidemic. **Method:** In this study a decision analytic model simulation of a hypothetical cohort of opioid dependent individuals of office-based XR-NTX versus BUP-NX will be created via TreeAge Software. This study will simulate health outcomes and costs under alternative treatment regimens with a Monte Carlo simulation over a one-year time horizon using a Markov model with daily time cycles. Monthly physician cost, opioid-free day and quality-adjusted life year (QALY) are summed for the period of the analysis comparing XR-NTX and BUP-NX treatment options and incremental cost-effectiveness ratio will be calculated per opioid-free day and QALY gained). Probabilistic sensitivity analysis will be performed to test the robustness of the model assumptions and uncertainty in the individual model parameters. **Results and Conclusions:** Analytical model in progress; to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the advantages and disadvantages with respect to utilizing extended-release naltrexone (XR-NTX)
Discuss the cost-effectiveness of extended-release naltrexone (XR-NTX) versus buprenorphine-naloxone (BUP-NX) for opioid dependence treatment

Self Assessment Questions:

- Which statement is true about extended-release naltrexone (XR-NTX)?
- A Prescribing XR-NTX requires physicians to attain mandatory traini
 - B: The cost per month for XR-NTX can be as high as three time of bu
 - C: XR-NTX is a μ -receptor partial agonist that can be prescribed by p
 - D: XR-NTX is a once a week intramuscular injection

Which statement is true with regard to efficacy results of X:BOT clinical trial?

- A During the induction phase, more participants successfully initiater
- B Subjective opioid craving was significantly less in buprenorphine-n
- C In the intention-to-treat population more patients relapsed in the XI
- D In the per protocol population more patients more patients relapse

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-402-L01-P

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

EVALUATION OF THE INCIDENCE OF CYTOMEGALOVIRUS (CMV) INFECTION WITH VARIOUS GRAFT-VERSUS-HOST-DISEASE (GVHD) PROPHYLAXIS REGIMENS

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Background: Graft-versus-host-disease (GVHD) is an immune response initiated by donor cells against the recipient after allogeneic hematopoietic stem cell transplant (allo-HSCT) and requires prophylaxis. Immunosuppressive therapy used for GVHD prophylaxis can increase risk of cytomegalovirus (CMV) infection, which is associated with increased morbidity and mortality in immunocompromised patients. To date, there are no published studies comparing the risk of CMV infection with various GVHD prophylaxis regimens. **Objectives:** The purpose of this study is to assess the incidence of CMV infection at days 100 and 365 post allo-HSCT in patients that received one of three included GVHD prophylaxis regimens. **Secondarily,** this study will evaluate the incidences of CMV viremia and disease independently and overall survival at days 100 and 365 post allo-HSCT. **Methods:** This is an IRB approved, retrospective cohort study of patients 18 years and older that underwent allo-HSCT between January 1, 2010 and January 1, 2017 and received GVHD prophylaxis with one of the following regimens: tacrolimus (FK)/methotrexate (MTX), bortezomib/tacrolimus/methotrexate, or tacrolimus/methotrexate/antithymocyte globulin (ATG). Patients were excluded if donor and recipient CMV serologies were negative or undocumented. Chart review was performed in order to collect data, including diagnosis of CMV viremia and/or disease, CMV risk factors, conditioning regimen, anatomic and immunologic cell sources, performance status, diagnosis of GVHD, baseline labs, and date of death (if applicable). **Results:** To date, 186 patients have been screened for eligibility. Of these, 84 patients met inclusion criteria. Twenty-five patients received FK/MTX, 55 patients received Bortezomib/FK/MTX, and four patients received FK/MTX/ATG. Incidence of CMV viremia and/or disease was as follows: five on FK/MTX (20%), 24 on Bortezomib/FK/MTX (44%), and two on FK/MTX/ATG (50%). Four patients were lost to follow-up prior to day 100 post allo-HSCT.

Conclusions: Conclusions are pending further data collection and analysis of results, including secondary endpoints and inferential statistics.

Learning Objectives:

Describe the pathophysiology of GVHD and the essential role of pharmacologic prophylaxis.

Explain how pharmacologic GVHD prophylaxis increases a patient's risk of CMV infection.

Self Assessment Questions:

Which of the following best describes the primary mechanism of GVHD?

- A T-cell-mediated immune response initiated by the recipient against
- B T-cell-mediated immune response initiated by the donor stem cells
- C Humoral-mediated antibody response initiated by the recipient against
- D Humoral-mediated antibody response initiated by the donor stem cells

Which of the following is true regarding CMV?

- A CMV is associated with significant morbidity and mortality in both immunocompetent and immunocompromised patients
- B The preferred treatment regimen for active CMV infection is valganciclovir
- C CMV enters a dormant state after primary infection, which is suppressed by immunosuppressive therapy
- D Due to increased risk of infection, all patients with positive CMV viremia should receive prophylaxis

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-403-L01-P

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

INCIDENCE OF REBOUND HYPERTENSION AFTER DISCONTINUATION OF DEXMEDETOMIDINE INFUSION

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Purpose: Dexmedetomidine is an alpha-2 adrenergic agonist that is structurally and pharmacologically similar to clonidine. Rebound hypertension is a concern with abrupt discontinuation of clonidine. As a result, the dexmedetomidine package insert includes a warning to avoid abrupt cessation of the agent due to potential for rebound hypertension. There has been no published incidence of rebound hypertension with dexmedetomidine, nor does guidance exist describing if or how the medication should be tapered to avoid this potential risk. The objective of this study is to determine the incidence of rebound hypertension associated with dexmedetomidine infusion cessation compared to that seen with other sedative medications. **Methods:** A non-interventional medical chart review will be conducted from June 1, 2014 and June 1, 2017. All critically ill patients greater than 18 years of age admitted to the Surgical ICU, Medical ICU, Trauma/Burn ICU or Neurocritical Care Unit of University of Michigan Hospital will be reviewed for inclusion in the study. Those receiving either intravenous dexmedetomidine continuous infusion or intravenous propofol or midazolam continuous infusion for a duration of at least 72 hours for the purpose of sedation will be included. Patients with alcohol withdrawal will be excluded. Incidence of rebound hypertension, defined as requirement of medical intervention in the form of anti-hypertensive medications or re-initiation of dexmedetomidine, will be assessed up to 24 hours following discontinuation of infusion. Additionally, blood pressure readings will be correlated with Richmond Agitation and Sedation Scale score at that time. If a difference in the incidence of rebound hypertension is found, the effect and influence of cumulative dose and duration of infusion will be assessed. Expected results of this study will help to determine the risk of rebound hypertension and guide appropriate discontinuation of dexmedetomidine. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review pharmacology and approved indications of dexmedetomidine
Explain the proposed pathophysiology of rebound hypertension behind the warning associated with dexmedetomidine

Self Assessment Questions:

Which of the following statements is false?

- A Dexmedetomidine has FDA approved indications for ICU sedation
- B Dexmedetomidine is an alpha-2 agonist
- C Incidence of rebound hypertension is clearly documented in available literature
- D Clonidine and dexmedetomidine are structurally similar

In general, what is the proposed mechanism of rebound hypertension associated with clonidine discontinuation?

- A Large catecholamine release
- B Increase in angiotensin II
- C Increase in vasodilation
- D Decrease in urine output

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-404-L01-P

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

ADJUNCTIVE NALOXEGOL FOR THE TREATMENT OF SPINAL SURGERY POST-OPERATIVE INDUCED CONSTIPATION: A RETROSPECTIVE STUDY

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Purpose: Naloxegol is a peripherally-acting mu opioid receptor antagonist that has been shown to treat opioid induced constipation (OIC). Bronson Methodist Hospital (BMH) added naloxegol to its adult post-operative laminectomy, discectomy and fusion order set as part of the post-operative bowel regimen. The purpose of this research is to determine whether the addition of Naloxegol to the post-operative bowel regimen decreases time to first bowel movement and decreases length of hospital stay at BMH. **Methods:** A retrospective chart review of patients who received lumbar laminectomies, fusions, and discectomies was conducted from January 2014 – December 2017 at BMH. Patients were included if they were between the ages of 18 – 85 years, in DRGs 453-460, and established on an opioid regimen equaling at least 30 oral morphine equivalents per day. Patients were excluded if they had cancer or end-of-life pain, were taking Naloxegol prior to surgery, had conditions or used medications associated with diarrhea or constipation, or had evidence of gastrointestinal obstruction. The primary efficacy outcome is mean time to first bowel movement after spinal surgery. Secondary efficacy outcomes include incidence of postoperative constipation, mean hospital length of stay, and total hospital cost. Safety outcomes include prevalence of adverse effects, including: abdominal pain, diarrhea, nausea/vomiting, incidence of ileus, and discontinuation of naloxegol or other PAMORA. **Results/Conclusion:** Data collection and analysis are currently in progress. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

State the mechanism of action of naloxegol.

Identify risk factors for post-operative opioid induced constipation when given a patient case.

Self Assessment Questions:

Which of the following statements most accurately describes the mechanism of action of Naloxegol?

- A Softens stool by drawing fluid into the GI tract
- B: Increases motility in intestines
- C: Displaces opiates from mu opiate receptors in the GI tract
- D: All of the above

A 56 year old AA male with a past medical history of bipolar disorder and lumbar stenosis has just undergone a spinal fusion (L1-4). This is his second day in the hospital post-op and he has refused to eat.

- A 2
- B 3
- C 4
- D 5

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-405-L01-P

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

A RETROSPECTIVE CHART REVIEW OF RELAPSE RATES OF URINARY TRACT INFECTIONS (UTIS) IN NEONATES TREATED WITH PARENTERAL AND THEN ENTERAL ANTIBIOTICS

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Purpose: Urinary tract infections (UTIs) affect about 7-15% of all neonatal patients that present with fever. There is a lack of guideline recommendations in the neonatal population for duration of antibiotics and whether it is appropriate to switch to enteral antibiotics after the initial work-up is complete. This study will investigate whether switching to enteral antibiotics impacts the relapse rates of UTIs in neonatal patients. The primary objective of this study will be to assess whether there is a difference in relapse rates when switched to enteral therapy versus treating with an entire course of parenteral antibiotics. The secondary objective will be to assess the difference in relapse rates between patients who received different durations of parenteral antibiotics when switched to enteral antibiotics.

Methods: Retrospective chart review from January 1st 2009 to July 31st 2017 of infants 30 days or younger diagnosed with a UTI or acute pyelonephritis will be included in the study. The study is IRB approved. Exclusion criteria include patients diagnosed with meningitis, positive CSF cultures, no blood or urine cultures before the first dose of antibiotics, polymicrobial/multidrug resistant cultures, indwelling catheters, admission to the neonatal intensive care unit and antibiotic duration longer than 14 days. Categorical data will be analyzed using the Chi-square test and continuous data will be analyzed using the T-test. **Results:** Data collection is in progress. **Conclusions:** Conclusions will be presented at the Great Lakes Pharmacy Conference.

Learning Objectives:

Review the current data for switching neonatal patients with UTIs to enteral antibiotics from parenteral antibiotics after initial septic workup. Discuss the benefits of switching to enteral antibiotics from parenteral antibiotics in neonatal patients.

Self Assessment Questions:

What are the current guideline recommendations from the American Academy of Pediatrics for treatment duration of antibiotics for UTIs in neonates?

- A 7 days
- B: 10 days
- C: 14 days
- D: No recommendations

What is a benefit of switching to enteral antibiotics from parenteral antibiotics?

- A Decreased length of hospital stay
- B Increased treatment efficacy
- C Increased treatment compliance
- D Decreased total length of treatment

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-406-L01-P

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

EFFICACY COMPARISON OF NEWER NON-INSULIN THERAPIES (NNITs) IN VETERANS WITH TYPE 2 DIABETES MELLITUS AT THE JESSE BROWN VA MEDICAL CENTER

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Purpose: According to the American Diabetes Association 2018 guidelines, patients recently diagnosed with type 2 diabetes with an uncontrolled hemoglobin A1c (HbA1c) under 9% should be started on metformin. If uncontrolled at maximum titration, a second agent is to be initiated. Second-line medication classes consist of sulfonylureas (SU), thiazolidinediones (TZD), dipeptidyl peptidase-4 inhibitors (DPP-4), sodium-glucose cotransporter 2 inhibitors (SGLT2), glucagon-like peptide-1 (GLP-1), and basal insulin. Because of the potential for the highest HbA1c reduction and the lowest cost, glipizide is commonly used as the initial second-line agent in patients without contraindications at JBVAMC. The remaining classes include TZD, DPP-4, SGLT2, and GLP-1, which will be referred to as the newer non-insulin therapies (NNITs) for this study. Due to the inclusion of some of these NNITs into the national formulary, it is necessary to examine how they are being used and to compare, head-to-head, the efficacy of each class. The purpose of this study is to evaluate the efficacy of the NNITs at the JBVAMC. **Methods:** This study will be a retrospective, electronic chart review of patients who started prescriptions for TZDs, DPP-4s, SGLT2s, and GLP-1s between January 1, 2012 and December 31, 2016. Data will be excluded if there is missing HbA1c data or multiple NNITs started at the same time. The composite endpoint will be the percentage change in HbA1c 6 months after initiation of each separate class. Secondary endpoints include the percentage of patients that reached their goal HbA1c at 6 months, percentage change of HbA1c at 12 months, medication adherence defined by medication possession ratio, and cost defined as average wholesale price. Additionally, patient information such as labs and concurrent diabetes medications will be gathered for various subgroup analyses post data collection. **Results/Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the classes of the different NNITs and their mechanisms of action.

Discuss the efficacy of antidiabetic medications, including NNITs, when being prescribed for type 2 diabetes management.

Self Assessment Questions:

Which of the following medications and drug classes are paired correctly?

- A Dapagliflozin and PPAR activator
- B: Glyburide and DPP-4 inhibitor
- C: Linagliptin and SGLT2 inhibitor
- D: Dulaglutide and GLP-1 agonist

Which of the following has shown the best overall HbA1c reduction?

- A Pioglitazone
- B Metformin
- C Empagliflozin
- D Saxagliptin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-407-L01-P

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

IMMUNIZATION RATES OF PATIENTS RECEIVING ANTIRETROVIRAL THERAPY IN A COMMUNITY PHARMACY SETTING

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Purpose: Immunizations are critical in reducing the risks of vaccine-preventable diseases. Several studies have demonstrated that adherence to specific immunization recommendations are low in patients receiving antiretroviral (ARV) therapy; however, limited data exists to describe trends in overall immunization status for this population. The primary objective of this study is to identify patients who have received ARV therapy and the Centers for Disease Control and Prevention (CDC) recommended immunizations at community pharmacies specializing in Human Immunodeficiency Virus (HIV) patient care. The secondary objectives are to determine if the above-identified patients received immunizations at a different healthcare facility, and to determine trends in patient characteristics including age, gender, insurance coverage, and how often therapy has changed. **Methods:** A retrospective cohort study is being conducted within four grocery store chain pharmacies in Chicago, IL as advanced HIV patient care services were initiated at the selected study sites in 2013. Patients 18 years and older currently on ARV therapy components recommended by the United States Department of Health and Human Services 2017 HIV guidelines were included. Eligible patients were identified using dispensing reports for National Drug Codes of specified ARVs filled at each study location. Baseline characteristics and the CDC recommended immunization histories were recorded. Recommended immunizations include hepatitis B, influenza, pneumococcal, human papilloma virus, and tetanus, diphtheria and pertussis. ARV dispensing reports and immunization history were collected from January 2013 to October 2017, in order to reflect the conception of HIV patient care services at the study locations. Additional immunization history information were also collected from the Illinois Comprehensive Automated Immunization Registry Exchange (I-CARE). Descriptive statistics will be used to describe study results. **Results/Conclusions:** Data collection and analysis are in progress. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify components of the CDC's HIV Care Continuum

Discuss immunization performance measures in HIV care established by the U.S. Health Resources & Services Administration

Self Assessment Questions:

Which of the following is not a good strategy to improve Linkage in Care

- A Involve the patient in ARV regimen selection
- B: Assess adherence at every clinic visit
- C: Conduct visits free of stigma and discrimination
- D: Provide mental health resources only during initial visit

Which immunization is not part of the U.S. Health Resources & Services Administration performance measure in HIV care?

- A Influenza
- B Pneumococcal
- C Haemophilus influenzae type b
- D Hepatitis B

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-909-L06-P

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

EVALUATION OF THE IMPACT OF ANTIBIOTIC THERAPY ON CLINICAL OUTCOMES IN KIDNEY TRANSPLANT RECIPIENTS WITH ASYMPTOMATIC BACTERIURIA

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Purpose: Asymptomatic bacteriuria (ASB) commonly occurs in patients following kidney transplantation with a reported incidence of up to 50% in the first year post-transplant. The use of antibiotics for treatment of ASB in this population remains controversial. Guidelines by the Infectious Diseases Society of America do not provide recommendations for kidney transplant recipients, while the American Society of Transplantation recommends antibiotic treatment for ASB cases within the first 3 months post-transplant. Limited data evaluating the impact of untreated ASB on progression to symptomatic UTI, clinical outcomes, and allograft-related outcomes exists. Thus, the purpose of this study is to evaluate the impact of antibiotic treatment for ASB on outcomes in kidney transplant recipients. **Methods:** This is a single-center, retrospective, cohort study comparing adult kidney transplant recipients who received antibiotics for the treatment of ASB to those who did not receive treatment at Michigan Medicine between January 2009 and August 2015. ASB is defined as a positive urine culture with bacteria in the absence of fever, dysuria, urinary urgency/frequency, lumbar pain, graft pain, or suprapubic pain. Patients with evidence of a symptomatic lower or upper UTI prior to index ASB episode will be excluded. Additionally, patients with urostomies, indwelling catheters, nephroureteral stents, perinephric abscesses, urosepsis, and those requiring intermittent catheterization will be excluded. The primary outcome will be a composite of symptomatic lower (cystitis) and upper (pyelonephritis) UTI within the first 6 months following the index ASB episode. Secondary outcomes include graft loss, graft rejection, 30-day all-cause mortality, 30-day all-cause hospital readmission, and antibiotic associated adverse effects. Appropriate descriptive statistics will be used for analysis. **Results/Conclusions:** Will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the epidemiology of asymptomatic bacteriuria in kidney transplant recipients.

Discuss the current recommendations by Infectious Diseases Society of America (IDSA) and American Society of Transplantation (AST) for management of asymptomatic bacteriuria in kidney transplant recipients

Self Assessment Questions:

Which of the following post-transplant time periods represents where the highest incidence of asymptomatic bacteriuria occurs and the least studied population?

- A: First 7 months
- B: First year
- C: First 3 months
- D: First 10 months

Which of the following statements is true regarding guideline recommendations provided by the Infectious Diseases Society of America (IDSA) and American Society of Transplantation (AST)?

- A: Neither the IDSA nor the AST provide recommendations on use of
- B: IDSA makes no recommendation for treatment of ASB in kidney tr
- C: AST makes no recommendation for treatment of ASB in kidney tr
- D: Both the IDSA and AST recommend antibiotic treatment for ASB \

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-408-L01-P

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

IMPACT OF SIMULATIONS ON HEALTH PROFESSIONAL STUDENTS' EMPATHY: A SYSTEMATIC REVIEW

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Empathy is an important attribute of health professionals in the delivery of patient care. The American Association of Colleges of Pharmacy (AACCP) cites empathy as an important communication skill for pharmacy graduates to possess. One strategy to facilitate the development of empathy is through the use of simulation activities. To date, there has been no comprehensive review of the impact simulation activities have on the development of empathy in health professional students. The objective of this study is to conduct a systematic review to assess the use and impact of simulation activities on healthcare professional students' empathy. Articles were selected for inclusion in the systematic review based on the following criteria: peer-reviewed, full text, published in English, published between 1992 and 2017, with either quantitative or qualitative study results. Articles were excluded if they were review articles. Databases searched were PubMed/MEDLINE, CINAHL, PsychINFO, ERIC, and Web of Science. A search strategy was developed for PubMed/MEDLINE and then adapted for use in other databases. Search strategies were developed using the main terms of "simulation" and "empathy" and "health occupations students." Titles and abstracts were assessed by two investigators independently for determination of inclusion in the review. For studies not included in the review the reason for exclusion was documented. The following data will be collected for the analysis: author(s) and citation, year of publication, number of subjects, type of healthcare professional student, study design, measurement tool, outcome measures, patient simulation description, and study findings. Once the results are analyzed, it will be important to evaluate the impact of simulation activities on students' empathy and identify trends in the types of simulation activities utilized. The results of this study will assist in developing teaching strategies to enhance the

Learning Objectives:

Explain why empathy is an important attribute for health professionals
Describe the purpose and different types of simulation activities

Self Assessment Questions:

Which of the following statements is true about empathy?

- A: Empathy and sympathy are equally important attributes for healthc
- B: Empathy is the ability to understand and share the feelings of one
- C: Empathy is expressing feelings of pity and sorrow for someone els
- D: Empathy is not a requirement for the accreditation of health profes

What is the purpose of simulation activities in healthcare?

- A: Education
- B: Assessment
- C: Research
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-729-L04-P

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

IMPACT OF DIRECT-TO-CONSUMER TELEHEALTH ON APPROPRIATE ANTIBIOTIC PRESCRIBING AMONG A COMMERCIALY INSURED POPULATION

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Purpose: Direct-to-consumer (DTC) telehealth provides patients with quick and convenient access to a physician by telephone or videoconference, but has raised concerns regarding the potential increase in inappropriate prescribing of antibiotics. The National Committee for Quality Assurance (NCQA) and Centers for Medicare and Medicaid Services have implemented three Healthcare Effectiveness Data and Information Set (HEDIS) measures addressing inappropriate antibiotic prescribing. As an NCQA accredited health plan, Blue Cross Blue Shield of Michigan (BCBSM) is dedicated to improving health outcomes. The primary objective of our research is to evaluate antibiotic prescribing among telehealth users versus non-telehealth users.

Methods: This study is a retrospective, observational, matched case-control study of BCBSM commercially insured patients. Per HEDIS specifications, BCBSM claims data (pharmacy and medical) and vendor telehealth data will be analyzed: January 1, 2017 to December 24, 2017 for the adults with acute bronchitis measure and July 1, 2016 to June 30, 2017 for children with pharyngitis and upper respiratory infection measures. Patients will be classified into two groups based on site of service: (1) telehealth or (2) non-telehealth. Propensity score matching will be used to create a matched control group of non-telehealth patients meeting the same HEDIS specifications. Variables assessed will include patient characteristics (age, sex, comorbidities), season (winter, spring, summer, fall), antibiotic class (penicillin, cephalosporin, tetracycline, macrolide, fluoroquinolone, lincosamide, sulfonamide/folic acid antagonist combination, azole), and if the antibiotic was prescribed inappropriately. Differences between telehealth patients and non-telehealth patients will be compared using chi-square for categorical and t-test for continuous variables. Results: Data is being analyzed and results will be presented at the conference. Conclusion: Summary of the results and conclusions will be presented at the conference.

Learning Objectives:

Define direct-to-consumer (DTC) telehealth.

List the three Healthcare Effectiveness Data and Information Set (HEDIS) measures for addressing inappropriate antibiotic prescribing

Self Assessment Questions:

Direct-to-consumer (DTC) telehealth is best defined as:

- A A telemarketing service.
- B A web application that allows a patient to schedule an in office visit
- C A way to offer patients access to a physician via telephone or video
- D A novel approach to office visits that allows providers to perform in

Which of the following are one of the Healthcare Effectiveness Data and Information Set (HEDIS) measures for addressing inappropriate antibiotic prescribing:

- A Appropriate testing for adults with pharyngitis (AWP).
- B Avoidance of antibiotic treatment in children with bronchitis (CAB).
- C Appropriate treatment for children with upper respiratory infection
- D Avoidance of antibiotic treatment in adults with ear infection (AEI).

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-870-L05-P

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

ANTIBIOTIC DOSING IN OBESITY, WEIGHING IN ON THE EVIDENCE

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Purpose: Antibiotics and their pharmacokinetic parameters have been well studied. Several studies have shown patients with a body mass index (BMI) ≥ 30 kg/m² demonstrate altered pharmacokinetics, however, few studies have specifically looked at dosing in the obese and whether these pharmacokinetic changes affect outcomes. The primary objective of this study is to compare therapeutic failure rates in obese patients with cellulitis treated with standard antibiotic doses compared to adjusted doses. We defined therapeutic failure as the need for a substitution and/or addition of an alternative oral antibiotic, or an emergency room visit or hospitalization within 30 days post-discharge.

Methods: This is a single-center, retrospective/prospective cohort analysis. Patients ≥ 18 years with a BMI ≥ 30 kg/m² who were admitted to Monroe Clinic between August and December 2016 with a primary or secondary diagnosis of cellulitis were eligible for the pre-protocol cohort. We then developed an adjusted-dose obesity protocol based on a literature review of altered antibiotic pharmacokinetics in obesity. This protocol was implemented in September 2017. Patients admitted between September 2017 and January 2018 will be eligible for the post-protocol cohort. Pregnant or lactating patients will be excluded. Therapeutic failure rates will be compared across the cohorts. The following data will be collected: antibiotic dose(s) administered to the patient, length of parenteral therapy, physical assessment of the cellulitis at follow-up appointment, emergency room visits or hospital readmission(s) within 30 days post-discharge. Results and Conclusion: The project is ongoing. Full information will be shared at the conference.

Learning Objectives:

Define three pharmacokinetic changes in obesity that impact antibiotic dosing decisions.

Recognize two ways that adjusted antibiotic dosing can optimize antimicrobial effectiveness.

Self Assessment Questions:

Which of the following statement is correct regarding obese (BMI ≥ 30 kg/m²) patients?

- A Obese patients have a decreased estimated glomerular filtration rate
- B Obese patients have increased tissue perfusion compared to non-obese
- C Obese patients have increased extracellular water compared to non-obese
- D Obese patients have a lower risk of infections compared to non-obese

Which of the following needs to be considered when selecting antibiotic therapy?

- A Patient's body mass index (BMI)
- B Patient's creatinine clearance.
- C Specific pathogens
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-409-L01-P

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

A HEALTH-SYSTEM EVALUATION OF CULTURE AND SUSCEPTIBILITY DATA OF A REGIONAL COHORT TREATED FOR PNEUMONIA.

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Disclosure: The authors of this presentation have no actual or potential conflicts of interest in relation to this presentation. **Purpose:** The 2016 update to the hospital-acquired pneumonia (HAP) guidelines eliminated the category of healthcare-associated pneumonia (HCAP). With this change, patients previously included in this category, specifically those who resided in extended care facilities (ECFs), were treated with broad-spectrum antibiotics similar to a HAP. Recent studies have shown that the rates of multi-drug resistant organisms (MDROs) are similar in patients presenting from ECFs or the community. The objective of this study is to evaluate patient presentation and subsequent culture data to guide empiric pneumonia treatment for our geographical location. **Methods:** This trial will look at patients with an admitting diagnosis of pneumonia to a Mount Carmel Health System hospital located in central Ohio. The hospital system's electronic health record will be utilized to capture a list of patients who presented to the hospital with pneumonia. The study will include patients admitted with pneumonia over the period of one year, from 09/01/2016 to 08/31/2017. Additional information to collect will be culture data, baseline patient characteristics, hospital patient was admitted to, antibiotic therapy, length of stay (including both ICU and general floors), patient outcomes, 30-day readmission rates, and severity of illness upon presentation. Comorbid conditions will be evaluated using the Charlson Comorbidity Index. Patients will then be organized into groups based on the specific extended care facility that they reside in. This will allow for the proper evaluation of resistance patterns on an individual facility basis, or based on the facility's geographic location. This data will be used to determine if the appropriate antibiotics are being used based on where the patient presented from. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the importance of antimicrobial stewardship in the treatment of pneumonia patients

Classify patterns of resistance based on culture data and patient characteristics

Self Assessment Questions:

Which of the following is (are) benefits of antimicrobial stewardship in patient's admitted with pneumonia?

- A: Decreasing rates of resistance over time
- B: Limiting adverse events associated with antimicrobial therapy
- C: Decreasing the rates of Clostridium difficile
- D: More than one of the above

What patient characteristics have an effect on antimicrobial treatment for pneumonia?

- A: Patients who have had outpatient surgery 6 months ago
- B: Patient's comorbidities
- C: IV antibiotics within the last 90 days
- D: B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-410-L01-P

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

RETROSPECTIVE, COHORT STUDY EVALUATING THE IMPACT OF EMPIRIC DOSE-REDUCED NAB-PACLITAXEL IN COMBINATION WITH GEMCITABINE IN METASTATIC PANCREATIC ADENOCARCINOMA: A SINGLE INSTITUTION EXPERIENCE

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Purpose: Pancreatic adenocarcinoma is the fourth leading cause of cancer-related death in the US. Patients often experience nonspecific symptoms, leading to increased time to recognition. Nearly 50% of all cases are metastatic at diagnosis. The five-year overall survival (OS) rate with metastatic pancreatic adenocarcinoma (mPAC) is 3%. OS has increased since the publication of the MPACT trial, which established the benefits of synergistic nab-paclitaxel plus gemcitabine. When treating mPAC, the current recommended dose of nab-paclitaxel is 125 milligrams per square meter on days 1, 8, and 15 of a 28-day cycle. At UC Health, one focus of clinical practice is mitigating treatment-associated adverse events including neutropenia, thrombocytopenia, fatigue, and neuropathy, which can occur with the combination of nab-paclitaxel and gemcitabine. This is accomplished by using empiric dose-reduced (EDR) nab-paclitaxel at a dose of 100 milligrams per square meter and employing a multidisciplinary team approach to patient care. **Methods:** This retrospective, single center, cohort study included patients 18 years of age and older with histologically confirmed mPAC, receiving first line treatment with EDR nab-paclitaxel in combination with gemcitabine at UC Health from January 1, 2012 to March 31, 2017. Prisoners and pregnant women were excluded. As established in the MPACT trial, the primary objective of this study is to compare rates of OS at 8.5 months for patients with mPAC undergoing treatment with EDR versus standard dose nab-paclitaxel in combination with gemcitabine. Secondary outcomes include: comparison of progression free survival at 5.5 months, CA19-9 absolute reduction; incidence and grade of adverse events (neutropenia, thrombocytopenia, fatigue, and neuropathy) using the Common Terminology Criteria for Adverse Events (v4.0); chemotherapy tolerability in terms of relative dose intensity and subsequent lines of treatment; and description of the involvement of multidisciplinary healthcare professionals including pharmacists, dietitians, and social workers. **Results:** Data analyses are currently ongoing.

Learning Objectives:

Review the limited treatment options for metastatic pancreatic cancer
Discuss literature supporting the use of nab-paclitaxel plus gemcitabine in terms of outcomes and adverse events

Self Assessment Questions:

Which adverse event occurs most commonly with gemcitabine administration?

- A: Neutropenia
- B: Stomatitis
- C: Cold-induced neuropathy
- D: Hand-foot syndrome

Which of the following is true regarding nab-paclitaxel?

- A: Nab-paclitaxel is not albumin-bound
- B: Nab-paclitaxel improves the concentration of gemcitabine within the
- C: The most common adverse event is thrombocytopenia
- D: Patients are very unlikely to experience weakness, numbness, ting

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-411-L01-P

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

SITE OF CARE OPTIMIZATION FOR SPECIALTY MEDICATIONS IN / MULTI-HOSPITAL HEALTH SYSTEM

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Purpose Specialty medications, such as infliximab, that are required to be injected or infused by a physician are traditionally billed through a patient's medical benefits instead of pharmacy benefits. These medications can be administered across multiple sites of care including: hospital outpatient departments, physician offices, infusion centers, or the patient's home. Both the cost and reimbursement for drug and administration can vary considerably based on site of care. The variation in cost has resulted in commercial payers and managed care organizations directing patients to lower-cost sites of care while health systems aim to determine which site of care is covered by the patient's insurance. The purpose of this project is to evaluate the financial impact to the health system as a result of administering the same specialty medications across different sites of care. Methods: A steering committee consisting of pharmacy administrators and a pharmacy resident was developed to oversee this project. A select number of specialty drugs were identified to be included in this project. The selected medications require physician-administration and are administered across multiple sites of care within the health system. Retrospective claims data for the pre-selected drugs was collected for January 2017 and March 2017. The claims data will be assessed to evaluate charges to the patient, medication administered, third party payer type, and site of care. The primary objective of this project is to determine the ideal site of care based on drug cost and reimbursement. Descriptive statistics will be utilized to analyze the results. This project is exempt from the institutional review board as it is a quality assurance project. Results/Conclusion: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify drivers to optimize site of care for specialty medications that require physician administration
List key considerations when developing a site of care program

Self Assessment Questions:

Which of the following is a reason to optimize site of care for specialty medications that require physician administration?

- A: To direct patients to a higher-cost site of care
- B: To increase drug expenditure in the hospital outpatient setting
- C: To increase adherence to specialty medications
- D: To reduce drug expenditure while maintaining quality of care

Key patient considerations when developing a site of care program may include:

- A: Ease of access to care
- B: Influence of hospitals in the region
- C: Provider autonomy
- D: Financial gain

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-730-L04-P

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

EVALUATING OUTCOMES OF ADJUNCT OCTREOTIDE IN NON-VARICEAL UPPER GASTROINTESTINAL HEMORRHAGE

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Purpose: Peptic ulcer bleeding occurs frequently and results in substantial patient morbidity, mortality and medical expense. Peptic ulcer bleeding accounts for 31-67% of upper gastrointestinal bleeding with 20% of cases complicated by continued or recurrent bleeding. Currently, proton pump inhibitor (PPI) therapy is the treatment of choice. In cases of non-variceal upper gastrointestinal bleed (NVUGIB), PPIs have shown superiority in reduction of re-bleeding to H2-receptor antagonists, octreotide, and somatostatin. The objective of this study is to determine the effect of octreotide as an adjunct to PPI therapy on re-bleeding rates in NVUGIB. Methods: A retrospective, multi-center cohort study was conducted in patients experiencing NVUGIB that received both octreotide and a PPI or a PPI alone. Patients over the age of 18 who underwent endoscopy within 24 hours of admission were screened for inclusion. Exclusion criterion included pregnancy, gastric or esophageal varices or gastric cancer. The primary endpoint was the rate of re-bleeding within seven days of endoscopy. Re-bleeding was defined as the occurrence of hematemesis, melena, or blood in the nasogastric tube plus, either shock or a reduction in hemoglobin. Secondary endpoints included seven day mortality, requirement of surgical intervention or interventional radiology, units of blood transfused and length of stay. A pooled analysis was used to assess the primary outcome. Descriptive statistics were used to assess secondary outcomes, and a logistic regression was applied to the subgroup analysis. Results/Conclusion: Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference

Learning Objectives:

Discuss guideline recommendations for non-variceal upper gastrointestinal bleed management
Describe the proposed mechanism for theorized benefit of octreotide use in non-variceal upper gastrointestinal bleed

Self Assessment Questions:

The 2003 Consensus statement grades the use of octreotide for treatment in non-variceal upper gastrointestinal bleed as what level of evidence?

- A: Level A
- B: Level B
- C: Level C
- D: Level D

Octreotide is proposed to have which of the following actions during a gastrointestinal bleed?

- A: Reduces splanchnic blood flow and motility
- B: Increases acid secretion
- C: Cytoprotective effects
- D: A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-412-L01-P

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

T2 MAGNETIC RESONANCE ASSAY FOR ANTIFUNGAL STEWARDSHIP IN THE ICU

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Purpose: The development of invasive candidiasis (IC) in critically ill patients is associated with high mortality especially in patients with septic shock. Timely empiric antifungal therapy and adequate source control are essential in the management of candidemia. Echinocandin overuse is associated with both the development of echinocandin resistance and unnecessary cost. T2-magnetic resonance assay (T2MR) is a rapid diagnostic test performed on whole blood to aid in diagnosing candidemia. The purpose of this study is to evaluate the effect of negative T2MR on antifungal stewardship in the intensive care unit (ICU) for patients receiving preemptive antifungal therapy. **Methods:** The present study is an IRB approved, retrospective, quasi-experimental study in ICU patients before and after the implementation of T2MR testing within our health system from January through November of 2015 (pre-T2) and 2017 (post-T2). **Inclusion:** negative blood culture and either a negative β -D-glucan test (pre-T2 group) or T2MR (post-T2 group). **Exclusion:** Solid organ/bone marrow transplant patients, non-candidia fungal infections, and other indications for echinocandin therapy. Patient charts will be manually reviewed and data will be collected using a standardized case report form. The primary endpoint is duration of preemptive echinocandin therapy (days) as defined by therapy initiated prior to microbiologic or biomarker testing indicative of candidemia. Secondary outcomes include length of stay, invasive candidiasis after discontinuation of preemptive therapy, reinitiation of antifungal therapy in the index admission, and inpatient mortality. Bivariate and multivariable statistical tests will be used to compare patient characteristics and outcomes between pre and post groups. **Summary and Conclusion:** Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the current therapeutic recommendations for candidemia in critically ill patients

Describe the use of T2-magnetic resonance assay and 1,3- β -D-glucan testing in critically ill patients with presumed candidemia

Self Assessment Questions:

Which of the following is associated with improved survival in patients with candidemia?

- A: Discontinuation of antibacterial agents
- B: Discontinuation of TPN therapy
- C: Early antifungal therapy
- D: Cessation of proton-pump inhibitor

IC is a 48-year old woman intubated in the ICU after a motor vehicle accident. She underwent abdominal surgery for a liver laceration and intestinal contusion. She has been persistently septic on nore

- A: De-escalate the anidulafungin to fluconazole therapy
- B: Stop anidulafungin therapy
- C: Escalate to liposomal amphotericin B therapy
- D: Obtain an echocardiogram to evaluate for fungal endocarditis

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-413-L01-P

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

EVALUATION OF INPATIENT RISK FACTORS FOR OPIOID-INDUCED RESPIRATORY DEPRESSION

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Purpose: Over the past 20 years, the "Opioid Crisis" has come to the forefront of healthcare in the United States. Regulating bodies have initiated efforts to curb this epidemic, including The Joint Commission's implementation of new inpatient standards for acute pain assessment and management. The standards include the expectation that hospitals monitor indicators for the safe use of opioids in an effort to improve the safety of prescribing and administration in the acute care setting. Within the Norton Healthcare system, individual safety reports are filed and evaluated, but global assessments are not routinely performed to evaluate trends in opioid related safety events. Evaluating current naloxone use to identify high risk aspects of the medication use process unique to our hospital system would allow for the development of strategies to mitigate opioid-induced respiratory depression risk. The purpose of the study is to describe current trends in opioid-induced respiratory depression safety events within Norton Healthcare in order to identify opportunities for improvement within the opioid medication use process. **Methods:** This is an IRB-approved retrospective, descriptive study evaluating 200 patients administered naloxone for opioid reversal at one of Norton Healthcare's four adult hospitals from May 2017 to October 2017. Patients are excluded if they received naloxone for reversal of opioids administered outside of Norton Healthcare, for intentional opioid overdose, during procedures or following procedural sedation. The study outcomes are to identify specific patient populations, opioid regimens, concomitant non-opioid medications, and prescribing characteristics that have an increased risk of contributing to opioid-induced respiratory depression within Norton Healthcare. **Results and Conclusion:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall patient specific risk factors for opioid-induced respiratory depression

Describe aspects of the inpatient medication use process that may increase the risk of opioid-induced respiratory depression

Self Assessment Questions:

Which of the following are risk factors for opioid-induced respiratory depression?

- A: Increased age
- B: Sleep apnea
- C: Kidney disease
- D: All of the above

An opioid naïve patient receives new orders on admission for hydrocodone/APAP 7.5-325 mg PO Q6H PRN moderate pain and alprazolam 0.5 mg PO TID PRN anxiety. What aspect of the medication use process pl

- A: Co-prescribing opioids and benzodiazepines
- B: Prescribing hydrocodone/acetaminophen PRN instead of schedule
- C: Prescribing PO opioids instead of IV
- D: Utilizing a combination opioid and non-opioid pain regimen

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-871-L05-P

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

USE OF PIPERACILLIN/TAZOBACTAM VS. CEFEPIME OR CARBAPENEM FOR INFECTIONS DUE TO SERRATIA, CITROBACTER OR ENTEROBACTER

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Purpose: The selection of appropriate antibiotics for gram-negative organisms remains a challenge as they are adept at acquiring resistance through efflux pumps, protein mutations, and production of antibiotic-metabolizing enzymes. AmpC beta-lactamase enzymes are an inducible type of resistance that is not readily detected by rapid diagnostics. This type of resistance is commonly seen in *Serratia*, *Pseudomonas*, *Indole-positive Proteus*, *Citrobacter*, and *Enterobacter* ("SPICE") species. These enzymes hydrolyze penicillins and some cephalosporins leading to worse outcomes in patients treated with 3rd generation cephalosporins. Although carbapenems are the drug of choice for these organisms, cefepime has been shown to be non-inferior. A study by Cheng et al. showed that mortality was not significantly different when comparing treatment with piperacillin-tazobactam versus cefepime or a carbapenem for bacteremia caused by AmpC-harboring bacteria. The objective of this study is to evaluate the efficacy of using piperacillin-tazobactam versus cefepime or a carbapenem in infections caused by *Serratia*, *Citrobacter*, or *Enterobacter* species. The primary outcome evaluated is all-cause mortality. Secondary outcomes evaluated include readmission rate and treatment failure. **Methods:** This single-center retrospective cohort study evaluated patients >18 years with a culture positive for either *Citrobacter freundii*, *Enterobacter cloacae*, *Enterobacter aerogenes*, or *Serratia marcescens*. Demographics, labs/cultures, antibiotics used, hospitalization status, and discharge information were obtained for statistical analysis and time series analysis. Patients included must have received piperacillin-tazobactam, cefepime, or a carbapenem for at least 72 hours and admitted between January 1, 2007 and October 25, 2017. Patients were excluded if they received other antibiotics as definitive therapy (defined as antibiotic use for majority of treatment) or have polymicrobial infection within 7 days of initial positive culture. **Results and Conclusion:** Data collection is currently ongoing. Preliminary results and conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Identify organisms that commonly harbor the AmpC beta-lactamase
Review which antibiotics can be used for AmpC-harboring bacteria

Self Assessment Questions:

Which of the following bacteria commonly harbor the AmpC beta-lactamase gene? (I. *Pseudomonas aeruginosa* II. *Escherichia coli* III. *Klebsiella oxytoca* IV. *Proteus mirabilis* V. *Enterobacter a*

- A I, ii, v
- B: I, v, vi
- C: li, iv, vi
- D: li, v, vi

Which of the following antibiotics should not be used for treatment of bacteria that may harbor the AmpC gene?

- A Ceftriaxone
- B Piperacillin-Tazobactam
- C Cefepime
- D Meropenem

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-414-L01-P

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

PHARMACIST ENGAGEMENT IN NEUROPSYCHIATRIC SERVICES: AN UNMET NEED

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Background: In the past decade the role of clinical pharmacists has expanded and pharmacist now have the ability to become board certified in various specialties including: oncology, critical care, ambulatory care, pediatrics and psychiatry. Psychiatric pharmacists are uniquely trained and qualified to provide patient specific recommendations to improve the care of patients with psychiatric and neurologic conditions. The primary goal of this study is to evaluate the role of a pharmacist in various neuropsychiatric services and assess for any unmet needs of patients with psychiatric and neurologic conditions. **Methods:** This retrospective study will assess interventions made by pharmacy students and residents (under the supervision of a clinical pharmacist specialist) during rotations in general adult psychiatry, general neurology, psychiatry consult liaison, and psychiatry emergency service from September 1, 2017 through December 31, 2017. All patients on the specified service during a month with pharmacy trainee coverage will be included in the study. Data collection will begin on January 1, 2018. The primary objective is to determine the number and types of clinical interventions completed on listed services. Secondary endpoints include daily and monthly census for services, number of medications per patient, time spent, and acceptance rate for interventions. Descriptive statistics will be used to analyze the results. **Results/Conclusion:** Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the role and impact of a neuropsychiatric pharmacist.
Review applicable national regulatory standards for neuropsychiatric pharmacy.

Self Assessment Questions:

What is a potentially unique role for a neuropsychiatric pharmacist?

- A Renally dose adjust gabapentin
- B: Therapeutic drug monitoring for lithium
- C: Respond and participate in all codes
- D: Counsel patients on discharge medications

A neuropsychiatric pharmacist has the capacity to improve which of the following national regulatory standard?

- A Hospital Based Inpatient Psychiatric Services
- B Hospital Value-based Purchasing Program
- C Centers for Medicare and Medicaid Services 30-day readmission r
- D Hospital Inpatient Quality Reporting Program

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-731-L04-P

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

EVALUATION OF EMERGENCY DEPARTMENT PHARMACIST IMPLEMENTED ANTIMICROBIAL STEWARDSHIP FOR URINARY TRACT INFECTIONS

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The Centers for Disease Control and Prevention (CDC) recently released Core Elements for Outpatient Antibiotic Stewardship, which includes emergency departments (EDs) in its target audience. Prior to January 2018, the St. Vincent ED utilized laboratory technicians to identify drug-bug mismatches based on susceptibility reports. The purpose of this project is to evaluate the effect of a pharmacist driven process for follow-up on urine culture and susceptibility data obtained in the ED. The primary objective is to determine percent of follow-ups resulting in prescriptions changed to more clinically appropriate therapy. The secondary objective is to determine percent of appropriate initial empiric treatment of uncomplicated cystitis and pyelonephritis. To establish baseline data, a retrospective chart review of the electronic medical record was conducted for all patients discharged from the St. Vincent ED from May 1, 2017 to July 31, 2017 with diagnoses of urinary tract infections based on ICD-10 codes. Data collected included patient age, creatinine clearance, diagnosis, empiric regimen, appropriateness of empiric therapy, drug-bug mismatch based on susceptibility reports, and if the patient was contacted and changed to more appropriate therapy. At baseline or pre-implementation, 50% of patients with drug-bug mismatches received follow up, and 46% were changed to more clinically appropriate agents. 8.4% of patients grew cultures with susceptibilities that resulted in drug-bug mismatches based on their empiric antibiotic regimen. However, this may be misleading, as only 20.4% of initial empiric antibiotics were considered appropriate based on Infectious Disease Society of America guidelines. In January 2018, a pharmacist review process took effect in which the pharmacist reviews culture and susceptibility reports for drug-bug mismatches. To evaluate the impact of this pharmacist driven process, a second retrospective chart review will be conducted for all patients discharged from the ED with the same diagnoses from January 15, 2018 to March 31, 2018.

Learning Objectives:

Describe the Centers for Disease Control and Prevention (CDC) four core elements of antimicrobial stewardship in the outpatient setting. Recall outcomes that can be improved through pharmacy antibiotic stewardship interventions in Emergency Departments (EDs).

Self Assessment Questions:

Which of the following is a core element of CDC outpatient antibiotic stewardship?

- A: Advocacy for change
- B: Auditing and tracing
- C: Compromise
- D: Tracking and reporting

Evidence suggests pharmacists can help improve which of the following

- A: Appropriate adjustment of empiric antimicrobial therapy based on
- B: Friendliness of ED staff towards patients who present with bacteri
- C: Incidence of uncomplicated cystitis
- D: Time spent in ED waiting room

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-415-L01-P

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

THE PREVALENCE AND IMPACT OF DRUG-DRUG-GENE INTERACTIONS IN A PHARMACOGENOMICS CLINIC POPULATION WITHIN A COMMUNITY HEALTH SYSTEM

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Pharmacogenomics is the study of how an individual's genetic makeup, or genotype, affects their response to medication. Genetic variations can be categorized according to their functional effects into groups called phenotypes. A drug-gene interaction (DGI) is how a phenotype affects a drug response. However, other factors besides genetics may impact enzymatic activity. For instance, phenoconversion is a phenomenon that occurs when factors such as disease states or medications convert a patient's genetically predicted phenotype to a different phenotype. A drug-drug interaction (DDI) may also influence enzymatic metabolizing activity through induction or inhibition. A drug-drug-gene interaction (DDGI) is the amalgamation of genetic variation response to medication and enzymatic alterations due to concomitant medications. A DDGI may precipitate phenoconversion. Currently, little research exists describing the prevalence and impact of DDGI induced phenoconversion on pharmacogenomics guided patient care. The purpose of this study is to determine the prevalence and clinical significance of DDGIs in a pharmacogenomics clinic patient population. This study is a retrospective chart review analyzing patient medication lists and pharmacogenomics results to identify any DDGI. Medications will be flagged if they are enzyme substrates, inducers, or inhibitors of the selected enzymes the pharmacogenomics panel tests for. Induction and inhibition will be classified by severity according to Indiana University's Flockhart Table. The presence of a DDI and a DGI that affect the same enzyme qualifies as a DDGI and a potential for phenoconversion. Finally, DDGIs will be reviewed to determine if a change in clinical recommendation is warranted.

Learning Objectives:

Identify drug-gene interactions and their clinical significance

Define phenoconversion as related to drug-drug-gene interactions

Self Assessment Questions:

1. Clopidogrel is a prodrug that is converted to its active form through metabolism by CYP2C19. Person A is a known CYP2C19 poor metabolizer. Which of the following statements is the most accurate for Person A. Person A will have:

- A: More active drug than a CYP2C19 normal metabolizer
- B: An allergic reaction to clopidogrel
- C: Less active drug than a CYP2C19 normal metabolizer
- D: The same amount of active drug as a CYP2C19 normal metabolizer

Which of the following would be an example of phenoconversion?

- A: Genotypic normal metabolizers converted into genotypic poor met
- B: Phenotypic poor metabolizers converted into genotypic normal me
- C: Genotypic normal metabolizers converted into phenotypic poor me
- D: Genotypic poor metabolizers converted into genotypic normal met

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-732-L04-P

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

ACUTE KIDNEY INJURY IN PATIENTS TREATED WITH VANCOMYCIN IN COMBINATION WITH PIPERACILLIN-TAZOBACTAM ADMINISTERED AS INTERMITTENT VERSUS ALTERNATIVE EXTENDED-INFUSION

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Purpose: Piperacillin-tazobactam given in combination with vancomycin is a commonly prescribed empiric antibiotic regimen given to hospitalized patients. Recent studies looking at patients receiving the combination of vancomycin and piperacillin-tazobactam infusions report high rates of acute kidney injury (AKI). However, there is limited data available describing the incidence of AKI with vancomycin in combination with extended-infusion (EI) piperacillin-tazobactam dosing regimens. Studies that examine EI piperacillin-tazobactam most often feature four-hour extended-infusions given every 8 hours. A previous study examined intermittent versus an alternative 3-hour EI piperacillin-tazobactam regimen in patients with documented gram-negative infections. Results showed that there was a significant reduction in 30-day all-cause hospital readmission associated with the EI regimen. However, other concomitant antibiotics were not evaluated and incidence of acute kidney injury was not studied. In this study, we will examine the difference in incidence of acute kidney injury in patients who received the combination of vancomycin and either intermittent or 3 hour EI piperacillin-tazobactam. **Methods:** This study will be conducted in a 433-bed community hospital in Lexington, Kentucky. The control group will consist of patients with documented gram-negative infections who received intermittent infusions of piperacillin-tazobactam for at least 48 hours prior to policy implementation along with vancomycin. The treatment group will consist of patients with documented gram-negative infections treated with the correct loading and extended-infusion maintenance doses of piperacillin-tazobactam along with vancomycin. Electronic chart review will be performed to collect clinical data, demographic data, cultures and sensitivities, MIC data, and RIFLE/AKIN criteria calculations. Outcomes measured will include incidence of AKI based on RIFLE and AKIN criteria, onset of AKI, in-hospital mortality, 30 day readmissions, and length of stay (total and ICU). For statistical analysis, independent samples t-test, Mann Whitney U, Chi square, and Fischer's exact will be utilized as appropriate.

Learning Objectives:

Define the RIFLE and AKIN criteria for acute kidney injury
Identify potential consequences of acute kidney injury in hospitalized patients

Self Assessment Questions:

Which of the following meets RIFLE criteria for acute kidney injury?

- A SCr increase 1.5x baseline
- B: SCr increase 2x baseline
- C: UOP <0.5mL/kg/hr for 6 hours
- D: Anuria for 12 hours

What is the estimated incidence of AKI in patients treated with combination vancomycin and piperacillin-tazobactam per recent literature?

- A <5%
- B 10 to 15%
- C 15 to 50%
- D >50%

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-416-L01-P

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

EVALUATION OF AN OUTPATIENT PHARMACIST CONSULT SERVICE AT CLEVELAND CLINIC HEALTH SYSTEM

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Community pharmacists are unique and accessible members of the patient's ambulatory healthcare team. Medication therapy management (MTM) services have increased significantly over time, with 60% of pharmacists providing MTM in 2014, compared to 13% in 2004. While benefit-generated MTM referrals may have limited relevance, provider-generated referrals may increase provider satisfaction with pharmacist consult services, improve patient education and reduce the need for additional appointments. The outpatient pharmacists at Cleveland Clinic have access to the electronic medical record (EMR), evaluate patient medications, labs, and office visit progress notes to provide more comprehensive MTM services. A pilot outpatient pharmacist consult service was initiated at 4 outpatient Cleveland Clinic pharmacies located within Family Health Centers in August 2017. It is our goal to evaluate this outpatient pharmacist consult service to determine if implementation across all Cleveland Clinic pharmacies is feasible and to determine impact on patient affordability of medications, pharmacist and provider satisfaction, and provider acceptance of pharmacist recommendations. The primary objective of the study is to characterize the types and duration of consult services conducted by outpatient pharmacists. Secondly, provider acceptance of pharmacist's recommendations, cost savings to patients, and provider and pharmacist satisfaction will also be assessed. This is a retrospective review of an ongoing, quality improvement, pilot program. Adult patients with a consult completed at Cleveland Clinic outpatient pharmacies in Beachwood, Independence, Strongsville, or Twinsburg, Ohio from September 21st, 2017 to January 31st, 2018 will be included. Data will be collected on patient demographics, type of consult completed, time spent on consult, number of recommendations made and accepted by provider, patient barriers, cost savings, and drug therapy problems. Data will be analyzed using descriptive statistics. Results and conclusions are pending conclusion of the pilot program in January 2018.

Learning Objectives:

Discuss the weaknesses of benefit-generated MTM referrals and potential benefits of provider-generated MTM referrals.
Explain the workflow of provider-generated MTM referrals compared to benefit-generated MTM referrals.

Self Assessment Questions:

Which of the following steps is unique to the provider-generated MTM referral process compared to the benefit-generated MTM process?

- A Pharmacist contacts the patient to schedule an encounter.
- B: Pharmacist meets with the patient over the phone or in person.
- C: Provider sends a consult to the pharmacist.
- D: Pharmacist contacts the insurance for authorization.

Which of the following is a potential benefit of the provider-generated MTM referral process?

- A Increased provider satisfaction with pharmacist services.
- B Increased number of physician appointments.
- C Decreased pharmacist workload.
- D Increased reimbursement from insurance companies.

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-733-L04-P

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

EFFECT OF INTRAVENOUS PUSH (IVP) ANTIBIOTIC ADMINISTRATION ON ANTIBIOTIC THERAPY DELAYS IN SEPSIS

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Purpose: Sepsis is a life threatening disease state associated with high rates of mortality, with a yearly incidence of over 1 million cases in the United States alone. Timeliness of antibiotic administration is recognized as important factor in reducing mortality associated with sepsis and other severe infectious disease states. According to guidelines for the management of sepsis, antibiotics should ideally be administered within 1 hour of presentation. In July of 2017, our medical center implemented a protocol whereby patients diagnosed with sepsis in the Emergency Department (ED) received intravenous push (IVP) beta-lactam antibiotics instead of intravenous piggyback (IVPB) for their first dose. This study was undertaken to evaluate the time to administration difference between IVP and IVPB beta-lactam antibiotics. IVP antibiotic doses not only allow prompt treatment of disease, but also free up intravenous (IV) lines and decrease nursing time dedicated to maintaining the IVPB infusions. **Methods:** This study is a single-center, retrospective analysis that received a formal Determination of Quality Improvement status. Patients diagnosed with sepsis in the University of Chicago Medicine Adult ED from September 2016 through November 2016 and from September 2017 through November 2017 were included in this analysis. Our primary endpoint was time from sepsis diagnosis to beta-lactam administration. Our secondary endpoints included: percentage of patients who received a beta-lactam antibiotic within 3 hours of sepsis diagnosis, incidence of adverse reactions, intensive care unit length of stay, hospital length of stay, and mortality. **Results/Conclusions:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference. The authors estimate that each group will contain approximately 150 patients.

Learning Objectives:

Describe the rationale behind using IVP beta-lactams for the first dose in sepsis patients

Explain the benefits of IVP beta-lactams compared to intravenous piggyback (IVPB) agents in this patient population

Self Assessment Questions:

How quickly do the Surviving Sepsis Guidelines recommend antibiotics be started for sepsis patients?

- A: Under 1 hour
- B: Under 3 hours
- C: Under 6 hours
- D: Under 9 hours

Which of the following statements is TRUE regarding the use of IVP antibiotics in the ED as compared to IVPB?

- A: IVP antibiotics free up IV lines for administration of other medications
- B: Literature comparing IVP and IVPB antibiotics have shown an increase in mortality
- C: Financial analysis in the literature has shown a cost increase when using IVP antibiotics
- D: Clinical data suggests a possible reduction in the efficacy of antibiotics when using IVP antibiotics

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-417-L01-P

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

VANCOMYCIN USE IN BLOOD CULTURE CONTAMINANTS

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Purpose: Vancomycin overprescribing can lead to resistant microorganisms and adverse effects, such as acute kidney injury. As part of a health system campaign to reduce overall vancomycin exposure, this study looked at one way to decrease the exposure of unnecessary vancomycin for a probable skin culture contaminant. Inappropriate prescribing of vancomycin for probable blood culture contaminants is multifactorial; however, may be largely due to a lack of knowledge on how to differentiate between a probable contaminant versus a true infection. The purpose of this study was to evaluate if an antimicrobial stewardship intervention reduces the number of days of unnecessary vancomycin. **Methods:** This study was an IRB approved, retrospective, quasi-experimental study with a control group. A checklist and flowsheet were designed to assist pharmacists in identifying probable contaminants alongside a microbiology lab comment stating "consistent with skin flora contaminant". Patients admitted November 1, 2016 through February 28, 2017 and November 1, 2017 through February 28, 2018 were included if they were at least 18 years old, located in a medical ward and had one out of two sets of blood cultures positive for: Coagulase negative Staphylococci, Corynebacterium species, Micrococcus species, Bacillus species (not B. anthracis), or Propionibacterium acnes. Patients were excluded if they were receiving vancomycin for another indication upon admission, febrile neutropenia, prior surgery within 24 hours, Staphylococcus aureus infection, or located in intensive care or oncology units. The primary outcome of duration of vancomycin was compared pre-/post intervention and between the intervention group (Henry Ford) and the control group (Henry Ford Macomb). Secondary outcomes included proportion of patients receiving vancomycin and measures of resource utilization. Safety outcomes included incidence of acute kidney injury. Data was analyzed using bivariate comparisons and p-values less than 0.05 were considered significant. **Results/conclusions:** Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the most common microorganisms associated with blood culture contamination.

Describe the factors for consideration when evaluating blood culture contaminants versus true infection.

Self Assessment Questions:

Which of the following microorganisms is commonly classified as a blood culture contaminant?

- A: Staphylococcus aureus
- B: Escherichia coli
- C: Pseudomonas aeruginosa
- D: Coagulase-negative Staphylococci

Which of the following factors most strongly correlates with a probable blood culture contaminant?

- A: One of two or more cultures positive; afebrile
- B: Leukocytosis and febrile
- C: Growth in both sets of blood cultures
- D: Presence of an indwelling catheter

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-418-L01-P

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

EMERGENCY DEPARTMENT TARGETED DISCHARGE PRESCRIPTION EVALUATION AT AN ACADEMIC MEDICAL CENTER

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Purpose: In 2016, an internal retrospective review of targeted emergency department (ED) discharge prescriptions demonstrated a 13.6% potential intervention rate. This finding was similar to other published works describing pharmacist involvement in ED discharge prescription review. With this baseline information, we sought to develop a process for further targeted review of prescriptions based upon select medication classes, laboratory, and demographic information available in the electronic health record (EHR). The aim of this project was to develop a real-time notification system in the EHR for targeted discharge prescription review based upon meeting select criteria as well as an associated ED pharmacist workflow. Also, this project sought to evaluate the intervention rate achieved through targeted discharge prescription review. **Methods:** Discharge prescriptions that met the inclusion criteria including targeted medication classes, recent serum creatinine (within 6 months) >1.5 mg/dL, patient weight ≤40 kg, and patient age ≤12 or ≥80 years were filtered into a real-time work queue for ED pharmacists. ED Pharmacists reviewed the prescriptions and in many cases, by utilizing their clinical privileges, made the necessary adjustments to the prescription. Providers were contacted for urgent discrepancies, clarification purposes, and when the prescription remedy fell outside of pharmacist privileges. If necessary, a new prescription was given to the patient before discharge or sent to their preferred pharmacy. After project implementation, interventions were reviewed and categorized to assess rate of intervention and the types of medication-related problems identified. Additional outcomes captured include time spent reviewing discharge prescriptions by the ED pharmacist, percentage of prescriptions intercepted prior to patient discharge, and time of day in which the majority of prescriptions were written. **Results/Conclusions:** To be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review existing institutional data related to pharmacist interventions on discharge prescriptions written from the emergency department.

Define high-risk prescription and patient criteria and overall intervention rate associated with each.

Self Assessment Questions:

Based on a prior review, what was the potential intervention rate by pharmacists on discharge prescriptions?

- A 2%
- B: 14%
- C: 35%
- D: None of the above

What prescription and patient criteria is considered high-risk for the purposes of this study?

- A Fluoroquinolones
- B Anticoagulants
- C Age Extremes
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-734-L04-P

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

EFFECT OF PROCALCITONIN ON ANTIBIOTIC PRESCRIBING FOR LOWER RESPIRATORY TRACT INFECTIONS

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Purpose: Lower respiratory tract infections can be caused by various infectious etiologies. Antibiotic therapy should be reserved for treating bacterial causes of lower respiratory tract infections. However, differentiating bacterial infections from non-bacterial infections can be difficult. Procalcitonin is a precursor hormone of calcitonin that is upregulated in response to inflammation. It has been studied and validated as a biomarker for bacterial infections to help guide decisions related to antibiotic therapy. Data showing a reduction in antibiotic use would provide reasoning to encourage pharmacists to make recommendations based on the procalcitonin results. The objective of this study is to investigate whether the use of the procalcitonin laboratory test has reduced antibiotic prescribing for lower respiratory tract infections at Henry Ford Alliance Health. **Methods:** This study has been approved by the Institutional Review Board. The electronic medical record system will be used to identify patients who were diagnosed with a lower respiratory tract infection and had a procalcitonin level ordered. These patients will be compared to patients diagnosed with a lower respiratory tract infection before the procalcitonin test was available. Data will be collected to assess antibiotic prescribing. Statistical analysis will be performed to assess if the use of the procalcitonin laboratory test decreased antibiotic prescribing for lower respiratory tract infections. Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the role of procalcitonin for guiding antibiotic therapy decisions in patients with lower respiratory tract infections.

Identify possible causes for false-positive or false-negative procalcitonin results.

Self Assessment Questions:

Which of the following is a benefit to using procalcitonin to guide antibiotic therapy?

- A Increasing healthcare costs
- B: Decreasing need for cultures
- C: Increasing length of stay
- D: Decreasing antibiotic use

Which of the following could cause a false-negative procalcitonin result?

- A Decompensated heart failure
- B Mycoplasma infections
- C Impaired renal function
- D Medullary thyroid cancer

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-419-L01-P

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

PROLONGED ORAL VANCOMYCIN AND SECONDARY PROPHYLAXIS FOR CLOSTRIDIUM DIFFICILE INFECTIONS IN PATIENTS ON BROAD-SPECTRUM ANTIBIOTICS

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Purpose Patients with a history of Clostridium difficile infection (CDI) who receive broad-spectrum antibiotics (BSA) and patients with active CDI who require continued BSAs are at an increased risk of CDI recurrence. No formal guidance exists on prevention of CDI recurrence in these patient populations. The objective of this study is to characterize two unique groups: patients with prior history of CDI on oral vancomycin for secondary prophylaxis who require BSAs and patients with active CDI on prolonged oral vancomycin treatment while on concurrent BSAs. **Methods** Inpatients 18 to 89 years of age, with or without active CDI, who received oral vancomycin concurrently with at least one dose of BSA from January 1, to July 31, 2017, were included. Exclusion criteria were protected patients, mortality during oral vancomycin therapy, vancomycin hypersensitivity reaction, vancomycin taper dosing, and concomitant metronidazole therapy in patients without an active CDI. The primary outcome is the duration of oral vancomycin after BSA discontinuation. Secondary outcomes include prophylaxis dosing regimen, 90-day CDI recurrence and 90-day VRE infection. **Results** There were 74 patients included for evaluation (n=61 for prolonged prophylaxis, n=13 for secondary prophylaxis). Vancomycin 125 mg PO QID was the most commonly used dose for secondary prophylaxis (n=8, 62%) and prolonged oral vancomycin prophylaxis (n=44, 72%). The median duration of oral vancomycin after the discontinuation of BSAs was 10 days (IQR 7-14). The rates of 90-day CDI recurrence and 90-day VRE infection were low at 12% and 8%, respectively. Of the 6 patients with VRE, 2 were isolated in the urine and 1 was in the respiratory culture. **Conclusion** Oral vancomycin secondary prophylaxis has been adopted at OSUWMC to reduce CDI recurrence. In patients with active CDI and concomitant BSAs, clinicians continue CDI treatment through the duration of BSAs or longer despite limited supporting evidence.

Learning Objectives:

Describe the risk of recurrent Clostridium difficile infection (CDI) in patients who require broad-spectrum antibiotics and limited guidance for prophylaxis in high-risk patients

Report findings of a medication use evaluation on oral vancomycin utilization for secondary and prolonged prophylaxis at a large, academic medical center

Self Assessment Questions:

Risk factors for recurrence of Clostridium difficile infection include

- A Administration of broad-spectrum antibiotics
- B: Advanced age
- C: Proton-pump inhibitor therapy
- D: All of the above

Recent literature supports the use of which agent for prophylaxis to reduce CDI recurrence?

- A Metronidazole
- B Vancomycin
- C Fidaxomicin
- D None of the above

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-420-L01-P

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

EXTERNAL VALIDATION OF A HYPOGLYCEMIA RISK MODEL IN PATIENTS ADMITTED TO MEDICAL/SURGICAL FLOORS

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Diabetes is a growing problem in the United States, with an estimated 30.3 million people having diabetes in 2017. There are increasing numbers of emergency room visits due to hypoglycemia compared to hyperglycemia. The rate of hospitalization due to hypoglycemia increased by 11.7% from 1999 to 2011 in individuals older than 65 years, compared to a 38.6% reduction in the rates of hospitalization for hyperglycemia in the same patient population. Efforts have been made to predict the risk of an individual developing severe hypoglycemia (blood glucose <40 mg/dL) while being admitted to the hospital. A model was created and tested on patients in a Mid-Western academic teaching hospital to predict the odds of a patient developing severe hypoglycemia during their hospital stay. The model was able to correctly predict severe hypoglycemic episodes 70% of the time, and the protocol that was established from this model was able to reduce the incidence of severe hypoglycemia by 68% at their hospital. This model has been proven to work at a single health system but has not been externally validated to determine its efficacy at other institutions. The objective of this retrospective chart review is to externally validate the ability of this risk model to predict the occurrence of severe hypoglycemia in patients admitted to the medical/surgical units at Cleveland Clinic Akron General Patients admitted to a medical/surgical floor between January 1, 2016 and December 31, 2016 who are prescribed any antidiabetic agent and develop a blood glucose value of <90 mg/dL during the hospitalization will be included. The primary outcomes are sensitivity, specificity, positive predictive value, and negative predictive value of the model, with regard to predicting severe hypoglycemia. Results and conclusions are pending.

Learning Objectives:

Review the trends in hyper- and hypoglycemia admission rates.

Describe the variables used in a risk model for predicting severe hypoglycemia.

Self Assessment Questions:

Which of the following correctly reflects a trend in hospital admissions due to dysglycemia?

- A There has been an increase in admissions due to hypoglycemia
- B: There has been a decrease in admissions due to hypoglycemia
- C: There has been an increase in admissions due to hyperglycemia
- D: There is no change in admissions due to dysglycemia

Which of the following is a variable in the risk model for predicting severe hypoglycemia?

- A Liver function
- B Not-by-mouth (NPO) status
- C Renal function
- D SGLT-2 inhibitor use

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-421-L01-P

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

EVALUATION OF ADDITIONAL RISK FACTORS FOR NSAID-INDUCED ACUTE KIDNEY INJURY AFTER TOTAL HIP AND TOTAL KNEE ARTHROPLASTY

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Background: Acute kidney injury (AKI) has been shown to affect 0.5-5.2% of patients who receive a joint replacement. Post-operative kidney injury has many potential causes, with one of the most studied factors being the use of nonsteroidal anti-inflammatory drugs (NSAIDs) for post-operative pain control. The impact of NSAID use on patients who undergo total knee and total hip arthroplasty has come to the forefront of consideration after a 2015 study published in the Journal of Arthroplasty found the rate of post-operative AKI in patients who received celecoxib and ketorolac was 2.7-times higher than past reported literature. The risk of kidney injury due to these medications is well-accepted, however the actual prevalence of NSAID-related post-operative AKI at the Richard L. Roudebush VA Medical Center has not been established. The purpose of this study is to evaluate the incidence of post-operative AKI after total knee and hip replacements when NSAIDs (ketorolac and/or celecoxib) are given post-operatively for pain and identify additional risk factors that may pre-dispose patients to post-operative AKI. Patient risk factors found to be significant will help guide NSAID prescribing habits, with the goal of limiting the incidence of AKI at our medical center. **Methods:** This project is a retrospective chart review of patients who underwent total knee or total hip arthroplasty between September 13, 2011 – September 1, 2015. Each patient will be assessed for acute kidney injury defined by the Acute Kidney Injury Network criteria and for the presence of additional risk factors, including concomitant disease states, home medications, intraoperative antibiotics, and patient demographics. Based on the results of this analysis, the post-operative pain medication prescribing protocol will be modified to drive prescribing practices based on these statistically significant patient-specific risk factors, limiting the incidence of AKI at our medical center.

Learning Objectives:

Describe the effect of nonsteroidal anti-inflammatory drugs (NSAIDs) on rate of acute kidney injury after total knee and hip arthroplasty
Identify additional risk factors for acute kidney injury after total knee and hip arthroplasty beyond NSAID use

Self Assessment Questions:

Which of the following criteria is listed in the definition of AKI per the Acute Kidney Injury Network?

- A: Increase in serum creatinine of ≥ 0.3 mg/dL from baseline
- B: Increase in serum potassium of $\geq 25\%$
- C: Oliguria of < 1 mL/kg per hour for more than 6 hours
- D: Increase in serum creatinine of ≥ 75 percent

Which of the following patient factors was found to be significant for an increased risk of acute kidney injury after surgery?

- A: Vancomycin dose
- B: Diabetes
- C: ACE inhibitor or ARB as home med
- D: Length of surgery

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-872-L05-P

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

EFFICACY OF ONCE-WEEKLY BORTEZOMIB WITH DARATUMUMAB FOR PATIENTS WITH RELAPSED OR REFRACTORY MULTIPLE MYELOMA

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Background/Purpose: Multiple Myeloma (MM) comprises approximately 10% of all hematologic malignancies in the United States. MM is currently an incurable disease with the goal of therapy being disease control, improved quality of life, and prolonged survival. The majority of patients will relapse and require multiple lines of treatment. In early phase studies, the combination of daratumumab and bortezomib in heavily pretreated relapsed/refractory multiple myeloma (RRMM) patients resulted in high response rates and acceptable safety profiles. On the basis of these findings, daratumumab is currently approved to be given with bortezomib days 1, 4, 8, and 11 of a 21-day cycle. Previous studies have demonstrated that once-weekly bortezomib is equally as efficacious and better tolerated than the standard twice-weekly schedule. However, there are currently no published reports of combining once-weekly bortezomib with daratumumab for patients with RRMM. **Methods:** In this retrospective study, patients 18-89 years of age who were treated with daratumumab plus bortezomib after at least one prior therapy for MM from November 2015 to August 2017 were included. Pregnant patients and those whose previous treatment included daratumumab plus conventional bortezomib dosing (e.g. 1.3mg/m² on days 1, 4, 8, and 11 of a 21-day cycle) were excluded. The primary objective is to evaluate the progression-free survival (PFS) of patients with RRMM, who received once weekly bortezomib with daratumumab. Secondary objectives include overall survival, overall response rate, duration of response, time to response, and toxicity evaluation. Response and toxicity were assessed according to the International Myeloma Working Group (IMWG) response criteria and the National Cancer Institute Common Terminology Criteria for Adverse Events (CTCAE) version 4.03, respectively. Descriptive statistics, Kaplan-Meier curves, and logistical regression analysis will be used to obtain secondary outcomes. **Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review current literature supporting the use of daratumumab in combination with bortezomib and dexamethasone for relapsed/refractory multiple myeloma.

Recognize treatment related toxicities with daratumumab in combination with bortezomib and dexamethasone.

Self Assessment Questions:

In early phase studies, the combination of daratumumab and bortezomib in heavily pretreated relapsed/refractory multiple myeloma resulted in:

- A: poor response rates and substantially toxic effects compared to bc
- B: high response rates but substantially toxic effects compared to bc
- C: high response rates and acceptable safety profiles compared to bc
- D: poor response rates but acceptable safety profiles compared to bc

The goal of reducing the frequency of bortezomib is to reduce which of the following toxicities:

- A: myelosuppression and peripheral neuropathy
- B: infusion reactions and mucositis
- C: mucositis and headaches
- D: myelosuppression and headaches

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-422-L01-P

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

EVALUATION OF APPROPRIATE USE OF BISPHOSPHONATES AND DENOSUMAB IN PATIENTS WITH CANCER

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Purpose: Bone modifying agents, such as bisphosphonates and denosumab, are important medications in the management of bone metastases and bone loss due to androgen deprivation therapy (ADT) or aromatase inhibitors (AI). The National Comprehensive Cancer Network (NCCN) and American Society of Clinical Oncology (ASCO) recommend diligent screening for bone loss in cancer patients receiving ADT or AIs and continued monitoring of patients receiving bone modifying agents for bone metastases and bone loss due to ADT or AI. While bone modifying agents are commonly used at our institution, it is unclear whether a standardized screening tool is used to identify eligible patients, calcium/vitamin D supplementation is prescribed during therapy, and patients who receive education on risks of therapy. Therefore, this study looks to evaluate current prescribing practices related to bone modifying agents in the Hematology, Oncology, and Urology clinics at the Richard L. Roudebush VA Medical Center (RLR VAMC). **Methods:** A retrospective chart review was performed to identify patients who received ADT for prostate cancer, AI for breast cancer, or have bone metastases through Hematology, Oncology, or Urology clinics at the RLR VAMC from November 1, 2016 to October 31 2017. Data collection will include demographic information, type of cancer, indication for bone modifying therapy, DEXA scan, type of bone modifying agent including dose, frequency, and duration, baseline and subsequent serum creatinine, calcium, albumin, and vitamin D levels, and documented education and incidence of osteonecrosis of the jaw or flu-like symptoms. The information will be used to identify opportunities to optimize prescribing practices related to bone modifying agents at the RLR VAMC. **Results/Conclusions:** Data analysis is ongoing. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify common indications for bone modifying agents in patients with cancer

Discuss patient-specific factors that may influence treatment choice in patients with bone loss

Self Assessment Questions:

Which of the following medications increases the risk of bone loss in patients with cancer?

- A: Leuprolide
- B: Doxorubicin
- C: Trastuzumab
- D: Erlotinib

What lab abnormality could result from a patient having poor renal function while receiving denosumab?

- A: Hypophosphatemia
- B: Hypokalemia
- C: Hypocalcemia
- D: Hyponatremia

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-423-L01-P

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

EFFICACY AND SAFETY OF VASOPRESSIN AS FIRST-LINE TREATMENT OF SHOCK STATES

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Purpose: Norepinephrine remains the first-line option to treat patients with circulatory shock despite its significant cardiac adverse effects. Studies have evaluated norepinephrine versus adjunct vasopressin, the only readily available non-catecholamine vasopressor, for the treatment of circulatory shock revealing mixed results. A paucity of evidence exists evaluating vasopressin as first-line monotherapy for treating non-cardiogenic related shock. The purpose of this study was to compare vasopressin monotherapy versus norepinephrine in the treatment of non-cardiogenic circulatory shock. **Methods:** This retrospective chart review evaluated patients admitted to Beaumont Hospital, Royal Oak who received either vasopressin or norepinephrine monotherapy as first-line therapy for shock. The primary outcome was time to shock reversal, defined as a systolic blood pressure greater than or equal to 90 mmHg for at least 24 hours without vasopressor support. Secondary outcomes included 28-day mortality, length of stay, need for additional vasopressor therapy, and safety outcomes. Eligible patients were at least 18 years old, had vasopressor therapy initiated in the emergency department or intensive care unit, were diagnosed with distributive or hemorrhagic shock, had received continuous infusion of study vasopressor monotherapy for at least one hour, and had received greater than or equal to 30 milliliters/kilogram of intravenous fluids within six hours of vasopressor initiation. Patients were excluded if they were initiated on two or more vasopressors within thirty minutes of each other, diagnosed with obstructive, cardiogenic, or neurogenic shock states, or had cardiac surgery during admission. Statistical analysis included Mann-Whitney U, chi-square, and Student's-t tests, when appropriate. A multivariate analysis was conducted to evaluate the primary outcome. **Results/Conclusion:** Initial results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the available literature regarding vasopressin use in circulatory shock

Describe the potential benefits of using vasopressin as first-line therapy in circulatory shock

Self Assessment Questions:

The available literature has consistently shown vasopressin to have which beneficial effect?

- A: Catecholamine sparing effects
- B: Quicker eradication of infection
- C: Increased cardiac output
- D: Decreased opioid use

A potential benefit of using vasopressin as a first-line option for treating circulatory shock is:

- A: Improved kidney function
- B: Increased ventilator compliance
- C: Lower rates of bowel ischemia
- D: Lower rates of hypoglycemia

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-424-L01-P

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

CHARACTERIZATION OF DISPENSING PATTERNS FOR NALOXONI IN COMMUNITY PHARMACIES WITH A STATEWIDE DISTRIBUTION PROTOCOL

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Purpose: Opioid overdoses are increasing at an alarming rate. As a result, many states have adopted laws that allow pharmacists to dispense naloxone without a physician's prescription. The primary objective of this study is to identify receipt of naloxone and characterize demographic information for these patients. Secondary objectives are to compare naloxone prescriptions dispensed by standing order, collaborative practice agreements, pharmacist prescription, and those dispensed per a physician's prescription and also to determine barriers of purchase including cost, insurance coverage, and patient location. **Methods:** A cross-sectional study will be performed from November 2017 to January 2018. Included subjects are 18 years of age and older who received a naloxone prescription from an Albertsons Companies pharmacy within one of eight states that allow pharmacists to provide naloxone without a physician's prescription. Eight states were chosen based on the Albertsons' locations with an active naloxone program meeting the timeline. The eight included states are: California, Colorado, Idaho, Maryland, New Hampshire, New Mexico, Oregon, and Pennsylvania. Patients will be identified and data will be collected via dispensing reports for specified naloxone National Drug Codes (NDC) between March 1, 2017 and August 31, 2017. These dates were chosen based on Albertsons naloxone program enactment. The following demographics and characteristics will be analyzed to determine trends: patient age, gender, location (city, state), how naloxone was provided (via standing order or physician prescription), cost to patient, type of insurance and medication coverage, prescribing provider's title, and provider location (city, state). SPSS V.24 software will be utilized to analyze the data. **Results/Conclusion:** Research is in progress. Results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patients at risk of opioid overdose.

Recognize barriers to patients receiving naloxone prescriptions.

Self Assessment Questions:

Which of the following patients are indicated to receive naloxone according to the Center of Disease Control and Prevention (CDC)?

- A: 52 year old patient, taking 40 morphine milligram equivalents (MM)
- B: 74 year old patient, taking 41 MME per day
- C: 27 year old patient, taking 50 MME per day
- D: 79 year old patient, taking 40 MME per day

Which of the following is a not a barrier to a patient receiving naloxone?

- A: Lack of knowledge about naloxone
- B: Stigma of being labeled as a "drug user"
- C: Regulatory restrictions that reduce naloxone availability
- D: Patient already receiving naltrexone

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-735-L04-P

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

EFFECTS OF SWITCHING FROM VITAMIN K TABLETS TO ORAL SOLUTION IN THE CLEVELAND CLINIC HEALTH SYSTEM

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Purpose: When pharmaceutical prices increase, health systems often face the challenge of balancing appropriate utilization of effected medications with maintaining financial stability of the organization. In response to increased prices of vitamin K tablets the Cleveland Clinic Health System instituted the use of an oral vitamin K solution made from parenteral product for inpatients requiring reversal of their international normalized ratio (INR) across the enterprise. This study seeks to determine if mean reduction in INR at 24 hours among patients receiving the oral solution was significantly different versus those that received vitamin K oral tablets prior to the change in protocol and describe the estimated cost savings of switching from oral tablets to oral solution made from the parenteral product. This paper is also meant to serve as an illustration of how changes in drug pricing can impact health systems to the point of requiring changes in clinical practice and how that may or may not affect patient outcomes. **Methods:** A retrospective, chart review will be conducted to examine efficacy and safety of oral vitamin K in reversing INR. This before-and-after study will compare mean reduction in INR at 24 hours post-dose of vitamin K in patients prior to and after the switch of products. Secondary endpoints will include required use of heparin bridging, evidence of bleeding (hemoglobin, hematocrit, use of blood derivatives), as well as intuitional cost information. **Results and conclusions:** Pending data collection

Learning Objectives:

Review the appropriate use of different vitamin K formulations for INR reversal.

Identify ways in which pharmacy departments can combat the negative financial impact of pharmaceutical price increases.

Self Assessment Questions:

Which of the following routes are recommended for administration of vitamin K by the CHEST guidelines?

- A: Intravenous
- B: Subcutaneous
- C: Oral
- D: A and C

Which of the following is a concern when administering vitamin K to reverse INR?

- A: Warfarin resistance
- B: Ease of administration
- C: Skin necrosis
- D: Increased risk of infection

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-736-L04-P

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

EVALUATION OF TACROLIMUS INTRAVENOUS TO ORAL CONVERSIONS WITH VARIOUS CONCOMITANT ANTIFUNGAL AGENTS AFTER ALLOGENEIC HEMATOPOIETIC STEM CELL TRANSPLANT

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Purpose: At many institutions, a tacrolimus-containing regimen is standard GVHD prophylaxis after allogeneic hematopoietic stem cell transplant (HSCT). Azole antifungals are commonly used to help reduce the incidence of invasive fungal infections in this immunosuppressed population. Tacrolimus is a substrate of the cytochrome P450 3A4 enzyme, whereas azole antifungals are inhibitors. Although many studies have demonstrated the importance of tacrolimus dose adjustments, there is limited data regarding appropriate tacrolimus intravenous (IV) to oral (PO) conversion factors to use while on concomitant azole therapy. The purpose of this study is to evaluate IV to PO conversion factors used for tacrolimus and associated change in level while on various concomitant antifungal agents after allogeneic HSCT. **Methods:** This is a single-center, retrospective cohort study of patients aged 18 years and older that underwent first allogeneic HSCT between January 1, 2010 and August 1, 2017 and received concomitant intravenous tacrolimus and antifungal agent. Antifungal agents included were micafungin, voriconazole, posaconazole, isavuconazole, and fluconazole. Patients were excluded if a tacrolimus dose adjustment was made prior to the first level obtained at steady state concentration. The primary outcome of this study is the IV to PO conversion factor used and associated change in tacrolimus level that occurred after conversion. Secondary outcomes include number of dose adjustments made between conversion and first therapeutic level, number of days from conversion to first therapeutic level, incidence of first level obtained at steady state concentration within goal range, number of days between IV to PO conversion and discharge, and patient-specific factors that may influence achieving goal tacrolimus level. Results and conclusions are pending further data collection and analysis.

Learning Objectives:

Discuss tacrolimus dosing strategies and prophylaxis goals in patients after allogeneic hematopoietic stem cell transplant

Review the literature on tacrolimus intravenous to oral conversion in allogeneic hematopoietic stem cell transplant patients

Self Assessment Questions:

What is the initial tacrolimus prophylaxis goal for most patients after receiving a matched unrelated donor stem cell transplant?

- A: 20 ng/mL - 25ng/mL
- B: 5 ng/mL - 10 ng/mL
- C: 7.5 ng/mL - 11 ng/mL
- D: 10 ng/mL - 15 ng/mL

When converting patients from IV to PO tacrolimus after allogeneic stem cell transplant, what is the general range of conversion factors used that is reported in the literature?

- A: 1:5 to 1:7
- B: 1:3 to 1:4
- C: 3:1 to 4:1
- D: 1:1 to 1:5

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-425-L01-P

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

TIMELINESS OF ANTIMICROBIAL DE-ESCALATION OF BLOOD CULTURES USING RAPID DIAGNOSTIC TESTING AND ITS IMPACT ON OUTCOMES IN A COMMUNITY HOSPITAL SETTING

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Purpose: Rapid diagnostic tests (RDTs) provide more timely and accurate organism identification compared to traditional culture and susceptibility methods. The use of RDTs in combination with antimicrobial stewardship have been shown to reduce use of broad spectrum antimicrobials, improve patient outcomes, and decrease health care costs. The objective of this study was to evaluate the utilization of Verigene®, a RDT, in regard to antimicrobial de-escalation for confirmed positive blood cultures within Community Health Network (CHNw). **Methods:** A retrospective chart review was conducted within the CHNw hospital system. Patients were included if they had a positive monomicrobial blood culture with organism identification via Verigene® and initiated on antimicrobial therapy during the time period of January 1, 2017 – July 31, 2017. Patients with polymicrobial bacteremia, on antimicrobials with known culture and susceptibilities at the time of admission, or receiving palliative or inpatient behavioral care were excluded. Patients were also excluded if they were less than 18 years or greater than 89 years old, pregnant, or incarcerated. The primary objective was to evaluate antimicrobial de-escalation utilizing Verigene® within CHNw. Antimicrobial de-escalation was defined as optimal (within 24 hours of Verigene® identification), suboptimal (beyond 24 hours of Verigene® identification, yet prior to susceptibilities), phenotypic (after susceptibilities), inappropriate, no de-escalation, or potential contaminants. Secondary objectives were to compare hospital length of stay, days of antimicrobial therapy, all-cause mortality during admission, 30-day readmission due to infection, and presence of an infectious disease consult. **Results/Conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe rapid diagnostic testing, in particular Verigene®, and the information provided by this technology.

Identify how the utilization of rapid diagnostic testing for antimicrobial de-escalation can improve patient outcomes.

Self Assessment Questions:

Which of the following are resistant organisms that the Verigene® rapid diagnostic test can identify?

- A: Methicillin-resistant Staphylococcus aureus
- B: Extended spectrum beta-lactamase producing Escherichia coli
- C: Penicillin-resistant Streptococcus pneumoniae
- D: A and B

Which statement best describes how rapid diagnostic testing has been shown to improve patient outcomes?

- A: Rapid diagnostic testing increases length of antibiotic therapy for patients
- B: Rapid diagnostic testing increases hospital costs.
- C: Rapid diagnostic testing decreases time to effective antimicrobial therapy
- D: Rapid diagnostic testing prolongs hospital stays.

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-426-L01-P

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

ACTIVATED PARTIAL THROMBOPLASTIN TIME VERSUS ANTI-FACTOR Xa (AXa) MONITORING OF UNFRACTIONATED HEPARIN (UFH) IN OBESE PATIENTS

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Purpose: Anti-factor Xa (AXa) may be a more reliable measure of anticoagulation compared to activated partial thromboplastin time (aPTT) for monitoring of intravenous (IV) unfractionated heparin (UFH). The safety and efficacy of AXa monitoring in the obese population has not been well studied. In January 2017, our hospital transitioned from aPTT to AXa for IV UFH monitoring. This study evaluated the safety and efficacy of this change in the obese cohort at our institution. **Methods:** Obese patients (BMI \geq 30 kg/m²) receiving IV UFH for at least 24 hours from 8/1/16 to 1/31/17 (aPTT group) were compared to those receiving IV UFH from 2/1/17 to 7/31/17 (AXa group). The primary outcomes were time to achieve therapeutic levels, percentage of time spent in the therapeutic range, and heparin dose required to achieve therapeutic level. Secondary outcomes included mean number of infusion rate changes and occurrence of adverse events including bleeding, thrombosis and 30 day mortality. **Results:** A total of 77 patients were included with 53% in the aPTT group and 47% in the AXa group. Significantly higher infusion rates of IV UFH were required to achieve therapeutic range in the AXa group (1449 units/hr versus 1022 units/hr, $p < 0.0001$). The percentage of supratherapeutic values was significantly lower in the AXa group (8.1% versus 20.4%, $p = 0.0001$). The mean number of rate infusion changes for the AXa group was significantly lower (2.1 versus 3.9, $p = 0.0048$). There was no significant difference in adverse events or other outcomes. **Conclusion:** The transition from aPTT to AXa resulted in significantly higher IV UFH doses required and fewer supratherapeutic AXa values without an increase in adverse outcomes. This supports the safety and efficacy of AXa monitoring in the obese veteran population.

Learning Objectives:

Recall the standard therapeutic range for the AXa assay when monitoring IV UFH.

Discuss the biological and analytical factors that result in the variability of aPTT that are avoided with the use of AXa monitoring.

Self Assessment Questions:

Which of the following adjustments of IV UFH would be most appropriate for an AXa level = 0.8 units/mL?

- A: Increase current IV UFH rate
- B: Continue current IV UFH rate
- C: Decrease current IV UFH rate
- D: Administer IV vitamin K

Which of the following statements is correct about aPTT when compared to AXa levels?

- A: AXa levels can be affected by underfilled sample tubes while aPTT
- B: APTT levels can be affected by diurnal variation, while AXa levels
- C: Neither AXa nor aPTT levels are affected by a delay in sample analysis
- D: Both AXa and aPTT levels are affected by a patient's race.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-427-L01-P

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

A PILOT PROJECT TO IMPLEMENT A PROTON PUMP INHIBITOR DE-ESCALATION PROTOCOL

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Proton pump inhibitors (PPIs) are commonly used in the treatment of acid-related diseases. Studies have suggested that nearly 80% of PPIs are prescribed without an evidence-based indication. Many patients that are prescribed chronic PPIs are unnecessarily maintained on therapy. Chronic PPI usage has been associated with a multitude of adverse reactions including chronic kidney disease, increased rate of bone fractures, and pneumonia among others. The primary objective of this study is to identify those veterans in a single Patient Aligned Care Team (PACT) who are inappropriately maintained on chronic PPI therapy. Secondary objective is to evaluate those veterans that are successfully discontinued on PPI therapy using pharmacist-driven de-escalation algorithm. **Methods:** The electronic medical record was used to retrospectively identify those veterans who are taking PPI within a single PACT. The data collected included prescribed PPI, duration, indication, prescriber, and medication possession ratio. Those veteran patients with low medication possession ratios were selected to be included in the trial de-escalation algorithm. The de-escalation algorithm, which had been used in previous studies, was approved by clinical pharmacist and providers of the PACT, was applied. Pharmacist contacted selected patients by telephone and obtained verbal consent from patient to de-escalate PPI. Goal of de-escalation pilot is to make available a resource to assist providers and clinical pharmacist with discontinuing PPI, which has been proven effective. Results and conclusions are pending and will be presented at Great Lakes Residency Conference.

Learning Objectives:

Recognize inappropriate PPI chronic use in patients.

Identify adverse effects associated with chronic use of PPI.

Self Assessment Questions:

What is the recommended proton pump inhibitor treatment period for symptomatic gastroesophageal reflux disease (GERD)?

- A: 180 days
- B: 72 days
- C: Up to 28 days
- D: 12 months

Which of the following adverse effects are associated with chronic use of proton pump inhibitors?

- A: Weight loss
- B: Hyperkalemia
- C: Hirsutism
- D: Pneumonia

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-737-L04-P

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

EFFECT OF PHENYLEPHRINE PUSHES PRIOR TO CONTINUOUS INFUSION NOREPINEPHRINE IN PATIENTS WITH SEPTIC SHOCK

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Purpose: Phenylephrine can be administered to patients with septic shock to maintain sufficient mean arterial pressure (MAP). In a recent study, authors found an increase in in-hospital mortality during a norepinephrine shortage compared to non-shortage times (39.6% vs. 35.9%) with an absolute risk increase of 3.7% ($p=0.03$). Phenylephrine was the most frequent agent utilized during the shortage, suggesting concerns with use in septic shock. Intravenous pushes of phenylephrine may be used to rapidly correct hypotension, but the clinical impact is unclear.
Objectives: The aim of this study was to evaluate the clinical efficacy and safety of utilizing phenylephrine pushes prior to continuous infusion norepinephrine in patients with septic shock. The primary objective was to compare the time to hemodynamic stability in patients with septic shock who received at least one phenylephrine push prior to administration of continuous infusion norepinephrine with patients who did not receive phenylephrine pushes prior to initiation of a norepinephrine infusion. Hemodynamic stability was defined as the time at which continuous infusion vasoactive medications had not been up-titrated for 6 hours and MAP was ≥ 65 mmHg. The secondary objectives were to compare intensive care unit (ICU) and hospital mortality rates, lengths of stay, and vasopressor requirements between the study groups.
Methods: This was a retrospective, cohort study performed at the 10 hospitals of a large health-system. Included subjects were ≥ 18 years old and admitted to an ICU and received continuous norepinephrine infusions for septic shock between January 2012 and September 2017. We determined 756 patients would provide 80% power to detect a 1 hour difference in time to hemodynamic stability assuming a standard deviation of 4 hours and a two-sided α of 0.05. A multivariable cox proportional hazard regression was utilized to evaluate the primary outcome. Results and Conclusions: To be presented

Learning Objectives:

Describe the role of phenylephrine intravenous pushes in septic shock patients

Identify differences between septic shock patients who do and do not receive phenylephrine pushes prior to continuous norepinephrine infusion

Self Assessment Questions:

Which of the following statements is true?

- A Phenylephrine is a selective α_2 -receptor agonist which may be ad
- B: Phenylephrine decreases systemic vascular resistance during shock
- C: Phenylephrine may decrease stroke volume and increase ventricular output
- D: Phenylephrine does not impact hemodynamic stability in patients with septic shock

Which of the following statements is true?

- A Intravenous phenylephrine use has been associated with improved outcomes in septic shock
- B Phenylephrine in septic shock is associated with many adverse effects
- C Phenylephrine use has been implicated as a cause of increased mortality in septic shock
- D Phenylephrine intravenous pushes are never used in septic shock

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-738-L01-P

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

IMPLEMENTATION OF A COLLABORATIVE PENICILLIN SKIN TESTING SERVICE AT A COMMUNITY HOSPITAL

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Purpose: While penicillin is the most commonly reported drug allergy in the US, providers tend to remain apprehensive in challenging unknown penicillin allergies due to fears of unintended drug reactions. The primary objective of this study is to evaluate the incidence of proven penicillin allergies compared to subjective allergy reporting after administration of a penicillin skin test. Secondly, results will be analyzed to determine if a penicillin skin testing service leads to alternative antibiotic choices for patients who tested negative and whether the service leads to an overall cost savings in antimicrobial use.
Methods: A concurrent chart review of patients who received a penicillin skin test from a collaborative nursing and pharmacist driven service was completed during the study period. Patients greater than 18 years old were evaluated for skin testing if they had a listed history to any penicillin antibiotic that was ambiguous, including unknown and childhood reactions, and were receiving broad spectrum antibiotics (aztreonam, vancomycin, carbapenems, and fluoroquinolones). Patients were excluded if they had recent antihistamine use, reported anaphylaxis to penicillin within 5 years, severe immunosuppression, allergy history indicating drug intolerance, or were pregnant.
Results: At the time of submission of the nine patients who underwent skin testing all nine tests were negative. All patients testing negative were transitioned to beta-lactam antibiotics and tolerated administration with no adverse effects reported within 30 days. The most common empiric antibiotics prior to the skin test were aztreonam ($n=3$), carbapenems ($n=1$), fluoroquinolones ($n=5$), and vancomycin ($n=4$). The average antibiotic cost per day before and after transition post skin test was \$533 and \$126, respectively.
Conclusion: Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify patients who may benefit from a penicillin skin test based on current infection, antibiotic treatment, or allergy and medication history

Recognize potential barriers in implementation of a collaborative nurse and pharmacist managed penicillin skin testing service

Self Assessment Questions:

Which of the following patients would most benefit from a penicillin skin test?

- A 66-year-old woman with a group G streptococcus bacteremia with
- B: 81-year old man with ESRD on HD three times weekly with osteon
- C: 56-year old man with newly diagnosed AML and neutropenic fever.
- D: 9-year old girl with streptococcal pharyngitis with a listed allergy of

Which profession will have the greatest impact on the development and sustainability of an antimicrobial stewardship focused penicillin skin testing service?

- A Nursing
- B Pharmacy
- C Physicians
- D Administration

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-428-L01-P

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

THE SAFETY AND TOLERABILITY OF PIPERACILLIN/TAZOBACTAM ADMINISTERED AS AN INTRAVENOUS BOLUS IN THE EMERGENCY DEPARTMENT

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Purpose: Piperacillin/tazobactam (P/T) is a combination antibiotic containing an extended-spectrum beta-lactam antibiotic (piperacillin) and a beta-lactamase inhibitor (tazobactam), which is used to treat a wide variety of infections. Recently, the use of an intravenous bolus method of administration has increased for antibiotics and has shown to be safe and cost-effective. The objective of this study will be to evaluate the safety of IV bolus administration over 3-5 minutes of P/T as initial antimicrobial therapy in the emergency department. Additionally, this study will aim to assess the impact of IV bolus P/T, as compared to intravenous piggyback (IVPB) P/T, on time to antibiotic administration from initial physician order. **Methods:** A retrospective chart review, along with review of the patient safety reporting database within the hospital was conducted to assess the safety and tolerability of P/T administered by IV bolus in the emergency department from 12/1/2016-10/31/2017. Additionally, a subgroup analysis of patients presenting with sepsis was evaluated to determine the time from entry of antibiotic order to administration of antibiotics with IV bolus P/T. **Results:** Data collection is currently in progress and full results will be presented. **Conclusions:** Data collection is currently in progress and conclusion will be presented.

Learning Objectives:

Review the impact of time to antimicrobial therapy in sepsis.
Describe potential benefits to the use of IV bolus antibiotics.

Self Assessment Questions:

Piperacillin/tazobactam has broad antimicrobial activity against all of the following bugs EXCEPT:

- A: Streptococcus pneumoniae
- B: Pseudomonas aeruginosa
- C: Methicillin-resistant Staphylococcus aureus
- D: Bacteroides fragilis

Which of the following is independently associated with decreased mortality rates through time of hospital discharge in patients presenting with severe sepsis?

- A: Early initiation of vasopressors
- B: Time to administration of effective antibiotics
- C: Colloid fluid resuscitation
- D: Both B and C

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-429-L01-P

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

IMPROVING CUMULATIVE LIFE TIME DOSE TRACKING OF ANTHRACYCLINES AND BLEOMYCIN AT SPARROW HOSPITAL AND THE HERBERT-HERMAN CANCER CENTER

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Purpose: Anthracyclines and bleomycin are recognized by the National Comprehensive Cancer Network, and the American Society of Clinical Oncology for having an increased risk of toxicity after exceeding their respective cumulative lifetime dose recommendations. Anthracycline treatment has the potential for insidious cardiomyopathy and heart failure, while bleomycin treatment can lead to significant pneumonitis or pulmonary fibrosis. The Quality Oncology Practice Initiative currently requires all certified institutions to track cumulative doses of chemotherapy agents associated with a risk of cumulative toxicity. The objective of this study is to determine if the current process for cumulative lifetime dose tracking can be improved. **Methods:** A retrospective chart review of all patients that have received one dose of an anthracycline or bleomycin in either the inpatient or outpatient setting from January through March 2017 will be conducted. After identifying deficits in the current process, if any, the need for an updated policy will be assessed. This assessment will involve nursing staff, pharmacists, and oncologists. Following any changes to the current process, an additional three month retrospective chart review will be conducted to determine if an improvement in the number of completed cumulative dose tracking charts can be observed.

Learning Objectives:

Discuss the potential life time risks associated with anthracyclines and bleomycin therapy.

Recognize the appropriate execution of baseline and repeat cardiac and pulmonary function tests in patients being treated with anthracyclines or bleomycin.

Self Assessment Questions:

Which of the following is/are considered a risk factor for bleomycin induced pulmonary toxicity?

- A: Cumulative life time dose greater than 300 units
- B: Mediastinal radiation
- C: Use of oxygen supplementation two years after bleomycin treatment
- D: A and B

A patient receiving anthracycline therapy requires an electrocardiogram or multigated acquisition scan in which of the following scenarios:

- A: Before starting treatment with an anthracycline
- B: After exceeding 100 mg/m² of doxorubicin
- C: The patient is experiencing signs and symptoms of heart failure
- D: A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-430-L01-P

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

EXPANSION OF ANTIMICROBIAL STEWARDSHIP PROGRAM TO OUTPATIENT: A FOCUS ON RESPIRATORY AND URINARY TRACT INFECTIONS

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Background: Antimicrobial resistance is a national threat, and ensuring appropriate antimicrobial prescribing can reduce the risk of resistance. Recent literature showed approximately 30% of outpatient prescriptions were inappropriate. To help combat this issue, the CDC provides a checklist of core antimicrobial stewardship elements that an outpatient facility can use to improve antimicrobial prescribing. Recommended strategies include integrating clinical decision support technology, tracking and reporting antibiotic prescribing, and provider education. Local resistance patterns in the Chicagoland area suggest avoiding macrolide or fluoroquinolone antibiotics as first line therapy for respiratory or urinary tract infections. **Purpose:** The purpose of this study is to assess the rate of fluoroquinolone and macrolide prescribing following implementation of an outpatient antibiotic stewardship program consisting of distribution of treatment algorithms and antibiogram. **Methods:** This was a single-center, retrospective, quasi-experimental study of patients over the age of 18 who were prescribed an antibiotic for respiratory or urinary tract infections. The pre-intervention group were patients who received antibiotics from December 2014 – January 2015, December 2015 – January 2016, and December 2016 – January 2017. The post-intervention group were patients who received antibiotics from December 2017 – January 2018. The primary outcome of this study was the proportion of clinic visits in which a macrolide or fluoroquinolone antibiotic were prescribed between the pre- and post-intervention groups. Secondary outcomes included: proportion of antibiotics prescribed per diagnosis, duration of antibiotic therapy, and appropriateness of antibiotic prescribing based on guidelines. **Results/Conclusions:** Results and conclusions are pending further data collection and analysis of results.

Learning Objectives:

Discuss the core elements of antimicrobial prescribing provided by the CDC

Select an appropriate antimicrobial regimen for the outpatient treatment of an uncomplicated urinary tract infection

Self Assessment Questions:

1. Which of the following is true regarding the CDC's core elements of antibiotic stewardship programs?

- A: It is preferred to restrict the prescribing of all antimicrobials to one
- B: Prospective audit and feedback is ineffective, and may cause prov
- C: Providing information to staff on improving antibiotic use and resit
- D: Actions to support optimal antibiotic use including facility-specific t

BH is a 25 yo F with no PMH who complains of increased pain and frequency of urination. While at clinic, a pregnancy test was collected and came back negative. Based on the outpatient specific guideli

- A: Fosfomycin 3g sachet po x1 dose
- B: Nitrofurantoin 100 mg BID po x 5 days
- C: Levofloxacin 500 mg po daily x 7 days
- D: Amoxicillin/clavulanate 500 mg/125 mg po BID x 3 days

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-431-L01-P

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

LEVERAGING A RAPID BLOOD CULTURE IDENTIFICATION PANEL WITH PHARMACIST-DRIVEN ANTIMICROBIAL STEWARDSHIP INTERVENTIONS IN A COMMUNITY TEACHING HOSPITAL

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Purpose: The purpose of this study is to evaluate the impact of pharmacist-driven antimicrobial stewardship (AMS) interventions for rapid diagnostic blood culture results in a newly decentralized pharmacy model. The BioFire FilmArray™ Blood Culture Identification (BCID) panel identifies 27 total targets approximately one hour after organism growth. Following implementation of the BCID at OhioHealth Doctors Hospital (DH), we provided education to clinical pharmacists on how to make real-time AMS interventions in response to positive BCID results. The educational initiative emphasized new clinical decision support (CDS) tools in the electronic health record regarding pertinent drug-bug mismatches. The timing of the education aligned with our transition to a decentralized pharmacist workflow model, allowing us to engage AMS efforts with providers at the point of care. **Methods:** We retrospectively reviewed results of all positive blood cultures at DH comparing three study periods: a historical control period (no BCID + no CDS/AMS education, November 2015 – January 2016), a pre-interventional period (BCID + no CDS/AMS education, November 2016 – January 2017), and a post-interventional period (BCID + CDS/AMS education, November 2017 – January 2018). Patients age 18 and older admitted to an inpatient unit at DH with two sets of blood cultures were included for review. Patients were excluded if they died, left facility against medical advice, or transferred to an outside hospital (OSH) prior to initial microbiology result. Patients were also excluded if they transferred from an OSH with a documented bloodstream infection or if the pathogen was determined to be a contaminant based upon the final culture results. The primary outcome was the time to optimal antimicrobial therapy following the initial microbiology result. Secondary outcomes included antimicrobial days of therapy, length of hospital stay, and pharmacist interventions accepted. **Results/Conclusions:** Results and conclusions will be presented at Great Lakes Pharmacy Conference.

Learning Objectives:

Discuss the strengths and limitations of the functionality of the BioFire FilmArray™ Blood Culture Identification (BCID) panel.

Describe key quality improvement measures that resulted from leveraging pharmacist interventions for BCID results.

Self Assessment Questions:

Which of the following statements describes the functionality of the BioFire FilmArray™ Blood Culture Identification (BCID) panel? The BCID:

- A: Is unable to identify more than one organism in a positive blood cu
- B: Can identify an organism or resistance gene from a positive blood
- C: Can detect antimicrobial resistance genes for all varieties of exten
- D: Can identify Candida, Aspergillus, and Mucor.

Which of the following quality improvement measures resulted from the pharmacy resident's research project at OhioHealth Doctors Hospital?

- A: Facilitated the build of a CDS alert for patients with candidemia bu
- B: Facilitated an evaluation of false positive firings of the CDS alerts I
- C: Facilitated multidisciplinary provider education on which organisms
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-432-L01-P

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

EVALUATION OF RECOMMENDATIONS MADE BY A COMMUNITY HOSPITAL ANTIBIOTIC ADVISORY TEAM AND THE POTENTIAL TO CAUSE TREATMENT FAILURE

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Purpose: This study aims to assess whether recommendations made by an Antibiotic Advisory Team (AAT) regarding de-escalation of antibiotic therapy for the treatment of respiratory infections resulted in treatment failure. **Methods:** A retrospective chart review was performed for all patients reviewed by AAT between January 1, 2016 and June 30, 2017. Patients were eligible for inclusion if the patient had a diagnosis of respiratory infection as well as documentation that a recommendation for de-escalation or discontinuation of antibiotic therapy was made by the AAT. Eligible patients were evaluated for development of treatment failure after the time of the recommendation. Data analysis included descriptive statistics and correlation statistics in the form of chi-square analyses. **Results:** To date, chart review has been completed for all patients reviewed by the AAT between January 1, 2016 and June 30, 2016. Of these, no significant difference was found in the frequency of treatment failure between recommendations which were accepted and the total sample population (8.4% vs. 9.15%, $p=0.79$). A sub-analysis was completed to evaluate the primary outcome among patients for whom the recommendation was accepted. In this sub-population there was no difference found between recommendations made to discontinue all antibiotic therapy and total accepted recommendations (9.62% vs. 8.4%, $p=0.66$). A difference was found between recommendations made to convert from intravenous to oral antibiotic therapy and total accepted recommendations (15% vs. 8.4%, $p=0.017$). **Conclusions:** Patients were no more likely to experience treatment failure when a recommendation was made to de-escalate antibiotic therapy in comparison to the entire sample population. This conclusion holds true for recommendations made to discontinue all antibiotic therapy, but not for recommendations made to change from intravenous to oral antibiotic therapy.

Learning Objectives:

Discuss the benefits of de-escalation of antibiotics in the treatment of respiratory infections

Describe the differences in treatment failure rates between patients for whom de-escalation of therapy is completed and those for whom empiric therapy is continued

Self Assessment Questions:

Which of the following is a benefit provided by de-escalation of antibiotic therapy?

- A Increased length of hospital stay
- B Decreased rates of antibiotic resistance
- C Increased duration of antibiotic therapy
- D Decreased frequency of positive culture results

Based on data from this presentation, which of the following is true?

- A De-escalation of antibiotic therapy results in an increased frequency of treatment failure
- B De-escalation of antibiotic therapy results in increased length of hospital stay
- C Discontinuation of antibiotic therapy results in an increased frequency of treatment failure
- D Treatment failure is no more likely to occur when an AAT recommendation is followed

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-739-L04-P

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

IMPLEMENTATION OF QUALITY IMPROVEMENT STRATEGIES TO INCREASE OUTPATIENT INFUSION CLAIMS REIMBURSEMENT

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Purpose: The Center for Medicare and Medicaid Services releases yearly regulations to the Inpatient and Outpatient Prospective Payment Systems (IPPS and OPSS), determining how services are classified and reimbursed. Hospitals must be aware of IPPS/OPSS changes and adjust billing processes accordingly. Inability to comply with regulations can result in financial turmoil. Quality improvement (QI) tools, such as process mapping, help staff visualize pain points in billing processes and identify potential solutions. The objective of this study is to measure the impact of a QI initiative on the rate of successful pharmacy claim submission. **Methods:** This study examines claims from the top ten drugs based on purchase cost at Hancock Memorial Hospital. Eligible claims require a retrievable charge and reimbursement. Claims must originate from the outpatient infusion center and inpatient administrations of study drugs will be excluded due to bundling of reimbursement. Initial data collection includes claims from September 1st, 2016 through May 31st, 2017. Both pre- and post- intervention claims include data on coding, billing units, payers, charge and reimbursement. Analysis of initial claims findings is used to direct the building of QI tools. These tools are developed between the project coordinator and the advisors. Once the tools are complete, they are presented and implemented at the hospital. Post intervention review of claims data started in January 2018 and will continue for 9 months. Comparison of pre-intervention data to post-intervention data will determine effectiveness of process changes on the successful claim submission rate and reimbursement collected. **Results:** Data collection is ongoing. Preliminary results to be presented at the Great Lakes Pharmacy Residency Conference in April 2018. **Conclusion:** Retrospective auditing of outpatient infusion claims can provide valuable insight into pharmacy, infusion center and billing department process gaps. QI tools open up interdisciplinary dialogue surrounding process changes that ultimately improve successful claim submission rate.

Learning Objectives:

Recognize the difference between preventable and non-preventable causes of outpatient infusion reimbursement loss

Identify workflow considerations that may negatively impact success of outpatient infusion claims submission

Self Assessment Questions:

Which of the following is a non-preventable cause of outpatient infusion reimbursement loss?

- A Absence of JW Modifier on a claim for a Single Dose Vial drug
- B Patient inpatient admission within 72 hours of infusion administration
- C Insurance denial due to absence of medication administration documentation
- D J9999 code submission for a drug with a newly assigned J-code

Which of the following is a non-human factor consideration for process failure in the submission of outpatient infusion claims?

- A Limited staffing/Employee turnover
- B Manual build-out of coding information into EHR
- C LCD coverage denial
- D Pharmacy manual documentation of waste during preparation

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-740-L04-P

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

IMPACT ON APPROPRIATE USE OF FLUOROQUINOLONES FOR URINARY TRACT INFECTIONS AFTER IMPLEMENTATION OF AN ADULT EMPIRIC ANTIBIOTIC THERAPY GUIDE

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Empiric therapy is an important step in the proper management of a microbial infection. For many indications, it is appropriate to prescribe a broad spectrum agent until additional cultures or susceptibilities are available. But for infections that are often not life threatening or polymicrobial, such as urinary tract infections, targeted empiric therapy against common pathogens is indicated. Unfortunately, problems continue to exist with the selection of targeted empiric therapy. To help answer this problem, an empiric antibiotic guide was implemented to help physicians and pharmacists with the selection of appropriate agent for various indications. To measure its effect on prescribing habits, empiric fluoroquinolone use for UTI was analyzed due to the risks associated with this class of medications (e.g. resistance, adverse effects). An Institutional Review Board approved study was developed to help complete this assessment. Antibiotic utilization reports were conducted within the electronic medical record system with regards to empiric prescribing of fluoroquinolones for the antibiotic reasons of urinary tract infection, prostatitis, and pyelonephritis. Data will be collected for 100 patients before and after the implementation of the guide. Data collected will include age, gender, diagnosis, white blood cell count, temperature at initiation, medication, dose, and duration prescribed, physical examination findings, urinalysis and urine culture results, renal function, and prescriber qualification. The primary objective will be to assess appropriateness of fluoroquinolone use for the treatment of UTI. This will help to assess if changes are needed for the empiric guide to optimize its use or if educational opportunities exist within certain medical groups. Overall, the total utilization of fluoroquinolones for UTIs decreased following the implementation of the empiric guide. Before and after implementation, the highest utilizers in the hospital were the hospitalists, followed by emergency department physicians. Appropriateness data is still pending.

Learning Objectives:

Describe an appropriate scenario in which a fluoroquinolone could be used for the empiric management of a urinary tract infection.

Select an appropriate antimicrobial agent for the treatment of an uncomplicated urinary tract infection given local susceptibility data.

Self Assessment Questions:

A fluoroquinolone should be used in which of the following scenarios for empiric treatment

- A: 90 year old female with an uncomplicated urinary tract infection
- B: 35 year old male with a urinary tract infection and potential signs c
- C: 32 year old pregnant female with a urinalysis positive for nitrites at
- D: 73 year old female with a catheter-associated urinary tract infectio

Based on the susceptibility data presented today, which agent would provide the most effective empiric coverage for an uncomplicated urinary tract infection?

- A: Ciprofloxacin
- B: Levofloxacin
- C: Trimethoprim/sulfamethoxazole
- D: Cephalixin

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-433-L01-P

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PROTECT: PHARMACIST RUN OUTPATIENT TRANSPLANT RECIPIENT CMV MONITORING PROGRAM

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Purpose: Cytomegalovirus (CMV) infection after solid organ transplant (SOT) is associated with graft loss and mortality. Antivirals are used to treat and prevent disease, however an effective management strategy in the ambulatory arena is challenging. The purpose of this project was to create a pharmacist driven monitoring program to ensure safe and appropriate antiviral therapy for treatment and prophylaxis of CMV after SOT. Methods: Workflows were developed to identify patients and integrate the program within the ambulatory transplant clinic. An initial three week pilot was completed via prospective chart review of all patients discharging from the inpatient transplant unit. Patients were included if they were receiving antiviral therapy and had at least one predefined inclusion criterion. Enrollment criteria included delayed graft function, active viremia, creatinine clearance <40 mL/min, valganciclovir therapy while awaiting coverage for valganciclovir, high risk serostatus with receipt of lymphocyte depleting induction agents, preemptive monitoring, and leukopenia (WBC <3 K/uL). Preliminary Results: Sixty-three patients were reviewed and 17 (27%) met inclusion criteria. The majority were recipients of kidney transplants (71%). Fluctuating renal function was the most common reason for enrollment (35%). Other enrollment included high risk serostatus in the setting of lymphocyte depleting induction agents (18%), active viremia (18%), preemptive monitoring (18%), and leukopenia (11%). Patients enrolled with fluctuating renal function on prophylaxis were universally on \leq valganciclovir 450mg by mouth once daily. Average time required to screen for enrollment was 0.77 minutes. Average evaluation time was 11.17 minutes. Pharmacist interventions centered on resumption of valganciclovir therapy and optimization of dosing. Conclusions: Pharmacist management of antiviral therapies for the prevention and treatment of CMV after SOT in the ambulatory setting is feasible from a time commitment standpoint. Additionally, management may result in improved patient and graft outcomes by optimization of drug therapy. Further comparative study is needed.

Learning Objectives:

Discuss the benefits of a pharmacist-driven cytomegalovirus (CMV) monitoring program in improving safe and appropriate antiviral therapy for abdominal organ transplant recipients.

Describe an approach for developing an outpatient medication monitoring service to improve patient care.

Self Assessment Questions:

What is one important reason to monitor antiviral therapy in solid organ transplant recipients?

- A: Solid organ transplant recipients experience frequent changes in r
- B: Solid organ transplant recipients are more likely to not take their m
- C: Solid organ transplant recipients have low health literacy
- D: Solid organ transplant recipients have very limited outpatient follow

How will transplant clinic pharmacists know that a patient may qualify for CMV monitoring?

- A: An electronic message will be generated and sent to the transplan
- B: The pharmacist will have to chart review every patient in clinic
- C: The nursing staff will alert the pharmacist
- D: Patients will identify themselves to the pharmacist in clinic

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-434-L01-P

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

EVALUATING THE INCIDENCE OF BEVACIZUMAB-INDUCED HYPERTENSION AND PROTEINURIA TO DETERMINE APPROPRIATE TREATMENT AND MANAGEMENT STRATEGIES

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Bevacizumab is utilized for the treatment of many cancers due to its effects on vascular endothelial growth factor (VEGF); however, hypertension and proteinuria are common adverse effects. In clinical trials, the incidence of all-grade hypertension ranged from 20% to 35.7%, and the incidence of all-grade proteinuria ranged from 2% to 26.5%. Currently, there is limited data regarding specific recommendations for the treatment of bevacizumab-induced hypertension and proteinuria. Purpose: The purpose of this study is to determine the incidence of bevacizumab-induced hypertension and proteinuria (all-grade and high-grade) at Rush University Medical Center. Methods: This retrospective, single-center, observational cohort study includes adult cancer patients who received at least one dose of bevacizumab for any indication from January 1, 2014 to July 1, 2017, with at least one follow-up visit at 3 months while on bevacizumab therapy. Patients were excluded who did not have a follow-up visit while receiving bevacizumab. Electronic medical records were utilized to collect baseline and follow-up visit data. Blood pressure measurements and point-of-care urine protein were collected at baseline and each follow-up visit. Measurements were graded according to the Common Terminology Criteria for Adverse Events (CTCAE) version 5.0. Endpoints: The primary outcome of this retrospective review is to determine the incidence of all-grade and high-grade bevacizumab-induced hypertension and proteinuria during the period up to 12 months after initiation of therapy. The secondary outcome is to determine if an angiotensin-converting enzyme inhibitor (ACEI)/angiotensin receptor blocker (ARB) or calcium channel blocker (CCB) provides better blood pressure control. Results and Conclusion: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize when patients receiving bevacizumab therapy should be evaluated and/or referred for appropriate management of bevacizumab-induced hypertension or proteinuria.

Discuss specific treatment options for patients experiencing bevacizumab-induced hypertension and/or proteinuria.

Self Assessment Questions:

JA is a 64 YOF receiving bevacizumab for stage IIIC serous ovarian cancer. Prior to receiving her third dose of therapy, her blood pressure measures 160/94 mm Hg. What adverse effect is she experiencing?

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

Which of the following medications is the most ideal option for first-line treatment of bevacizumab-induced hypertension and concomitant proteinuria?

- A: Hydralazine
- B: Hydrochlorothiazide
- C: Isosorbide mononitrate
- D: Lisinopril

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-435-L01-P

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

EVALUATION OF AN AMBULATORY CARE PHARMACIST'S IMPACT ON QUALITY MEASURES IN PATIENTS WITH UNCONTROLLED DIABETES WITHIN AN INTERNAL MEDICINE CLINIC

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Purpose: As the Centers for Medicare and Medicaid Services shift toward a value-based physician payment model, through the Merit-Based Incentive Payment System (MIPS), there is an increased demand to deliver higher quality care and achieve specific quality measures. This increased demand provides opportunity for expanded ambulatory care pharmacy services. Type 2 Diabetes Mellitus (T2DM) is commonly encountered in the ambulatory care setting and tied to multiple MIPS measures. The primary objective of this study was to evaluate the impact of ambulatory care pharmacist intervention in diabetes care on quality measures. Methods: This retrospective, single-center, before-and-after matched cohort study included patients who have a primary care physician within the University of Cincinnati Medical Center General Internal Medicine Resident clinic, are 18 years and older, and have a diagnosis of T2DM with a Hgb A1c $\geq 9.0\%$. Those who received pharmacist intervention were eligible for inclusion in the intervention arm and those without pharmacist intervention were included in the comparator arm. Categorical data was analyzed using chi square or Fisher's exact test and continuous data was analyzed using a paired t-test or Wilcoxon rank sum, as appropriate. A sample size of 210 patients was necessary to adequately power the study at 80% with a p-value less than 0.05 representing statistical significance. The primary outcome was to compare the percentage of patients who achieved a Hgb A1c $< 9.0\%$ with pharmacist intervention versus without pharmacist intervention. Secondary outcomes included comparing the achievement of diabetes standards of care at recommended intervals between these two groups and describing the interventions made by ambulatory care pharmacists in patients with uncontrolled T2DM. Results: Data collection and analysis are ongoing.

Learning Objectives:

Describe the goals, timeline, scoring, and reimbursement principles of the Merit-Based Incentive Payment System (MIPS)

Review the existing literature surrounding ambulatory care pharmacist interventions in patients with diabetes

Self Assessment Questions:

Which of the following is true of the new MIPS payment model?

- A: Results in only a positive or neutral pay adjustment for providers
- B: Increases the number of quality reporting programs
- C: Incentivizes for higher quality care
- D: Utilizes quality measures as the only determinant of physician reimbursement

Which of the following MIPS measures related to diabetes is considered a "high-priority measure"?

- A: Percentage of patients who received a yearly foot exam
- B: Percentage of patients with a Hgb A1c $> 9.0\%$
- C: Annual influenza/updated pneumococcal immunizations
- D: Percentage of patients with a yearly nephropathy screening

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-436-L01-P

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

FREQUENCY, RISK FACTORS, AND CLINICAL OUTCOMES OF CONTEMPORARY, THIRD-GENERATION LEFT VENTRICULAR ASSIST DEVICE INFECTIONS

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Purpose: Although mechanical support through left ventricular assist device (LVAD) implantation has been associated with improved survival and quality of life in patients with heart failure, infection has been reported as a major complication following implantation. The majority of data describing the epidemiology of LVAD-associated infections are in patients who underwent implantation of HeartMate II, a second-generation device implanted outside of the pericardium in a preperitoneal pocket. HeartWare is a third-generation, compact LVAD designed for intrapericardial placement. The purpose of this study is to characterize the incidence of HeartWare device-related infections, identify associated risk factors, and determine the impact of infection on various clinical outcomes. **Methods:** This is a single-center, retrospective, cohort study of adult patients (≥18 years of age), with a HeartWare LVAD, implanted between 2010 and 2017 at Michigan Medicine. Patients who received a right ventricular assist device (RVAD), either alone or in combination with a LVAD, will be excluded from the study. All data will be collected through chart review of the electronic medical record. The primary outcome of interest is the incidence of LVAD-associated infections per 1000 device days as well as the number of LVAD-associated infections per 100 person-years. LVAD-associated infections will be defined using definitions proposed by The International Society for Heart & Lung Transplantation (ISHLT) and the Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS). Secondary outcomes include the time from implantation to index infection, incidence of infection characterized by the type and causative pathogens, and identification of risk factors for infection. Additionally, the impact of infection on clinical outcomes (hospital readmissions, pump exchanges, time to transplant, and all-cause mortality) will be assessed. Appropriate descriptive statistics will be used. Multivariable logistic regression will be used to explore independent predictors for LVAD-associated infection. **Results and conclusions:** Presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the changing role of left ventricular assist devices in the management of advanced heart failure.
Describe the major differences in device design between HeartWare and earlier left ventricular assist devices that may impact risk of infection.

Self Assessment Questions:

Which of the following is true regarding the use of LVADs in patients with heart failure?

- A: LVAD support is primarily used as destination therapy
- B: LVAD support is primarily used as a bridge to transplantation
- C: Destination therapy and bridge to transplantation are equally common
- D: The use of LVADs in this population is significantly declining

What major difference in device design of the HeartWare LVAD is hypothesized to lead to lower rates of infection compared to earlier devices?

- A: No external driveline due to internal power source
- B: Small device size allows for intrapericardial placement
- C: Pump material is resistant to infection
- D: Small device size reduces the size of the preperitoneal pocket required

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-437-L01-P

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

EVALUATION OF ARSENIC TRIOXIDE DOSING IN OBESE PATIENTS WITH ACUTE PROMYELOCYTIC LEUKEMIA

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Purpose: Optimal dosing strategies for arsenic trioxide (ATO) in the obese patient population have not been elucidated. Therefore, the purpose of this study is to compare clinical outcomes between obese and non-obese patients with low-risk acute promyelocytic leukemia (APL) receiving ATO. Specific aims of this study include assessing the frequency of adverse effects, characterizing the dosing and dose-reduction strategies, and comparing disease free survival (DFS) and cumulative relapse between obese and non-obese patients with APL. The intent is to begin building a body of evidence that could guide dosing and dose adjustment recommendations for obese patients with APL treated with ATO. **Methods:** This is a single center, retrospective medical record pilot study utilizing mean difference and Kaplan-Meier statistical analyses. Adult patients with a diagnosis of low- or intermediate- risk APL who received induction or consolidation therapy with arsenic trioxide from January 1, 2012 to June 30, 2017 were included. Pediatric patients, patients receiving ATO for relapsed disease, and those with high-risk APL were excluded. Data collection included patient baseline characteristics and treatment related variables. The primary endpoint evaluated was composite of QTc prolongation, cardiac abnormalities, and hepatotoxicity resulting in dose modification. Secondary endpoints were frequency and magnitude of dose modification due to respective abnormalities, frequency of abnormalities and disease free survival and cumulative relapse. **Results:** Results will be presented at the 2018 Great Lakes Residency Conference.

Conclusions: Conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Recognize the adverse effects of arsenic trioxide
Relate available dosing guidelines and current literature to dosing of arsenic trioxide in obese patients

Self Assessment Questions:

When compared with anthracycline-containing regimens, arsenic trioxide (Trisenox) containing regimens are associated with an increased occurrence of the following adverse effect:

- A: QTc prolongation
- B: Neutropenia
- C: Secondary malignancy
- D: Thrombocytopenia

American Society of Clinical Oncology (ASCO) Practice Guideline recommendations to dose chemotherapy based on actual body weight in obese patients for most agents does not apply to arsenic trioxide (T)

- A: Arsenic trioxide is a differentiating agent and not a cytotoxic chemotherapeutic
- B: The guidelines evaluated data from patients with breast, ovarian, and lung cancer
- C: Both A and B.
- D: ASCO guidelines apply to arsenic trioxide.

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-438-L01-P

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

IMPACT OF INHALED CORTICOSTEROIDS (ICS) ON PROGRESSIOI FREE SURVIVAL (PFS) IN PATIENTS WITH METASTATIC LUNG CANCER RECEIVING IMMUNOTHERAPY

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Checkpoint inhibitors that target the programmed death ligand-1 (PD-L1) pathway have been approved for the treatment of non-small cell lung cancer (NSCLC). These immune-active checkpoint inhibitors encompass a unique slew of immune-related adverse drug events (irADE), which include dermatitis, colitis, and pneumonitis. These irADEs are reversed with high-dose corticosteroids, thus it is hypothesized that corticosteroids would diminish the efficacy of an immunotherapy agent. Chronic obstructive pulmonary disease (COPD) and lung cancer share smoking as a major risk factor; hence, there is an overlap in the two patient populations. Because the cornerstone of treatment for COPD is ICS, there poses a theoretical risk of decreased efficacy of immunotherapy due to systemic exposure of ICS for patients with these two comorbidities. The purpose of this study is to assess the effect of ICS on immunotherapy efficacy through the analysis of PFS. The secondary outcome will evaluate the incidence and grade of irADEs order to gauge whether ICS have a protective effect. This is a retrospective, single center cohort study conducted at the University of Chicago Medicine from October 19, 2015 to August 1, 2017. We included patients with NSCLC who received at least one dose of nivolumab, pembrolizumab, or atezolizumab until disease progression or unacceptable toxicity. Patients with an established diagnosis of an autoimmune disease or a malignancy other than NSCLC were excluded from this study. A total of 148 patients were screened, 30 in ICS-group and 89 in non-ICS group. Baseline characteristics were similar between groups. PFS at 6 months (ICS: 40%, non-ICS: 41%; $p=0.95$) and 12 months (ICS: 17%, non-ICS: 25%; $p=0.35$) was not statistically significant. The frequency of irADE is not significantly affected by the use of ICS (ICS: 30%, non-ICS: 44.1%; $p=0.17$). Further analysis will include pneumonitis as an irADE of interest.

Learning Objectives:

Identify the mechanism of action of immune-checkpoint inhibitors and the unique adverse events associated with these agents.

Discuss the theoretical concern raised with concurrent use of an immune-checkpoint inhibitor and inhaled corticosteroids.

Self Assessment Questions:

Which of the following is commonly associated with immune-checkpoint inhibitors as an immune-related adverse event?

- A: Fever
- B: Vomiting
- C: Pneumonitis
- D: Alopecia

RJ is a 56 year old male who develops hepatitis following two cycles of nivolumab. Which of the following may be considered to manage this immune-related adverse event?

- A: Discontinue Therapy
- B: Leucovorin
- C: Methylprednisolone
- D: A & C are correct

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-439-L01-P

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

TREATMENT OF HEADACHE IN SUBARACHNOID HEMORRHAGE

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Purpose: Aneurysmal subarachnoid hemorrhage (aSAH) affects up to 30,000 individuals per year in the United States. Sudden severe headache is a cardinal symptom and the most common complaint amongst these individuals. Headaches are likely caused by blood released into the subarachnoid space causing chemical irritation on the meninges, increasing pressure on the brain, and damaging neurons. Current aSAH guidelines have limited or no recommendations for headache treatment in this context. The University of Kentucky Medical Center utilizes a multimodal aSAH headache treatment protocol. The purpose of this study was to compare the efficacy of our current aSAH headache treatment protocol versus previously used strategies.

Methods: This was a retrospective cohort study of patients presenting with aSAH and headache. Data from a historic cohort was previously collected from patients treated from July 2008 through December 2010 ($n = 108$). The aSAH headache treatment protocol was implemented in February 2014. An eight-month washout period was used and protocol-treated patient data was collected from September 2014 through November 2017. Data collected included severity of aSAH and headache, interventions made to secure the aneurysm, incidence of vasospasm, previous and concomitant medication use, and hospitalization status. To compare cohorts, a chi-squared test was used to analyze measures such as sex and severity of subarachnoid hemorrhage, while a t-test was used to analyze vasospasm incidence, pain score, number of analgesia doses per day, and length of stay. Multivariate analysis and linear regression were used to identify risk factors and predictors for treatment efficacy. Results: Data collection in progress. Results will be presented at the 2018 Great Lakes Pharmacy Resident Conference. Conclusion: Conclusion will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review complications of aneurysmal subarachnoid hemorrhage

Review pharmacotherapy options for aneurysmal subarachnoid hemorrhage headache

Self Assessment Questions:

Which of the following is often a delayed complication associated with subarachnoid hemorrhage?

- A: Cerebral ischemia
- B: Photophobia
- C: Headache
- D: Nausea

Which of the following medications may contribute to cerebral vasospasm?

- A: acetaminophen/butalbital/caffeine
- B: dexamethasone
- C: oxycodone
- D: magnesium

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-440-L01-P

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

EFFECTS OF DEXMEDETOMIDINE VERSUS MIDAZOLAM, PROPOFOL, AND LORAZEPAM ON OPIOID ANALGESIC DOSAGE REQUIREMENTS AND PATIENT OUTCOMES

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Purpose: Sedation and analgesia are often required in the intensive care unit (ICU), for which opioid analgesics are commonly utilized. Healthcare professionals seek methods to minimize the adverse effects associated with opioids. Dexmedetomidine may offer a unique opioid sparing effect. The purpose of this study is to evaluate if there are differences in number of ventilator-free days, ICU length of stay, and average total daily dosages of opioid analgesics received during ICU stay between two patient groups: those who received dexmedetomidine alone or in combination with other sedatives, and those who received only midazolam, propofol, and/or lorazepam. **Methods:** This study is a retrospective chart review of patients at least 21 years of age admitted to the medical and surgical intensive care units at Cabell Huntington Hospital within a one-year period who received dexmedetomidine, midazolam, propofol, and/or lorazepam during the same time period that they received one or more opioid analgesics, such as fentanyl, morphine, hydrocodone, oxycodone, and hydromorphone. Patients with a documented history of substance abuse or opioid dependence and patients who have received long-term opioid therapy are excluded. The primary outcomes are number of ventilator-free days and ICU length of stay. The secondary outcome is average total daily dosages of opioid analgesics, in morphine milligram equivalents, received during ICU stay. **Outcomes** will be compared to assess if there are differences between the following two groups: those who received dexmedetomidine alone or in combination with other sedatives, and those who received only midazolam, propofol, and/or lorazepam. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the potential benefits of dexmedetomidine over other sedatives for intensive care unit patients.

Discuss the utility of dexmedetomidine for lowering opioid analgesic dosage requirements in medical and surgical intensive care unit patients

Self Assessment Questions:

Which of the following is true regarding dexmedetomidine?

- A It is a gamma-Aminobutyric acid (GABA) receptor agonist
- B: It possesses anticonvulsant effects
- C: It has been associated with increased risk of in-hospital cardiopul
- D: It has been associated with a lower risk of delirium compared with

Which of the following is a relatively common adverse effect associated with opioids?

- A Tachypnea
- B Dependence
- C Diarrhea
- D Urinary retention

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-441-L01-P

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

EVALUATION OF CONTINUOUS PERIPHERAL NERVE BLOCK IN TOTAL KNEE ARTHROPLASTY POST-OPERATIVE PAIN MANAGEMENT

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Background: Total knee arthroplasty (TKA) is a procedure that can result in significant pain for the patient. Pain is a chief concern for patients undergoing TKA, and poorly controlled pain can drastically limit rehabilitation and recovery. Continuous peripheral nerve blocks (CPNBs) are useful in patients who are expected to have prolonged need for analgesia. CPNBs work by delivering a continuous infusion of a local anesthetic through a percutaneously-placed catheter. The catheter is placed bordering the peripheral nerve providing prolonged analgesia. This technique may increase patient satisfaction by decreasing pain and opioid use and side effects. Current recommendations include the use of a multimodal approach for pain management. This approach may include opioid analgesics, non-opioid analgesics, regional anesthesia, and other adjuncts which can be individualized based on the specific source and severity of pain experienced by the patient. Some institutions perform CPNB as part of this multimodal approach. The purpose of this study is to evaluate the effect of a bupivacaine 0.2% solution administered via CPNB plus multi-modal therapy on post-operative as needed pain medication use, length of stay, and average patient pain scores in patients undergoing TKA. **Methods:** This is a single-center retrospective chart review of patients who underwent TKA between 9/30/2016 to 9/30/2017 at Presence Saint Joseph Medical Center. Patient pain scores, length of stay, and frequency of as needed pain medication use have been evaluated between patients receiving standard post-surgical care with or without CPNB. **Results/conclusions:** Final results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the potential benefits involved with the use of a multimodal approach to postsurgical pain management.

Recognize possible advantages and disadvantages of the use of a bupivacaine continuous peripheral nerve block in patients undergoing total knee arthroplasty.

Self Assessment Questions:

Which of the following is a benefit of multimodal pain management?

- A No effect on use of opioid medications
- B: Decreased incidence of nausea and vomiting
- C: No effect on length of stay
- D: Increased pill burden

Which is a disadvantage of the use of a continuous peripheral nerve block?

- A High incidence of nerve injury
- B Increased opioid use
- C Possible infection at catheter site
- D Increase in postoperative pain

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-442-L01-P

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

IMPLEMENTATION OF UNFRACTIONATED HEPARIN DOSING PROTOCOLS UTILIZING ANTIFACTOR-XA LEVEL MONITORING

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Purpose: Healthcare practitioners have historically utilized the partial thromboplastin time (PTT) test for monitoring and adjusting therapy with unfractionated heparin (UFH). The PTT does not directly measure UFH levels, but is a surrogate marker of antifactor-Xa (anti-Xa) activity. Many studies demonstrate that anti-Xa levels increase accuracy, decrease variability and decrease the time to therapeutic anticoagulation goals. PTT results can be affected by physiologic variables that do not impact anti-Xa levels. The goal of transitioning from PTT to anti-Xa monitoring for UFH is to increase patient safety and provide accurate and concise dosing. **Methods:** Implementation of anti-Xa monitoring will include three community hospitals. The initial ground work was established by meeting with our laboratory anticoagulation leadership to discuss feasibility and financial impacts. Once the pharmacy and laboratory leadership were in agreement, a physician champion was solicited from our hematology group. A proposal was presented to the Pharmacy and Therapeutics (P&T) committee and other stakeholders for feedback. Dosing protocols and titration parameters were constructed after a review of literature and protocols established at other institutions. Dosing protocols were established for atrial fibrillation, deep vein thrombosis, pulmonary embolism, acute coronary syndrome, stroke, traumatic brain injury, continuous renal replacement, and left ventricular assist device. The final proposal was approved by the P&T committee. System wide education will include grand rounds for medical staff, nursing focused education, and pharmacist staff education. After implementation, the time to achieve therapeutic anticoagulation and percent of supratherapeutic anti-Xa levels will be monitored. These values will be compared to a baseline UFH drug use evaluation to assess improvement. **Results/conclusion:** Implementation in process.

Learning Objectives:

Outline the implementation process of unfractionated heparin dosing protocols utilizing Antifactor-Xa level monitoring
Recognize advantages and disadvantages of using antifactor-Xa levels versus partial thromboplastin time to monitor unfractionated heparin

Self Assessment Questions:

- Which of the following statements is correct?
- A: Physiologic variables do not affect antifactor-Xa levels or partial th
 - B: Partial thromboplastin time is a surrogate marker of heparin activit
 - C: Partial thromboplastin time can be used and interpreted at any ho
 - D: Antifactor-Xa levels must be calibrated by the laboratory
- What is the therapeutic range of unfractionated heparin using Antifactor-Xa levels?
- A: 65 – 95 seconds
 - B: 0.3 – 0.7 seconds
 - C: 65 – 95 units/mL
 - D: 0.3 – 0.7 units/mL

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-443-L01-P

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

EVALUATION OF TRANSITION FROM CONTINUOUS INSULIN INFUSION TO LONG ACTING BASAL INSULIN IN THE MEDICAL INTENSIVE CARE UNIT

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Purpose: Hyperglycemia is a common complication in critically ill patients that has been associated with increased ICU and hospital length of stay in addition to increased morbidity and mortality. Transition from continuous insulin infusion to basal insulin is often associated with uncontrolled blood glucose levels due to ineffective dosing regimens. A small retrospective study evaluating insulin transition at Cleveland Clinic Main Campus found that doses of basal insulin were frequently much less than 80% total insulin requirements during infusion. The goal of this study is to determine an appropriate dosing method for transition from a continuous intravenous insulin infusion to a subcutaneous insulin regimen in patients in the medical intensive care unit. **Methods:** This study is a retrospective chart review of adult patients in the medical intensive care unit on a continuous insulin infusion between September 2011 and September 2017. The ICU hyperglycemia IV insulin order set administration and long acting basal insulin administration will be identified at the initial transition episode through a report from the electronic medical record. Baseline characteristics and all variables related to blood glucose control will be collected from data reports and manual chart review. The primary objectives of this study are to compare rates of blood glucose control in the 36-hour period during transition from continuous intravenous insulin to subcutaneous insulin using a weight-based calculation and a 24 hour-requirement-based calculation. The secondary objectives are to describe the incidence and frequency of hypoglycemia and hyperglycemia during insulin transition. The primary and secondary outcomes and baseline characteristics will be analyzed using ANOVA or Kruskal-Wallis and descriptive statistics. **Results/Conclusions:** To be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the current guidelines for blood glucose control in the critically ill patient
Describe the dosing recommendations for subcutaneous basal insulin during the transition period

Self Assessment Questions:

- What is the recommended blood glucose target for a majority of critically ill patients?
- A: <100 mg/dL
 - B: 110-140 mg/dL
 - C: 140-180 mg/dL
 - D: >180 mg/dL
- What percentage of a daily insulin infusion dose is recommended when converting to basal insulin?
- A: 30-50%
 - B: 60-80%
 - C: 90%
 - D: 100%

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-444-L01-P

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

EVALUATION OF POST-OPERATIVE ANTIBIOTICS IN PEDIATRIC SCOLIOSIS PATIENTS AT PEYTON MANNING CHILDREN'S HOSPITAL

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Purpose: Surgical site infections (SSIs) after pediatric scoliosis procedures have been shown to result in significant morbidity and mortality. The Centers for Disease Control and Prevention (CDC) and Surgical Care Improvement Program (SCIP) recommend implementation of preventative strategies. Previous audits demonstrated compliance with all SCIP measures except dosing and discontinuation of antibiotics after surgery. **Methods:** This was a retrospective quality improvement study conducted in children less than 18 years of age who were admitted to the pediatric intensive care unit (PICU) after a scoliosis-related procedure between February 1, 2017 and November 30, 2017. Demographic, surgical, and antibiotic data were collected on each patient. Selection, dosing, and duration of antibiotics were compared to hospital-approved guidelines. The primary objectives of this study were to determine the effectiveness of the automatically populated stop date on post-operative antibiotic duration and to determine prescriber compliance with weight-based dosing guidelines. **Results:** A total of 53 pediatric scoliosis patients (4 to 17 years of age) were included in the study: 4 congenital scoliosis patients (9%), 8 neuromuscular scoliosis patients (15%), and 41 idiopathic scoliosis patients (77%). During the 10 month study period, 25 patients (47%) were appropriately discontinued from antibiotics within 24 hours of surgery. This rate decreased from a previous audit performed prior to the implementation of the automatic 24 hour stop date (43/70 patients, 61.4%). After antibiotic dosing guidelines were implemented, 68% of patients were appropriately dosed by weight. This is improved from previous audits that found approximately 50% compliance with weight-based dosing. **Conclusion:** Implementation of weight-based dosing guidelines resulted in increasing rates of optimization of dosing in pediatric patients post-scoliosis procedures.

Learning Objectives:

Recognize Surgical Care Improvement Program (SCIP) initiatives as preventative strategies to reduce the occurrence of surgical site infections.

Recall the appropriate prophylactic antibiotics and the importance of weight-based dosing and re-dosing during pediatric scoliosis procedures

Self Assessment Questions:

HP is a 15 year-old male weighing 100 kg with NKDA who presents to the hospital early this morning for a scheduled posterior spinal fusion surgery at 1000. The pediatric orthopedic surgeon asks you what

- A Cefazolin 1000 mg
- B: Cefazolin 2000 mg
- C: Cefazolin 3000 mg
- D: Clindamycin 900 mg

The same pediatric orthopedic surgeon then asks you if it is appropriate to IV push the antibiotic and immediately start the incision. What do you recommend?

- A Yes, it is appropriate to push the antibiotic and immediately start it
- B Yes, you do not even need to finish administering the antibiotic prior
- C No, administer the antibiotic at least 120 minutes prior to the incision
- D No, administer the antibiotic preferably 30 minutes prior to the incision

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-445-L01-P

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

IMPLEMENTATION OF AN OUTPATIENT PROTON PUMP INHIBITOR STEWARDSHIP PROGRAM

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BACKGROUND: Overutilization of proton pump inhibitors (PPIs) in the ambulatory care setting along with the absence of symptom re-evaluation has led to inappropriate chronic use of PPIs. Long-term use of PPIs use has been associated with a growing list of adverse effects including bone fracture, chronic kidney disease, hypomagnesaemia and Clostridium difficile infection. Implementation of de-escalation programs has been shown to reduce PPI utilization and costs. **PURPOSE:** The purpose of this project is to reduce inappropriate outpatient PPI prescribing within Gundersen Health System (GHS). **METHODS:** A set of criteria was created to evaluate appropriateness of PPI therapy based on accepted guidelines for the management of PPI related indications. Using these criteria, and in collaboration with gastroenterology and family medicine departments at GHS, a PPI de-escalation protocol was designed. This protocol is a tool to guide clinicians in de-escalating PPIs in the outpatient sector. Electronic health record tools were also developed to promote consistent protocol utilization and alleviate clinician workload. These tools include patient education materials and prebuilt note templates for internal documentation. In collaboration with the family medicine residency clinic faculty, a sustainable multi-discipline workflow was designed to implement the program within an existing outpatient clinic structure. This workflow focused on identifying candidates for de-escalation, documenting de-escalation plans, patient education and follow-up. This workflow was implemented in family medicine residency clinic as a pilot program. Assessment of post-implementation data and identification of strengths and barriers associated with this pilot program will guide expansion into other clinics and departments. **RESULTS:** There are no objective results to report at this time. **CONCLUSIONS:** Development and implementation of an outpatient PPI de-escalation program remains a promising method to reduce inappropriate PPI use within a health system.

Learning Objectives:

Identify patients who are eligible for PPI de-escalation.

Select appropriate PPI de-escalation and follow-up plans.

Self Assessment Questions:

Identify which patient would be most appropriate for PPI de-escalation (assume all patients prescribed a PPI >3 months):

- A 43 year-old male with a history of Barrett's esophagitis
- B: 56 year-old male with a history of uncomplicated, stable GERD
- C: 65 year-old female with a history of GI bleeding secondary to unknown cause
- D: 33 year-old female with a history of GERD associated with peptic esophagitis

JB is a 56 year-old male who presents to clinic for an annual wellness visit. He has a history of uncomplicated GERD diagnosed 4 years ago. He was prescribed omeprazole 20 mg daily and required dose titration

- A Stop PPI completely. If rebound heartburn occurs, resume omeprazole
- B Switch PPI to esomeprazole 20 mg daily. If rebound heartburn occurs, increase dose
- C Decrease omeprazole to 20 mg daily. If rebound heartburn occurs, increase dose
- D Stop PPI completely, and start taking calcium carbonate 500 mg for symptom relief

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-741-L04-P

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

FILGRASTIM VERSUS TBO-FILGRASTIM IN AUTOLOGOUS HEMATOPOIETIC STEM CELL TRANSPLANTATION

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BACKGROUND Granulocyte colony stimulating factor (G-CSF) is routinely used to shorten the duration of neutropenia following autologous hematopoietic stem cell transplantation (HSCT). A hospital-wide formulary change resulted in the replacement of filgrastim with Tbo filgrastim for all on- and off-label indications, including use in autologous HSCT. Following the change, a retrospective study was conducted at Northwestern Memorial Hospital in 182 consecutive patients with multiple myeloma who underwent autologous HSCT immediately after and immediately prior to the formulary change. The time to engraftment was similar in each group; however, early engraftment (≤ 12 days) occurred more often ($p = 0.05$) and late engraftment (≥ 14 days) less often ($p = 0.09$) in filgrastim-treated patients. The number of documented infections was significantly less in the Tbo-filgrastim group ($p < 0.02$). **PURPOSE** This will be a confirmatory study to the aforementioned study conducted at Northwestern Memorial Hospital to further evaluate the impact of the growth factor formulation on time to engraftment in multiple myeloma patients undergoing autologous HSCT. **METHODS** It will be retrospective cohort study of patients with multiple myeloma receiving melphalan 200 mg/m² for autologous HSCT. The control group will be made up of patients who received filgrastim prior to the formulary change compared to those who received tbo-filgrastim following the formulary change. The primary endpoint will be time to neutrophil engraftment, which is defined as ANC greater than 500 cells/mm³. Secondary endpoints will include hospital length of stay, platelet count at the time of neutrophil engraftment, number of CSF doses, and confirmed infections. **RESULTS** In progress **CONCLUSIONS** In progress

Learning Objectives:

Discuss the role of growth factors in hematologic stem cell transplantation.

Review the implications of the approval of tbo-filgrastim in the United States.

Self Assessment Questions:

Filgrastim is FDA approved for the following indications in the United States:

- A: Reduction in the duration of neutropenia following bone marrow transplant
- B: Prevention of chemotherapy-induced neutropenia
- C: Peripheral stem cell mobilization
- D: All of the above

Which of the following is true regarding the approval of tbo-filgrastim in the United States?

- A: Tbo-filgrastim was approved as a biosimilar to filgrastim
- B: Tbo-filgrastim was FDA approved for all of the filgrastim indications
- C: Tbo-filgrastim was FDA approved for reduction in duration of neutropenia
- D: Tbo-filgrastim was FDA approved for reduction in duration of follow-up

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-446-L01-P

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

COST ANALYSIS OF A SIGNIFICANT DECREASE IN VANCOMYCIN USE AS A RESULT OF AN ANTIMICROBIAL STEWARDSHIP INTERVENTION

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Purpose: New regulations set forth by the Center for Medicare and Medicaid Services and the Joint Commission have influenced the rise in antimicrobial stewardship (AS) programs across the United States. However, the economic effect of these programs on an institution has been difficult to measure. A previous pre-post quasi-experimental pilot study was performed at our institution to assess the benefit of early AS review via prospective audit and feedback in all adults with positive blood cultures. There was no difference in the utility of the AS intervention in meeting AS endpoints compared to historical data. However, this study found a significant decrease in the median vancomycin duration of therapy when comparing pre- vs. post-intervention phases (61.2 vs. 32.7 hours, $p < 0.001$, respectively). The purpose of this present study is to determine the difference in institutional costs after implementation of a hospital-wide AS intervention that resulted in a significant decrease of vancomycin use. **Methods:** A retrospective cost analysis comparing the cost of vancomycin use before and after implementation of an AS intervention at Rush University Medical Center will be performed. Hospitalized adult patients with positive blood cultures from June-October 2014 (pre-AS intervention) and June-October 2015 (post-AS intervention) with at least one ordered dose of vancomycin will be reviewed for study inclusion. Pregnant patients and patients who died or were transitioned to comfort care less than or equal to 24 hours after blood culture positivity will be excluded. The primary outcome is the amount of institutional costs saved by decreasing vancomycin use. Secondary outcomes include the incidence of nephrotoxicity, in-hospital mortality, and length of hospitalization. **Results:** in process. **Conclusion:** pending results.

Learning Objectives:

Describe the 7 Core Elements of the Antimicrobial Stewardship Standard mandated by the Joint Commission.

Discuss reasons for inpatient antimicrobial stewardship programs to target vancomycin use.

Self Assessment Questions:

The Joint Commission's Antimicrobial Stewardship Standard requires that antimicrobial stewardship programs practice which institution-specific core element?

- A: Report providers who misuse antibiotics
- B: Track antibiotic prescribing
- C: Prevent empiric antibiotic use
- D: Develop novel antimicrobials

Which of the following contribute(s) to institutional costs associated with intravenous vancomycin?

- A: Drug procurement
- B: Therapeutic drug monitoring
- C: Adverse events
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-742-L04-P

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

DEVELOPMENT OF POLICIES AND PROCEDURES FOR THE IMPLEMENTATION OF USP 800 STANDARDS IN A COMMUNITY HOSPITAL SETTING

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Purpose: Hazardous drugs (HDs) are drugs that may demonstrate carcinogenicity, teratogenicity, genotoxicity, reproductive toxicity, and organ toxicity. The use of HDs in practice is on the rise, increasing potential exposure for many healthcare workers and patients. It is important to minimize the risks associated with HDs to prevent harm. A new set of standards related to the handling of HDs is grouped under chapter 800 of the United States Pharmacopeia. Hospitals are expected to be in compliance with this chapter by December 1, 2019, making development of policies and procedures for implementation necessary. **Methods:** This project has been submitted to the institutional review board (IRB) and is exempt from IRB oversight. An analysis of the institution's current list of HDs and handling methods will be completed to determine if the list contains all of the drugs designated as hazardous by the National Institute for Occupational Safety and Health (NIOSH). Current practices for the handling of all of the drugs on the list within the pharmacy and patient care areas will be analyzed. Next, current practices will be compared to the USP 800 standards to focus on the major areas of change. New policies will be written and current existing policies related to the handling of HDs will be updated. These policies will follow the process of approval through various committees, with the goal of final approval by April 2018. Pharmacy technicians and pharmacists will attend educational sessions where pre/post assessments will be given to determine the understanding of the staff. After policy approval, a plan will be synthesized to ensure education of all healthcare workers that handle HDs. **Results:** N/A **Conclusion:** N/A

Learning Objectives:

Outline key components necessary to develop policies and procedures related to the implementation of USP 800

Review major requirements that must be implemented in order to be compliant with USP 800

Self Assessment Questions:

By what date are hospitals expected to be in compliance with USP 800?

- A: July 1, 2018
- B: January 1, 2019
- C: July 1, 2019
- D: December 1, 2019

Which of the following statements is correct?

- A: OSHA maintains a list of drugs that are considered to be hazardous
- B: USP 800 handling techniques only apply to workers who administer
- C: Assessments of risk may be performed for different drugs and doses
- D: USP 800 regulations apply to antineoplastic drugs only

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-680-L03-P

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

EFFECT OF AN INTRAVENOUS (IV) OPIOID REDUCTION PROTOCOL ON CONSERVING IV OPIOID SUPPLY, PATIENT-REPORTED PAIN LEVELS, AND PATIENT SAFETY

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Purpose: National back-orders and decreased manufacturing of IV opioids have resulted in critically low supplies of IV opioids across the country. IV opioids are essential pain-relieving medications for patients with swallowing or absorption limitations, chest pain, and end-of-life care. Given that manufacturer shortages are predicted to last at least another year, a community teaching hospital implemented an opioid IV to PO protocol to help preserve its supply of IV opioids. The objective of this study is to determine the impact of the opioid IV to PO protocol on the rate of IV opioid use. Additionally, the study will assess the protocol's impact on patient-reported pain levels and patient safety.

Methods: After submission to the Institutional Review Board, a retrospective chart review will be performed on a cohort of inpatients over the age of 18 who received IV opioids in the 2 months prior to implementation of the protocol. Another equal patient cohort will be selected from the 2 months post-implementation, following initial run-in period, to compare against the pre-implementation cohort. Outcomes to be measured include number of IV opioid administrations, patient reported pain post-administration of the opioid agent according to the pain numeric rating scale (NRS), and number of hospital-wide naloxone administrations. The primary endpoint is rate of IV opioid use as identified through patient medication administration record (MAR) evaluation. Secondary endpoints are average decrease in patient-reported pain levels and rate of naloxone use. Patient-reported pain levels will be retrieved from the patient medical records. Number of naloxone administrations will be collected through internal reporting methods. Data repository (DR) reports will identify number of admitted inpatients to assist with determining rates of endpoints.

Results: Pending **Conclusions:** Pending

Learning Objectives:

Identify patient specific characteristics that indicate good candidacy for oral opioid use in replacement of intravenous opioid use.

Select appropriate patient care provisions in response to a patient's Pasero Opioid-Induced Sedation Scale (POSS) score.

Self Assessment Questions:

In which of these patient conditions would conversion from intravenous opioid to oral opioid be appropriate?

- A: Small bowel obstruction
- B: Post-operative pain without nausea and vomiting
- C: Strict Not-PO (NPO) status
- D: Severe diarrhea

What would be an appropriate action to take for a patient with a POSS score of 4?

- A: Monitor and reassess POSS score in two hours
- B: Increase opioid dose by 50%
- C: Administer naloxone
- D: Increase opioid dose by 25%

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-447-L01-P

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

EFFECT OF MARIJUANA USE ON POST-TRAUMATIC STRESS DISORDER (PTSD) TREATMENT OUTCOMES IN VETERANS

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Purpose: To determine if pre-enrollment/concurrent marijuana use, either medical or recreational, impacts the success or failure of evidence based post-traumatic stress disorder clinical team (PCT) treatments including both psychotherapy and medication management. **Methods:** A list of veterans enrolled in the PCT between October 1st, 2008 and October 1st, 2016 will be obtained, and a random study sample will be identified. A sample size calculation specified 340 participants will be needed to detect statistically significant differences. Eligible study participants are veterans aged 18-85 years, with at least two post-traumatic stress disorder check list (PCL) scores a minimum of 30 days apart, and a diagnosis of PTSD. Information to be collected includes relevant information about treatment and co-occurring diagnoses. The PCL will be used to assess treatment response. Treatment success is defined as a reduction in PCL score of equal to or greater than five points. Treatment failure is defined as not achieving a five-point or more reduction in PCL-M scores, or not completing the treatment by leaving the program early. The marijuana use arm will be compared to the no-marijuana use arm, and differences in the relative number of treatment successes and failures will be evaluated for statistical and clinical significance. **Results:** Pending **Conclusion:** Pending

Learning Objectives:

Identify the limitations of available research utilizing marijuana in PTSD treatment

List possible adverse effects of marijuana in PTSD treatment

Self Assessment Questions:

Of the following, which is not considered to be a limitation of marijuana PTSD research

- A Every strain of marijuana's chemical composition is different and c
- B: Patients are often hesitant to try marijuana
- C: Marijuana is only FDA indicated for cachexia
- D: Inadequate number of voluntary participants for research trials

By how much is marijuana estimated to increase risk of suicide based on presented information

- A 25%
- B 50%
- C 75%
- D 100%

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-743-L01-P

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

CLINICAL OUTCOMES FOLLOWING TREATMENT OF ENTEROBACTER PNEUMONIA WITH PIPERACILLIN/TAZOBACTAM COMPARED TO CEFEPIME OR ERTAPENEM

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Purpose: Enterobacter spp. are a common cause of nosocomial pneumonia and can be difficult to treat due to the potential for isolates to harbor AmpC resistance. Carbapenems maintain stability in the presence of AmpC beta lactamases and were considered the standard of care, but due to concerns regarding antibiotic resistance and the development of Clostridium difficile infection, carbapenem-sparing options are desired. Cefepime has been compared to carbapenems and shown to be non-inferior for treatment of Enterobacter bacteremia. Studies evaluating efficacy of piperacillin/tazobactam (P/T) compared to cefepime or carbapenems are lacking despite common usage for Enterobacter infections. Therefore, the objective of this study is to compare outcomes in patients with Enterobacter pneumonia after treatment with P/T compared to cefepime or ertapenem. **Methods:** A single-center retrospective cohort study was conducted from November 1, 2011 to September 30, 2017. Patients 18-89 years old with Enterobacter pneumonia were included if they received definitive treatment with cefepime, ertapenem, or P/T for 72 hours. Exclusion criteria included: (1) switch to definitive treatment more than 72 hours after culture obtainment; (2) treatment with Enterobacter-targeted combination therapy for more than 72 hours; (3) Enterobacter isolates that produce extended-spectrum beta-lactamases; (4) concomitant respiratory infection with Pseudomonas, Acinetobacter, Stenotrophomonas, or Burkholderia spp; (5) concomitant endocarditis; and (6) inadequate treatment of concomitant infections. The primary outcome was incidence of clinical cure and secondary outcomes included pneumonia recurrence, development of resistance, duration of mechanical ventilation, hospital length of stay, and mortality. Descriptive statistics and logistic regression will be used to analyze the data and assess the strength of the association between definitive treatment and any confounders. **Results/Conclusions:** Data evaluation is being conducted and results and conclusions will be presented.

Learning Objectives:

Recognize potential for treatment failure due to AmpC resistance with infections caused by Enterobacter species (spp.).

Identify opportunities to optimize antimicrobial therapy for infections caused by Enterobacter spp.

Self Assessment Questions:

What factors are correlated with treatment failure in the management of Enterobacter infections?

- A Active AmpC expression leading to large amounts of B-lactamase
- B: AmpC derepression following exposure to third-generation cephal
- C: Evidence of ceftazidime resistance in vitro
- D: All can be correlated with treatment failure

What steps can be taken in clinical practice to mitigate treatment failure due to AmpC resistance in Enterobacter pneumonia?

- A Switch patients with a positive respiratory culture to piperacillin/taz
- B Switch patients with a positive respiratory culture to cefepime or er
- C Switch patients with a positive respiratory culture to ampicillin/sulb
- D Switch patients with a positive respiratory culture to ceftriaxone er

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-448-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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PREVENTION OF HOSPITAL-ASSOCIATED VTE: IMPLEMENTATION OF VTE RISK REASSESSMENT AND EXTENDED DURATION PROPHYLAXIS

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Background: Venous thromboembolism (VTE) is a significant cause of morbidity and mortality. Screening patients within 24 hours of hospital admission for VTE and bleeding risk and ensuring appropriate VTE prophylaxis is ordered are standards of practice for pharmacists at UW Health. While initial screening is essential, VTE and bleeding risk can change throughout hospitalization. Most hospital acquired VTE events occur in patients with longer admissions, but there is limited data to support when VTE risk reassessment should be completed. Additionally 75% of hospital-acquired VTE events occurred after discharge despite utilization of inpatient VTE prophylaxis. **Purpose:** To design a process for reassessing VTE and bleeding risk in medical and surgical patients and to identify high risk patients who would benefit from extended duration thromboprophylaxis after discharge. **Methods:** This study is a retrospective chart review which includes two phases. Phase I involves implementation of a clinical support tool to assist with VTE and bleeding risk reassessment. Retrospective data assessment will include patient age, sex, and VTE and bleeding risk as defined by hospital guidelines. Additionally, VTE prophylaxis rates and post-operative, hospital acquired, and 30 day readmission VTE events will be collected. Phase II involves updating the VTE prevention practice guideline to define medical patients that are high risk for VTE who qualify for extended duration thromboprophylaxis. A retrospective analysis of patients discharged on extended duration thromboprophylaxis will evaluate 30 day readmissions for VTE or bleeding events. **Results & Conclusions:** The project is expected to result in the creation of a clinical decision support tool for VTE risk and bleeding risk reassessment, initiation of extended duration thromboprophylaxis at hospital discharge for high risk medical patients, and decreased readmission rate for VTE. Data collection and analysis are ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe how to complete a VTE and bleeding risk assessment
Review the utility of reassessing VTE risk and bleeding risk and its impact on readmission rates for bleeding and VTE

Self Assessment Questions:

What patients should be re-screened for VTE risk and bleeding risk based on initial risk assessment?

- A High VTE Risk, Low Bleed Risk receiving subcutaneous heparin
- B: High VTE Risk, High Bleed Risk on therapeutic warfarin
- C: Low VTE Risk, Low Bleed Risk with sequential compression device
- D: Low VTE Risk, High Bleed Risk with active upper GI bleed

Which of the following is scored as part of the Padua Prediction Score?

- A Active bleeding
- B History of myocardial infarction
- C Systemic Lupus Erythematosus
- D Relative with thrombophilic condition

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-873-L05-P

Activity Type: Knowledge-based Contact Hours: 0.5
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HEMODYNAMIC SAFETY OF CONTINUOUS INFUSION LABETALOL VERSUS ESMOLOL BASED THERAPY FOR TYPE B AORTIC DISSECTIONS (TBADS)

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Background: Type B aortic dissections (TBAD) are a life-threatening vascular disease with a 5-year mortality of ~40%. Medical management of TBADs requires aggressive blood pressure and heart rate control to minimize the shearing force on an already damaged aorta. Current guidelines recommend targeting a heart rate control to less than 60 beats per minute and a systolic blood pressure between 100-120 mmHg, but fall short in recommending a specific agent. Continuous infusion (CI) beta-blockers, such as labetalol and esmolol, have become a mainstay of therapy given their ability to effect both heart rate and blood pressure, either by decreasing direct cardiac output (esmolol and labetalol) or by direct alpha antagonism (labetalol). Both agents have a good safety profile, however neither agent is benign. Case reports of prolonged use of CI labetalol have led to irreversible hypotension and/or bradycardia requiring vasopressor support. Esmolol infusion may be associated with excessive volume administration and hypernatremia if used at normal dosages or extended periods of time. The primary objective of this study is to determine the hemodynamic safety of CI labetalol compared to esmolol-based therapy for TBADs. **Methods:** Patients 18 years of age or older who received CI labetalol or esmolol-based therapy for TBAD, identified by ICD-9 and 10 coding, at NMH between January 1, 2015 – December 31, 2017 for a minimum of 2 hours, during which a minimum of four blood-pressure readings were recorded in the medical record were included. Patients with diagnosis other than TBADs were excluded. The primary composite endpoint of this study was SBP <90, HR <50, cessation of therapy due to hemodynamic changes, or need for rescue therapies. Secondary endpoints include total dose, volume, and duration of therapy, time to first BP or HR goal, need for vasopressor support, and average number of ICU days. **Results/Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Describe the rationale for medical management with labetalol and esmolol for TBADs

Discuss common adverse events and potential drawbacks associated with CIV labetalol and esmolol in TBADs

Self Assessment Questions:

Current guidelines recommend controlling for heart rate and systolic blood pressure in TBADs. Which of the following does labetalol effect?

- A Increase heart rate only
- B: Decrease blood pressure only
- C: Increase both heart rate and blood pressure
- D: Decrease both heart rate and blood pressure

Which of the following is the maximum cumulative dose for intravenous labetalol recommended by the FDA?

- A 150 mg/day
- B 200 mg/day
- C 300 mg/day
- D 600 mg/day

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-449-L01-P

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

MANAGEMENT OF COMPLICATED URINARY TRACT INFECTION IN A COMMUNITY TEACHING HOSPITAL

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Purpose: Urinary tract infections (UTIs) are one of the most common infections requiring antimicrobial therapy in the United States. At Swedish Covenant Hospital (SCH), complicated UTIs are common and account for a large portion of inpatient admissions. The majority of these patients are initiated on intravenous (IV) ceftriaxone or IV fluoroquinolone. The SCH Antimicrobial Stewardship Committee developed complicated UTI treatment guidelines, which were approved by the Pharmacy and Therapeutics Committee. The primary objective of this study is to evaluate the clinical impact of the UTI treatment guidelines in patients with complicated UTIs who are initiated on aforementioned IV antibiotics. **Methods:** This Institutional Review Board approved single centered, non-randomized, controlled interventional study is being conducted from August 1, 2017 to February 28, 2018. The control and intervention groups include admitted adult patients diagnosed with complicated UTI and initiated on either IV ceftriaxone or IV fluoroquinolone (levofloxacin or ciprofloxacin) for the three-month period prior to or after UTI treatment guideline implementation, respectively. Patients diagnosed with uncomplicated UTI, pregnancy, sepsis, or other concurrent infections or have a length of stay less than 48 hours are excluded. After UTI guideline implementation in November 2017, clinical pharmacists are making interventions to de-escalate antibiotic therapy and adhere to the recommended antibiotic duration. Primary outcomes include the antibiotic de-escalation rate, time to antibiotic de-escalation, and duration of antibiotic therapy. Secondary outcomes include hospital length of stay and number of patients with 30-day readmission. The Pearson chi-square test or Fisher's exact test will be used in data analysis. **Results:** Baseline results reveal that the de-escalation rate was 62%. The median time to antibiotic de-escalation was four days, and the average duration of antibiotic therapy was 9.34 days. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize what factors are correlated with a complicated urinary tract infection.

Review the current 2010 Infectious Diseases Society of America Guidelines for Antimicrobial Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women regarding initial treatment options as well as step down therapy.

Self Assessment Questions:

Which of the following factors are associated with complicated urinary tract infections that can increase colonization and decrease efficacy of therapy?

- A: Pregnant women without systemic symptoms
- B: Multi-drug resistant bacteria
- C: All UTIs in males
- D: Both B and C

After receiving Ceftriaxone 1 gram intravenously every 24 hours for 3 days and the urine culture returns as pan-sensitive Escherichia Coli, which of the following antibiotics are appropriate step-down

- A: Amoxicillin/clavulanate 875 mg orally twice daily for 10 days
- B: Ciprofloxacin 500 mg orally twice daily for 4 days
- C: Levofloxacin 750 mg orally daily for 7 days
- D: Nitrofurantoin monohydrate macrocrystals 100 mg orally twice daily

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-450-L01-P

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

A RETROSPECTIVE ANALYSIS OF DUAL ANTI-PLATELET THERAPY VERSUS ASPIRIN PLUS ORAL ANTICOAGULATION FOLLOWING TRANSCATHETER AORTIC VALVE REPLACEMENT (TAVR)

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Purpose: Transcatheter aortic valve replacement (TAVR) has emerged as a viable alternative to surgical aortic valve replacement. TAVR's have high success rate, however, major post-operative complications exist such as myocardial infarction and ischemic stroke. In an effort to avoid these complications subsequent to TAVR antithrombotic therapy is recommended in the post-operative period. The 2017 ACC Expert Consensus Decision Pathway for Transcatheter Aortic Valve Replacement in the Management of Adults with Aortic Stenosis supports the use of clopidogrel 75 mg daily for the first 6 months for balloon expandable valves and 3 months for self-expanding valves in addition to lifelong aspirin 81 mg daily to avoid ischemic events. However, there is limited data identifying the most appropriate antithrombotic therapy subsequent to TAVR in this population. **Methods:** A retrospective chart review will be conducted on patients receiving either dual antiplatelet therapy (DAPT) or aspirin plus oral anticoagulation, subsequent to undergoing transcatheter aortic valve replacement. The study period will evaluate patients that meet inclusion/exclusion criteria from October 1st, 2014 through June 30th, 2017. The primary aim is to determine the effectiveness of DAPT compared to aspirin plus oral anticoagulation. Patients were excluded if they had experienced a major bleed within the 3 months before the TAVR procedure, prior intracranial bleeding, drug-eluting stent implantation within the year before the TAVR procedure, and an allergy to clopidogrel and/or aspirin. The primary study endpoint is a composite of nonfatal myocardial infarction, nonfatal stroke, death, major or life-threatening bleeding (according to Valve Academic Research Consortium 2 definitions) within 30 days following the TAVR. Data will be analyzed using descriptive statistics.

Results/Conclusions: To be presented at Great Lakes conference

Learning Objectives:

Identify potential TAVR candidates that are indicated based on existing literature

Recognize potential antithrombotic therapy options following a TAVR procedure identified in existing literature

Self Assessment Questions:

Which of the following antithrombotic therapies, following a TAVR procedure with a balloon expandable valve, is supported by the 2017 ACC Expert Consensus?

- A: Aspirin 81mg + Clopidogrel 75mg x 3 months
- B: Aspirin 81mg + Clopidogrel 75mg x 6 months
- C: Aspirin 81mg indefinitely + Clopidogrel 75mg x 3 months
- D: Aspirin 81mg indefinitely + Clopidogrel 75mg x 6 months

Which of the following antithrombotic therapies, following a TAVR procedure with a self-expandable valve, is supported by the 2017 ACC Expert Consensus?

- A: Aspirin 81mg + Clopidogrel 75mg x 3 months
- B: Aspirin 81mg + Clopidogrel 75mg x 6 months
- C: Aspirin 81mg indefinitely + Clopidogrel 75mg x 3 months
- D: Aspirin 81mg indefinitely + Clopidogrel 75mg x 6 months

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-744-L01-P

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

HOSPITAL OPIOID REQUIREMENTS FOR ACUTE PAIN FOLLOWING CONTINUATION VERSUS DISCONTINUATION OF BUPRENORPHINI FOR ADDICTION MAINTENANCE

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Purpose: The use of buprenorphine for Medication-Assisted Treatment (MAT) of addiction has increased dramatically in recent years as the rate of opioid addiction has risen nationwide. This is reflected in the 427% increase in the number of opioid treatment programs offering buprenorphine for MAT from 2003 to 2015. Treatment of acute pain can be particularly challenging in this patient population. With a stronger mu receptor binding affinity than other opioids used in clinical practice, buprenorphine attenuates the analgesic effect of full-agonist opioids. As the number of patients receiving MAT continues to rise, buprenorphine is more commonly seen in patients admitted to the hospital. Despite this trend, there are currently no published evidence-based recommendations for the management of acute pain in patients prescribed buprenorphine for MAT. Our study examines the opioid requirements during hospitalization in patients whose buprenorphine MAT was continued versus discontinued in an effort to better understand the acute pain treatment needs of this patient population. **Methods:** This study involved a retrospective chart review of adult patients admitted to the medical center from 8/1/15-7/31/17 who had a substance use disorder diagnosis, were maintained on sublingual buprenorphine for MAT prior to hospitalization, and who received full-agonist opioids during hospitalization. Patients were divided into two groups: those whose buprenorphine was administered throughout the hospitalization and those whose buprenorphine was stopped inpatient. The primary objective is to compare the effect of buprenorphine continuation versus discontinuation on inpatient opioid requirements. Secondary objectives include evaluating differences in functional outcomes, pain levels, and hospital length of stay. Study results will provide evidence to guide opioid dosing in this patient population and may influence future policy development related to inpatient buprenorphine prescribing within our health system. **Results/Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe how buprenorphine's pharmacology can impact the treatment of acute pain in patients treated for opioid use disorder.

Identify the risks and benefits associated with two key strategies for treating acute pain in patients receiving buprenorphine.

Self Assessment Questions:

Buprenorphine acts as a _____ at the mu opioid receptor, displaying a relatively _____ binding affinity.

- A partial agonist; strong
- B: partial agonist; weak
- C: antagonist; strong
- D: antagonist; weak

Buprenorphine is FDA approved for which of the following indications?

- A Pain
- B Dyspnea
- C Opioid dependence
- D A and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-451-L01-P

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

IMPACT OF OXYCHLOROSENE BLADDER IRRIGATION PROTOCOL ON INCIDENCE OF UTI IN SIMULTANEOUS LIVER/KIDNEY TRANSPLANT RECIPIENTS

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Urinary tract infections (UTI) are common in patients post solid organ transplant. There are multiple factors predisposing this population to developing UTIs, including urethral catheter insertion and kidney transplant. Currently, there are no guidelines on the use of a preferred prophylactic regimen for simultaneous liver/kidney transplant (SLKT) patients to reduce risk of developing a UTI in the immediate post transplant period. In May 2017, Indiana University Health University Hospital implemented a post SLKT oxychlorosene 0.05% bladder irrigation (OBI) protocol starting two days after surgery for four doses every 12 hours. The primary goal of this study is to determine if the OBI protocol will reduce the incidence of UTI and use of anti-infectives for UTI post SLKT compared to a historical control group. This study is a retrospective chart review of SLKT patients between May 1, 2016 – April 30, 2018; the historical control group being patients receiving SLKT between May 1, 2016 to April 30, 2017. Use of anti-infectives, diagnosis of UTI, length of stay, foley catheter duration, age, sex, pre-transplant MELD score, serum creatinine, 30 day survival, and Clostridium difficile test results will be collected on all patients analyzed. Fisher's exact test and student's t-test will be used to analyze data. Data analysis thus far shows the implementation group receiving a lower number of anti-infectives compared to the historical control group ($p=0.013$). This preliminary data suggests implementation of an OBI protocol post SLKT reduces the incidence of UTI and use of anti-infectives. Final results will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review risk factors of developing urinary tract infection (UTI) post-transplant and consequences for overtreatment.

Discuss oxychlorosene and its role in urinary tract infection prevention.

Self Assessment Questions:

1. BM is a 50YOM s/p SLKT secondary to NASH. PMH is pertinent for DMII, HTN, HLD, and depression. Post transplantation he received anti-thymocyte globulin rabbit thymoglobulin induction and maintenance

- A Age
- B: Hypertension
- C: Immunosuppression
- D: Male sex

Which of the following is an adverse effect of oxychlorosene?

- A Nephrotoxicity
- B Irritation
- C Nausea
- D Risk of superinfection

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-452-L01-P

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

EVALUATING EMPLOYEE KNOWLEDGE OF PREDIABETES, PREDIABETES RISK LEVEL, AND INTEREST IN A DIABETES PREVENTION PROGRAM (DPP)

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Statement of the purpose: To evaluate the relationship between supermarket chain employee knowledge of prediabetes and their prediabetes risk level. The secondary objective is to identify factors associated with interest in participating in an employer-sponsored DPP, and employee prediabetes risk level. Statement of methods used: Employees were emailed a link to a survey that assessed prediabetes risk level according to the Center for Disease Control (CDC) Prediabetes Risk Test, knowledge of prediabetes, and factors influencing participation in an employer-sponsored DPP. Questions related to elements of both the Information-Motivation-Skills Theoretical Model and the Social-Cognitive Theory. Survey data were included for respondents 18-65 years old that are living in a county within the state of Indiana, are not diagnosed with diabetes, and are not taking medication for treatment of diabetes. Quantitative analyses of the data are planned based on chi-square tests of associations in contingency tables and regression models. Summary of (preliminary) results to support conclusion: In progress. Conclusions reached: To understand potential drivers of participation in a supermarket chain pharmacy provided DPP and increase program effectiveness, we seek to understand the prediabetes risk level, knowledge of prediabetes, and factors influencing participation in a DPP within an employee population. These findings will help guide the planning and expansion of community pharmacy DPPs by focusing on certain program components that are most pertinent to the target market.

Learning Objectives:

Identify factors that are associated with increased patient risk of prediabetes according to the CDC prediabetes risk assessment
Recall and describe in your own words the goals of the national DPP

Self Assessment Questions:

According to the CDC prediabetes screening test, which of the following factors increase a patient's risk of having prediabetes?

- A: Age <45 years old
- B: Not having a primary care provider
- C: Having a biological sister, brother, or parent with diabetes
- D: Male gender

The goal(s) of the national DPP are:

- A: Lose 5-7% of body weight if overweight and achieve 150 minutes of physical activity per week
- B: Increase the number of healthcare providers trained as Certified Diabetes Educators
- C: Reduce the risk of prediabetes in the United States by 50% by 2020
- D: To establish personalized goals for A1c and blood sugar monitoring

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-453-L01-P

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

EARLY VENOUS THROMBOEMBOLISM PROPHYLAXIS IN NEUROSURGICAL ICU PATIENTS

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Brittany Huff, PharmD, Kasey Greathouse, PharmD, BCPS, Ahmed Mahmoud, PharmD, BCCCP Northwestern Memorial Hospital. 251 E. Huron, Chicago, IL 60619 bhuff@nm.org Purpose: Neurosurgical patients that do not receive venous thromboembolism (VTE) prophylaxis have a reported occurrence of deep vein thrombosis (DVT) between 18-50%, with 84% of DVTs occurring within the first week after neurosurgery. There is a paucity of literature investigating the safety and efficacy of VTE prophylaxis with either low molecular weight heparins (LMWH) or unfractionated heparin (UFH) in the neurosurgical population. More specifically, in post tumor resection craniotomy patients, there are no definitive recommendations within current guidelines regarding safety and timing of VTE prophylaxis initiation. The purpose of this retrospective study is to determine if early VTE prophylaxis, defined as administration starting on post-operative day (POD) 1, would increase the risk of significant bleeding in neurosurgical patients. Methods: This will be a retrospective chart review of non-pregnant neurosurgical patients 18 years and older who underwent a craniotomy and received post-operative VTE prophylaxis with either UFH or LMWH between January 1st, 2016 and September 18th, 2017 at Northwestern Memorial Hospital. The primary endpoint is occurrence of significant bleeding defined as a computed tomography (CT) of the brain with acute bleeding or proven hematoma at the surgical site with a drop in hemoglobin (>2 g/dL). The secondary endpoint is occurrence of VTE. Data collected will include general demographic data, comorbidities including those known to increase the risk of VTE, time to significant bleeding, occurrence of VTE, and date and time of administrations of UFH or LMWH. Results: To be presented at the conference. Conclusion: To be presented at the conference.

Learning Objectives:

Identify if early VTE prophylaxis in post-craniotomy patients increases the risk of significant bleeding
Identify if early VTE prophylaxis in post-craniotomy patients reduces the occurrence of VTE

Self Assessment Questions:

Which of the following post-operative administration times for VTE prophylaxis has been extensively studied and associated with good outcomes in post-craniotomy patients?

- A: Immediately post-operative
- B: 24 hours post-operative
- C: 48 hours post-operative
- D: No official consensus recognized

Based on the available literature, which of the following agent(s) has been associated with significantly decreasing VTE occurrence without significantly increasing the risk of bleeding in post-craniotomy patients?

- A: Unfractionated heparin
- B: Enoxaparin
- C: Both unfractionated heparin and enoxaparin
- D: Neither unfractionated heparin nor enoxaparin

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-454-L01-P

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

EFFICACY AND SAFETY OF HYPERTONIC SALINE FOR CEREBRAL EDEMA WITH MINIMAL MIDLINE SHIFT IN ICU PATIENTS WITH ACUTE ISCHEMIC STROKE

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Purpose: Recent studies in traumatic brain injury suggest that hypertonic saline (HTS) is possibly more effective than mannitol in reducing ICP secondary to cerebral edema with a favorable adverse effect (ADE) profile. This has been extrapolated to prevention of ICP elevation in acute ischemic stroke, though clinical outcomes remain unknown. The purpose of this study is to assess the efficacy and safety of using HTS in ischemic stroke. **Methods:** This retrospective cohort study included patients admitted to the ICU and diagnosed with ischemic stroke with suspected cerebral edema on CT scan but with minimal midline shift (≤ 2 mm at baseline). Patients were divided into two groups: those who did not receive HTS (N) vs. HTS (H) group. Patients were excluded if they were pregnant or if comfort care was initiated within 24 hours of arrival. The primary outcome was the modified Rankin Scale (mRS) at discharge. Secondary outcomes included mortality, ICU length of stay (LOS), and ADEs. **Results:** Forty-four patients were evaluated (n=22 N, n=22 H). The Glasgow Coma Scale (15 N v. 9 H, $p=0.009$) was different at baseline. The median mRS indicated worse outcomes in the HTS group at discharge (3 N v. 5.5 H, $p<0.001$). All-cause mortality was higher in those receiving HTS (9.1% N v. 50% H, $p=0.007$), but there was no difference in ICU LOS [3 days N v. 4 days H; $p=0.082$]. A significant difference was observed for ADEs between N and H, respectively: hypokalemia (0% v. 22.7%, $p\leq 0.05$), AKI (18.2% v. 54.6%, $p=0.03$), and hyperchloremia (9.1% v. 50%, $p=0.007$). **Conclusion:** The use of HTS to prevent complications of cerebral edema was not associated with improvement in functional outcome and led to increased adverse effects. To account for differences in baseline demographics, matched sub-group analysis will be performed and presented at GLPRC

Learning Objectives:

Discuss the effectiveness of hypertonic saline vs. mannitol in treating ICP in patients with neurologic injury

Identify the common adverse events associated with HTS therapy

Self Assessment Questions:

Based on previous studies, HTS was more effective in lowering _____ but did not have a significant effect on _____

- A: ICP burden; mRS
- B: ICP burden; mortality
- C: ICP; Glasgow coma scale
- D: ICP; midline shift

Which of the following is an adverse event associated with hypertonic saline (3% NaCl)?

- A: Hyperkalemia
- B: Hypochloremia
- C: Acute renal failure
- D: Metabolic alkalosis

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-455-L01-P

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

IMPLEMENTATION AND EVALUATION OF A BROAD-SPECTRUM ANTIBIOTIC DE-ESCALATION ALGORITHM WITHIN THE ICU

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Purpose: Broad-spectrum antibiotics are essential to the initial treatment of severe infections such as sepsis and septic shock in critically ill patients. However, early discontinuation or de-escalation to narrower spectrum therapy may increase safety and reduce resistance. Determining when to de-escalate and discontinue these agents remains challenging when common clinical and laboratory measures such as white blood cell count, fever, or c-reactive protein are not always specific to bacterial infections. Additionally, many patients remain culture negative providing little guidance to a more appropriate agent. This study implemented and evaluated an algorithm that incorporates serum procalcitonin, methicillin-resistant Staphylococcus aureus (MRSA) nasal PCR, and duration of therapy recommendations into a comprehensive algorithm for patients initiated on broad-spectrum antibiotics in the ICU. The algorithm is designed as a tool to help clinicians and medical teams use newer diagnostic tests along with current clinical and laboratory measures to discontinue and de-escalate broad-spectrum antibiotics within the ICU. The objectives of this study were to determine the efficacy, safety, and duration of antimicrobial therapy before and after implementation of the algorithm. **Methods:** Single-center case-control study via electronic chart review of patients prescribed broad-spectrum antibiotics within an ICU between January 2017 and May 2018. Patients were compared before and after implementation of the algorithm. Primary outcomes include duration of antipseudomonal, anti-MRSA, and total antimicrobial therapy. Secondary outcomes include mortality within 30 days, Clostridium difficile infection rate, re-initiation of antibiotics, and length of hospital stay. **Results & Conclusion:** Results and conclusion to be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe two utilities of procalcitonin in de-escalating and discontinuing antibiotics within the ICU

Identify appropriateness of a procalcitonin-guided de-escalation strategy in three different patient populations

Self Assessment Questions:

Procalcitonin has supportive evidence for use in which of the following scenarios

- A: As a diagnostic agent for pulmonary viral pathogens
- B: As a clinical marker of improvement in critically ill patients
- C: As a diagnostic agent for pulmonary fungal infections
- D: As a diagnostic agent for hemodynamically stable patients with ce

Procalcitonin has supportive evidence for use in which of the following patients

- A: Patients with confirmed endocarditis
- B: Patients with poor source control
- C: Patients with pneumonia
- D: Patients with osteomyelitis

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-456-L01-P

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

A COMPARISON BETWEEN PHARMACIST AND NURSE PROVISION OF ORAL CHEMOTHERAPY COUNSELING AND FOLLOW-UP: IMPACT ON PATIENT CARE AND ADHERENCE

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Many healthcare systems underutilize pharmacists for counseling and follow-up of patients receiving chemotherapy. Patients prescribed these medications follow a complex process of initiation and monitoring, for which pharmacists should play an integral role. Literature demonstrates pharmacist-led programs deliver early interventions, decrease adverse events, increase adherence, reduce drug interactions, and decrease medication errors. Within many institutions, however, nurse-driven counseling is the standard of care which may not be ideal given time constraints with other patient care responsibilities and limited formal education of chemotherapies. The purpose of this program aims to add to the growing body of evidence that routine pharmacist activity in chemotherapy counseling and follow-up improves patient adherence and satisfaction. Through a prospective, randomized controlled trial conducted at two locations within a community hospital-based cancer institute, patients are assigned to a control group receiving standard of care nurse-provided care, or the study group receiving pharmacist-provided care. Adult patients newly started on oral chemotherapy, able to provide consent will be included. Standardized counseling for each chemotherapy agent is available to nurses and pharmacists for guidance. Patients are counseled by a nurse or pharmacist within seven days of being prescribed oral oncolytics. In the pharmacist intervention group, follow-up occurs every two weeks for a total of six weeks, whereas nursing group follow-up occurs as needed. Initial counseling and subsequent follow-up is documented as a patient encounter within the patient's medical record. The timeline concludes with the six-week follow-up encounter, where all patients are administered a survey designed to determine adherence rates and overall satisfaction of each treatment group. Results will be presented to determine if routine pharmacist-led oncology counseling improves patient adherence and satisfaction, and if such improvements justify expansion of pharmacist responsibilities in a community hospital-based cancer institute. Patient enrollment is ongoing, conclusions will be made after data collection is completed.

Learning Objectives:

Define ways pharmacists improve the quality of patient-centered oncology care in an outpatient setting.

Identify barriers to implementation of a pharmacist-led outpatient oncology counseling program.

Self Assessment Questions:

1. Which of the following are ways that pharmacists can improve oncology-based patient care?

- A Increased tracking of interventions
- B: Dose adjustments and supportive care prescriptions
- C: Monitoring of adverse events
- D: B and C

2. Which of the following is NOT a barrier to implementation of a pharmacist-led oral chemotherapy program?

- A Poor communication between healthcare providers
- B Allocated time for pharmacists to provide these services
- C Pharmacist dedication to patient care
- D Standardizing a process throughout each healthcare system

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-874-L05-P

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

EVALUATING THE EFFECTS OF A "URINALYSIS TO REFLEX CULTURE" PROCESS CHANGE IN THE EMERGENCY DEPARTMENT (ED) AT A VETERANS AFFAIR (VA) HOSPITAL

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Purpose: A process change at the Hines VA was designed to help facilitate appropriate ordering of urine cultures (UC) and was piloted in the ED setting at the beginning of October 2017. This process change involved creating new order sets that would allow providers to order a urinalysis (UA) only, a UA with culture where lab personnel would be allowed to cancel the UC order if the UA did not have >5 WBC/HPF, and a UA with culture designated as "DO NOT CANCEL," where the UC would be processed regardless of the UA results. The scenarios in which the latter option would be appropriate include pregnancy, a genitourinary procedure with necessary pre-operative culture, and neutropenia. The primary objective is to compare the frequency of inappropriate UC utilization and inappropriate antibiotic prescribing pre- and post- implementation of the new UC ordering process. The secondary objective is to assess the frequency of outpatient, ED, and hospital visits made with the chief complaint of UTI in the group of patients that have a UC cancelled because of the new process change. Methods: This is a pre-post quality improvement study analyzing the UC ordering practices in the ED setting. Data collection will be continued for two months or until an adequate number of patients are obtained. Patients who had a UA sent from the ED during the data collection period will be grouped as follows: 1. Negative UA, 2. Only UA ordered, 3. "Do not cancel" UC ordered, or 4. Positive UA with subsequent UC. UC utilization as well as appropriateness of antibiotic prescribing will be compared pre- and post- "UA to reflex culture" process change. Any adverse outcome related to cancellation of a negative UA will also be collected. Results/Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review potential issues associated with the automated processing of urine cultures following urinalysis.

Identify criteria used to assess the appropriateness of antibiotic prescribing for UTIs.

Self Assessment Questions:

Automated urine cultures following urinalysis may result in which of the following?

- A Over-treatment of asymptomatic bacteriuria
- B: Reduced lab costs
- C: Diminished workload on lab personnel
- D: Missed UTI diagnoses

Which of the following is a sign/symptom of a UTI which may support the initiation of antibiotic therapy?

- A Altered mental status
- B Dysuria
- C Flank pain
- D All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-457-L01-P

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

EVALUATION OF THE SAFETY OF ACTIVATED PROTHROMBIN COMPLEX CONCENTRATE FOR REVERSAL OF ORAL FACTOR Xa INHIBITOR-ASSOCIATED HEMORRHAGE.

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Purpose: Oral factor Xa inhibitors have emerged as a new class of anticoagulants, quickly becoming alternatives to the longtime mainstay of oral anticoagulation, warfarin. Although factor Xa inhibitors have a decreased risk for major bleeds compared to warfarin, the true reversal agent, andexanet alfa, is not currently available. Activated prothrombin complex concentrate (aPCC) has been increasingly used for reversal of factor Xa inhibitor-associated hemorrhage although this practice is only based on experimental models of bleeding. The primary purpose of this study is to determine the incidence of thrombotic events with aPCC in the reversal of oral factor Xa inhibitor-associated hemorrhage.

Methods: This study is a retrospective, single center observational study performed at a large tertiary community teaching hospital in patients greater than 18 years of age who have received aPCC with a reported history of oral factor Xa inhibitor utilization. Patients with a Glasgow Coma Score (GCS) of less than 4, partial or no code status and history of an arterial or venous thrombosis within 30 days were excluded. The primary outcome of this study is incidence of in-hospital thrombotic events. Secondary outcomes include adverse events related to aPCC utilization, hematoma expansion within 48 hours, time to procedure or intervention performed, intensive care unit and hospital length of stay, and mortality. The following data points will also be collected: site of bleed, indication for anticoagulation, hours from last dose of factor Xa inhibitor to aPCC administration, aPCC dosing, quantity of administered blood products, administration of vitamin K, pre- and post-treatment international normalized ratio (INR), prothrombin time (PT), hemoglobin, and platelet count. **Results/Conclusion:** Preliminary results show that out of 30 total patients, three patients developed a thrombus (10%), all of which were deep vein thromboses. Final results and conclusions will be presented at the Great Lakes Pharmacy Conference.

Learning Objectives:

Review the different treatment options for oral Factor Xa inhibitor-associated hemorrhage
Describe safety outcomes of activated prothrombin complex concentrate (aPCC) when utilized for oral Factor Xa inhibitor-associated hemorrhage

Self Assessment Questions:

A 63 yo AAF presents to the ED with altered mental status. Per her caregiver, the patient took her rivaroxaban this morning (approximately 6 hours ago). A CT of the head shows an intracranial hemorrhage

- A It is inappropriate to give FEIBA to this patient due to her subtherapeutic level
- B: 500 units
- C: 1000 units
- D: 2500 units

What factors does aPCC contain?

- A Non-activated Factors II, IX, X and activated Factor VII
- B Non-activated Factors II, VII, IX, X and activated Factor VIII
- C Non-activated Factors II, VIII, X and activated Factor VII
- D Non-activated Factors VII, IX, X and activated Factor VIII

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-458-L01-P

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

VENO-OCCLUSIVE DISEASE: STANDARDIZATION OF PREVENTION AND TREATMENT AT AN ACADEMIC MEDICAL CENTER

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Purpose: Veno-occlusive disease (VOD) is a potentially fatal complication of hematopoietic stem cell transplantation (HSCT) with limited, expensive, and high-risk treatment options. While international guidelines provide recommendations on prophylaxis and treatment strategies, optimized medication regimens are not well-defined in the literature, leading to variable selection, dosing, and duration of treatment. At UW Health, there is a standard operating procedure for the prevention and treatment of VOD, but neither a clinical practice guideline nor consensus among providers exists. As a result, management has historically been inconsistent and provider-specific. The purpose of this project is to standardize prevention and treatment of VOD in both adult and pediatric HSCT patients to improve patient safety, evidence-based practices, and utilization of value-based therapy. **Methods:** A clinical practice guideline was created based on a thorough literature evaluation a review of previous institutional experiences with VOD treatment, and the expert opinions of pharmacists, physicians, and nurses. This guideline outlines prophylaxis, monitoring parameters, diagnosis, and treatment for VOD. The project will include the development of a supportive care plan for the use of defibrotide, which will contain recommendations for dosing, duration, and post-administration monitoring for this high-risk treatment. In addition, this project will involve creating a pharmacist-driven delegation protocol to enable pharmacists to initiate ursodiol prophylaxis in appropriate patients prior to admission for HSCT. **Preliminary Results:** Expected results of the project include an evidence-based clinical practice guideline to standardize the prevention and treatment of VOD, a supportive care plan to promote safe use of defibrotide, and a pharmacist-driven delegation protocol to ensure initiation of appropriate VOD prophylaxis prior to HSCT. Additional anticipated results are increased patient safety, evidence-based practices, and utilization of value-based therapy.

Conclusions: Final results and conclusions will be presented at the

Learning Objectives:

Outline the key steps involved in the development and approval of a clinical practice guideline and delegation protocol at an academic medical center
Describe the implementation of a clinical practice guideline and associated support tools

Self Assessment Questions:

Which of the following is contraindicated in a patient who is receiving defibrotide?

- A Enoxaparin for pulmonary embolism
- B: Alteplase for central venous access device occlusion
- C: Phenylephrine for blood pressure support
- D: Heparin flush for intravenous line care

For which of the following patients would the UW Health VOD Prophylaxis Delegation Protocol NOT allow clinical pharmacists to prescribe ursodiol?

- A A patient who is going to receive an autologous HSCT
- B A patient who is going to receive a busulfan-based conditioning chemotherapy
- C A patient who received gemtuzumab ozogamicin two months ago
- D A patient with a bilirubin of 2 mg/dL pre-HSCT

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-459-L01-P

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

PHARMACOKINETIC EVALUATION OF VANCOMYCIN IN PATIENTS RECEIVING CONTINUOUS RENAL REPLACEMENT THERAPY

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Purpose: Vancomycin and continuous renal replacement therapy (CRRT) are frequently used together in the intensive care unit. Vancomycin pharmacokinetics have been studied extensively over the past several decades; however, no consensus has been found on the appropriate dosing regimen in patients receiving CRRT. Existing data are inconclusive and many studies recommend increased therapeutic monitoring to guide dosing. A process improvement initiative that utilizes two-point pharmacokinetic analyses to dose vancomycin in patients receiving CRRT was implemented to improve rates of therapeutic trough attainment. This updated dosing strategy uses 3- and 15-hour serum vancomycin concentrations in a pharmacokinetic evaluation to individualize the dosing regimen based on patient-specific clearance and volume of distribution. **Methods:** This retrospective, system-wide, cohort study includes adult patients admitted to an intensive care unit with an order for vancomycin therapy and simultaneous CRRT. The primary objective of this study is to compare the percentage of therapeutic trough concentration attainment prior to the third dose of vancomycin in patients dosed based on pharmacokinetic analysis versus conventional dosing. Secondary objectives are to compare dosing strategies for time to therapeutic level and percentage of trough concentrations that are within goal, as well as to describe pharmacokinetic parameters. Selected variables collected include time of vancomycin administration and levels obtained, dosing regimen, vancomycin random and trough concentrations, pharmacokinetic parameters, CRRT modality and settings, CRRT downtime, and several other variables. Pharmacokinetic parameters will include elimination rate constant, half-life, maximum concentration, volume of distribution, and area under the curve. Categorical data will be analyzed using chi-square or Fischer's exact test, as appropriate. Continuous data will be analyzed using student t-test or Wilcoxon Rank Sum, as appropriate. Significance of $p < 0.05$ and 80% power will be applied. **Results:** Data collection and analysis are currently on going. Results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review effect of continuous renal replacement therapy on vancomycin pharmacokinetics and pharmacodynamics

Discuss the impact of individualized pharmacokinetic evaluation on vancomycin goal attainment

Self Assessment Questions:

Which of the following statements is true about vancomycin?

- A: Vancomycin is a small molecule which increases removal with CR
- B: Vancomycin has a large volume of distribution making it more diffi
- C: Vancomycin is a lipophilic molecule and not removed by CRRT
- D: Vancomycin's seiving coefficient is low and not removed by CRRT

Which of the following dosing regimens achieves therapeutic levels in all patients on CRRT?

- A: 750 mg q12hr
- B: Continuous infusion
- C: 450 mg q12hr
- D: None of the above. Many studies recommend individualizing dosir

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-745-L04-P

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

OUTCOMES FOR CANCER PATIENTS WITH ACUTE ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION

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Purpose: The increase in cancer diagnoses and decrease in cancer mortality has led to a higher incidence of long-term cardiovascular complications. Previous studies have described a potential increase in morbidity and mortality in patients diagnosed with acute ST-segment elevation myocardial infarction (STEMI) and a history of cancer compared to those with no cancer history. The aim of this study is to determine the risk of in-hospital complications associated with cancer compared to non-cancer patients in the setting of acute STEMI.

Methods: This retrospective cohort includes subjects admitted to an academic, medical center for STEMI between January 1, 2012 and June 30, 2017. Subjects are identified using the electronic medical record and the Action Registry (NCDR®). The primary outcome is incidence of a composite of in-hospital complications as defined by the Action Registry (NCDR®). Secondary outcomes include individual components of the primary outcome as well as patient disposition, discharge medications and 30-day mortality and readmission rates. Additionally, pre-defined subgroup analyses of the primary outcome include variations in percutaneous intervention, cancer diagnosis and treatment. Multivariable logistic regression models will be used to assess the primary and secondary endpoints. **Results:** A total of 690 STEMI patients were identified via the Action Registry (NCDR®). Of the 690 patients, 249 have been collected to date (30 with a cancer history vs. 219 with no cancer history). The mean age for all patients is 60.7 years with 24.1% of patients being female. The primary outcome occurred in 36.7% vs. 36.1% of patients with cancer history vs. no cancer history, respectively. **Conclusion:** Additional results are in progress and conclusions will be derived based on these results. Preliminary results suggest that in-hospital complications are not increased in STEMI patients with a history of cancer.

Learning Objectives:

Identify definitions of in-hospital complications as defined by the Action Registry (NCDR®)

Describe the effect of cancer history on the risk of cardiovascular disease

Self Assessment Questions:

Which of the following is not an in-hospital complication as defined by the Action Registry (NCDR®)?

- A: Atrial fibrillation
- B: Heart block
- C: New requirement for dialysis
- D: Cardiogenic shock

Which of the following is true?

- A: Cancer history increases the risk of cardiovascular disease
- B: Cancer history decreases the risk of cardiovascular disease
- C: Cancer history has no effect on the risk of cardiovascular disease
- D: Cancer history has not been studied in relationship to cardiovascu

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-460-L01-P

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

EFFECT OF NICARDIPINE VERSUS LABETALOL USE ON TIME TO RTPA ADMINISTRATION IN HYPERTENSIVE ACUTE ISCHEMIC STROKE PATIENTS IN THE EMERGENCY DEPARTMENT: A RETROSPECTIVE COHORT STUDY

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ASA/AHA acute ischemic stroke guidelines recommend nicardipine or labetalol as first line agents to achieve blood pressure control prior to administration of recombinant tissue plasminogen activator (rtPA). There is a lack of evidence suggesting whether one antihypertensive agent leads to faster time to rtPA administration and/or better patient outcomes. This was a retrospective, single-center, cohort study that evaluated acute ischemic stroke patients who received nicardipine or labetalol as first line antihypertensive therapy prior to rtPA administration in an Emergency Department (ED). Patients were excluded if they received treatment with another anti-hypertensive agent prior to the administration of nicardipine or labetalol. The primary outcome of this study was time from admission to the ED to the administration of rtPA. Secondary outcomes were morbidity and mortality between the two groups, rate of blood pressure control at 5, 15, 30, 45, and 60 minutes after start of antihypertensive therapy. Subgroup analyses compared outcomes of patients that received any nicardipine prior to rtPA and morbidity and mortality associated with reduction in mean arterial pressure (MAP) greater than 25% prior to rtPA administration and any patients. 40 patients were included in the analysis, 37 received labetalol, and 3 received nicardipine as first agent. Overall, 11/40 patients received nicardipine prior to rtPA. Median door to needle time was 35 minutes with nicardipine compared to 58 minutes with labetalol. No difference was seen between groups with blood pressure control at any time point or in morbidity and mortality outcomes. No differences were observed with morbidity and mortality among patients with a drop in MAP >25% in the first hour of treatment. There was no difference observed in door to needle time between nicardipine and labetalol as first agent used for treatment. This study was underpowered to detect if a difference exists and further research is required.

Learning Objectives:

Identify consequences of treatment delays when administering intravenous thrombolysis in acute ischemic stroke.
Review recommended antihypertensive regimens in setting of acute ischemic stroke.

Self Assessment Questions:

An absolute contraindication to alteplase utilization is uncontrolled hypertension, which is defined as a blood pressure above _____.

- A: 200/100 mmHg
- B: 140/90 mmHg
- C: 185/110 mmHg
- D: 150/110 mmHg

AHA/ASA guidelines recommend which two agents as first line for blood pressure lowering prior to rtPA administration?

- A: Hydralazine/Labetalol
- B: Clonidine/Nicardipine
- C: Hydralazine/Clonidine
- D: Nicardipine/Labetalol

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-461-L01-P

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

IDENTIFICATION OF PNEUMOCOCCAL VACCINE ELIGIBLE PATIENTS IN A HOSPITAL SETTING USING AN ELECTRONIC HEALTH RECORD (EHR)

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Identifying vaccination opportunities is crucial to improving public health. Electronic Health Record (EHR) systems and Immunization Information Systems (IIS) are used to automate Best Practice Alerts (BPAs) that identify vaccination opportunities. However, immunization records in newly implemented EHR systems may not be complete. The purpose of this study was to determine incidence of identification and administration of pneumococcal 13-valent conjugate vaccine (PCV13) and pneumococcal polysaccharide vaccine (PPSV23) in an inpatient population. A retrospective quantitative study design was used to review EHRs of patients admitted to the institution between May 1, 2017 and August 31, 2017. Data collected includes age, immunization history, and diagnosis. Eligibility to receive PCV13 or PPSV23 was identified by BPAs in the EHR or practitioner assessment. Eligibility criteria was determined by BPAs and recommendations from the Advisory Committee on Immunization Practices (ACIP). Identification of vaccine eligibility was assessed as correctly identified, incorrectly identified, or unable to determine. Interventions included administration of PCV13, PPSV23, or no vaccine given. Interventions were assessed for appropriateness based on eligibility status and categorized as correct, incorrect, or unable to determine. For BPA population (n = 351), eligibility status was correctly identified in 79.5%, incorrectly identified in 17.1%, and unable to determine in 3.4%. In the BPA population, correct interventions occurred in 17.7%, incorrect intervention in 78.3%, and unable to determine in 4.0%. In the random sample (n = 49), correct intervention occurred in 10.2%, incorrect intervention in 83.7%, and unable to determine in 6.1%. BPAs accurately identified vaccination eligibility for the majority of patients. Incorrect interventions were mostly from lack of vaccine administration despite eligibility. This investigation shows that EHR systems are useful for identifying vaccination opportunities, but immunization history should still be reviewed by a practitioner. The institution anticipates implementation of a protocol to improve pneumococcal vaccination opportunities.

Learning Objectives:

Identify patients eligible to receive pneumococcal 13-valent conjugate vaccine
Identify patients eligible to receive pneumococcal polysaccharide vaccine

Self Assessment Questions:

A.W. is an 80 year old female who was admitted to your institution for nausea, vomiting, and dehydration. Days later patient has improved and discharge is pending. You notice she has no documentation

- A: pneumococcal polysaccharide vaccine
- B: pneumococcal 13-valent conjugate vaccine
- C: pneumococcal 7-valent conjugate vaccine
- D: no vaccine is needed

F.M. is a 20 year old male admitted to the hospital for observation after an asthma exacerbation. After reviewing the patient's vaccination history, you note no documentation of a pneumococcal vaccine

- A: pneumococcal polysaccharide vaccine
- B: pneumococcal 13-valent conjugate vaccine
- C: pneumococcal 7-valent conjugate vaccine
- D: no vaccine is needed

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-910-L06-P

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

AMINOGLYCOSIDE DAILY VERSUS DIVIDED DOSE FOR SYNERGY IN ENTEROCOCCUS INFECTIVE ENDOCARDITIS

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Purpose: Current Infectious Diseases Society of America Endocarditis guidelines recommend extended interval synergy dosing for aminoglycosides in all IE except for infections due to *Enterococcus* spp. for which they recommend traditional aminoglycoside dosing. However, data evaluating the optimal aminoglycoside dosing for enterococcal endocarditis are limited. The primary objective of this study is to evaluate the safety of once-daily aminoglycoside dosing strategy compared to daily divided aminoglycoside dosing when used for synergy in infective endocarditis due to *Enterococcus* spp. **Methods:** This is a retrospective, observational, cohort study designed to evaluate the safety and efficacy of aminoglycoside extended interval versus divided dose for synergy in enterococcal endocarditis. Patients who received gentamicin for the treatment of Enterococcal endocarditis at an Indiana University Health hospital from 2010 to 2017 will be reviewed for inclusion. Patients less than 18 years old, pregnant, on hemodialysis or with incomplete records will be excluded. Subjects will be stratified based on dosing regimen. The primary endpoint is rate of acute kidney injury (AKI) as defined by the RIFLE criteria for once vs. divided daily aminoglycosides. The secondary endpoints are negative blood culture results within 72 hours and 7 days from the time of the first dose of aminoglycoside and 30 day mortality. Primary and secondary endpoints will be evaluated with Chi-square or Fisher's exact test where appropriate. Continuous variables such as, time to bacterial clearance, dose of aminoglycoside, duration of aminoglycoside therapy, serum creatinine, and length of stay will be evaluated with Student's t-test or Wilcoxon rank sum test. 63 patients in each group are required to detect 20% difference in rate of AKI with 80% power and an alpha of 0.05. **Results/Conclusion:** Data collection currently being conducted. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the role of aminoglycosides when used for treatment of enterococcal IE.

Select appropriate antibiotic dosing schemes for infective endocarditis resulting from *Enterococcus* species.

Self Assessment Questions:

What is the proposed benefit of once vs. divided daily dosing of aminoglycosides?

- A: Increased time above MIC
- B: Reduced Cost
- C: Reduced Hepatotoxicity
- D: Reduced Nephrotoxicity

Which of the following antibiotic regimens is currently listed in the IDSA guidelines for endocarditis involving native or prosthetic valve resulting from *Enterococcus* species?

- A: Ampicillin 2 g q4h + gentamicin 3 mg/kg in 2-3 divided doses
- B: Ampicillin 2 g q4h + gentamicin 3 mg/kg q24h
- C: Ceftriaxone 2g q24h + gentamicin 3 mg/kg q24h
- D: Vancomycin 15-20 mg/kg + rifampin 300 mg TID + Gentamicin 3 mg/kg q24h

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-462-L01-P

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

COMPREHENSIVE PHARMACOTHERAPY REVIEW IN POST-DISCHARGE MANAGEMENT OF CIRRHOSIS AND ITS IMPACT ON HOSPITAL ADMISSIONS

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Purpose: The purpose of this study is to examine the impact of suboptimal medication management and identify modifiable medication-related risk factors for readmission in the care of patients with liver cirrhosis. The current body of literature lies largely in determining predictive factors for readmissions, implementing interventions to target the medication management of certain aspects of complications of cirrhosis, and examining the cost of 30-day readmissions. There are potential areas to reduce readmissions, two of which are infection-related readmissions and readmissions for gastrointestinal bleeds. This study hopes to add to the body of evidence and examine the impact of optimal, guideline-driven, comprehensive medication management on the rates of 30-day hospital readmission. Lastly, this study hopes to identify medication-related targets for future pharmacy practice model interventions. **Methods:** This is a case-control study, where subjects will be matched according to month of index hospitalization and site of hospitalization. Additional data collected included patient demographics, disease characteristics, comorbid conditions, medication therapy, and patient outcomes. Adjudication of appropriateness of medication therapy was performed by coinvestigators blinded to the outcome. Descriptive analysis will be performed using measures of central tendencies, distributions, and proportions. Bivariate analysis and multivariable logistic regression will be used to compare outcomes and adjust for confounding factors. A $P < 0.05$ will be considered statistically significant for all comparisons. **Results and Conclusions:** will be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Review the American Association for the Study of Liver Diseases (AASLD) recommendations for the management of cirrhosis
Identify the role of the pharmacist in ensuring optimal therapy for complications of cirrhosis

Self Assessment Questions:

In patients who survived an episode of spontaneous bacterial peritonitis (SBP), which of the following antibiotic regimens is recommended, per the AASLD guidelines, to reduce the risk of recurrence with

- A: Amoxicillin 500 mg every 8 hours
- B: Ciprofloxacin 750 mg once weekly
- C: Sulfamethoxazole/trimethoprim 800/160 mg five days weekly
- D: Norfloxacin 400 mg daily

If used in appropriate candidates with refractory ascites, which of the following medications has been shown to increase survival?

- A: Propranolol
- B: Midodrine
- C: Chlorthalidone
- D: Lisinopril

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-463-L01-P

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

IMPLEMENTATION AND EVALUATION OF AN IMPROVED PHARMACIST PATIENT CARE MODEL

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Purpose:Internal medicine pharmacists at Froedtert Hospital currently follow a unit-based staffing model. While this fosters relationships with unit-based services such as nursing and social work, it does not fully align the clinical pharmacist with the internal medicine provider teams. Implementing a service-line staffing model would allow pharmacists to attend patient care rounds, granting them more opportunities to propose medication interventions and better aligning internal medicine pharmacists with pharmacy students and residents. The purpose of this project is to 1) assess the feasibility of this service-line model and 2) measure the satisfaction of pharmacists to in turn improve quality of services provided on internal medicine units at Froedtert Hospital.

Methods:This is a pre/post study design with data collected from August 2017 through May 2018. A pre-survey was distributed to pharmacists, providers, nurses, and learners to assess the current perception and satisfaction of pharmacy involvement in patient care. An 8-week-long pilot will be run, pairing internal medicine pharmacists with medicine teams, rather than units. After pilot completion, a post-survey will be distributed to the same groups of individuals to measure the impact of the service-line model. The primary outcome measured through the survey will be pharmacist satisfaction with the patient care they are able to provide. Secondary outcomes include perceptions of pharmacy services from providers, nurses, and learners comparing the two staffing models. Preliminary Results/Conclusions: Research is in progress and results will be presented at the Great Lakes Pharmacy Residency Conference. Preliminary data reveal the majority of internal medicine pharmacists (76%) would prefer a service-line staffing model. Expected outcomes include: improving pharmacists' satisfaction in their ability to provide patient care, increased workflow efficiency, and improved relationships with providers. Implementation aims to enhance the quality of the internal medicine rotation for learners and provide guidance for future initiation of service-line staffing models.

Learning Objectives:

Describe the advantages and disadvantages of a unit based vs. service-line based pharmacy practice models

Outline a process of implementing a pharmacy service-line staffing model through communication and alignment of necessary stakeholders

Self Assessment Questions:

Which of the following is an advantage of a service-line based staffing model?

- A Provision of a central contact for nursing staff and providers
- B: Emphasis on "generalist" management of patient care
- C: Pharmacist proactively involved as a member of the inter-professional team
- D: Conducive to developing a close working relationship with the nurse

Which of the following environmental factors were considered the greatest barrier to implementing a service-line staffing model?

- A Mobile computing capabilities
- B Geographic restrictions
- C Type of institution
- D Staffing restrictions

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-746-L04-P

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

EVALUATION OF OUTCOMES ASSOCIATED WITH DELAY IN SECOND DOSE OF ANTIBIOTICS IN PATIENTS WITH SEPSIS

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Purpose: Sepsis requires timely stabilization and management of the patient. Early intervention, including empiric antibiotics within the first three hours after presentation, has been associated with improved mortality outcomes. Delays in administration of the second dose, however, have been associated with undesirable increases in mortality and length of stay. This study seeks to quantify the magnitude of delay between optimally timed first doses of select empiric antibiotics and administration of second doses of these antibiotic therapies, as well as to examine differences in clinical outcomes related to any delays. **Methods:** This retrospective cohort study will utilize data extracted from the electronic medical record between January 2016 and June 2017. Patients with a sepsis diagnosis who were administered timely first doses (i.e. within three hours) of piperacillin-tazobactam, cefepime or meropenem in the emergency department will be stratified by whether or not second doses were received in a timely manner (i.e. within eight hours). Patients <18 years old and those given first dose at an outside hospital prior to transfer were excluded. Primary outcomes include differences in clinical outcomes (length of stay, 30-day and 90-day mortality) associated with delays in receipt of second doses of empiric antibiotic therapy. **Results/Conclusions:** Results will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss optimal timeframes for initiating management of septic patients

Identify negative clinical consequences of not initiating appropriate antibiotic therapies within optimal timeframes from patient presentation

Self Assessment Questions:

Empiric antibiotics should be started within how many hours following a differential diagnosis including sepsis?

- A Within 24 hours
- B: Within 3 hours
- C: Within 8 hours
- D: After culture results have returned

Which of the following is not associated with a delay in the administration of antibiotics in septic patients?

- A Increased mortality
- B Increased hospital length of stay
- C Increased risk of mechanical ventilation
- D Increased survival due to appropriately chosen antibiotics following

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-464-L01-P

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

EVALUATION OF THE MANAGEMENT OF IMMUNE RELATED ADVERSE EVENTS ASSOCIATED WITH CHECKPOINT INHIBITORS IN A REGIONAL CANCER CENTER

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Purpose: The use of checkpoint inhibitors in the treatment of melanoma has drastically changed the course of the disease, increasing overall survival and progression free survival. Due to their mechanism of action a new unique set of adverse events have been observed, known as immune related adverse events (irAE's). The objective of this study is to evaluate incidence and treatment of irAE's. This data will be used to create a clinical supportive plan to assist providers in management of side effects related to checkpoint inhibitors. This will potentially reduce hospitalizations, emergency room visits, and interruptions to therapy. **Methods:** This study has been approved by the Institutional Review Board. This retrospective chart review will assess patients receiving treatment with checkpoint inhibitors from August 1, 2016, to July 31, 2017 at the SwedishAmerican Regional Cancer Center. The medication evaluated in the study are nivolumab, ipilimumab, pembrolizumab, and atezolizumab. The data collected will include: age, diagnosis, start date of checkpoint inhibitor, previous chemotherapy treatment regimens, labs, pre-medications, primary care physician, preferred pharmacy, pre-existing conditions, home medication list, office visits, and hospital admissions. The incidence and treatment of irAE's will be assessed for efficacy, appropriateness, and patient response. This information will be used to prepare and potentially implement a clinical supportive plan of proper management and treatment of irAE's for patients and providers. **Results and Conclusions:** Data collection is complete. Final results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the mechanism of immune related adverse events
Describe proper pharmacologic management of immune related adverse events

Self Assessment Questions:

Patient MC is receiving ipilimumab for metastatic melanoma. After her second treatment, she develops colitis grade 1, which is treated with anti-diarrheal medications. However, after her third treatment

- A Discontinue ipilimumab and allow patient to recover
- B: Delay her fourth cycle and continue symptomatic management with
- C: Discontinue ipilimumab and initiate 0.5-1 mg/kg/day methylprednisolone
- D: Discontinue ipilimumab and switch to alternative treatment keeping

Which medication works by binding the programmed death ligand (PD-L1) to prevent down-regulation of anti-tumor effects?

- A Ipilimumab
- B Atezolizumab
- C Nivolumab
- D Pembrolizumab

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-465-L05-P

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

SEPSIS TREATMENT OF INPATIENTS IN A COMMUNITY HOSPITAL EVALUATION OF ANTIBIOTIC AND FLUID ADMINISTRATION

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Purpose: Sepsis is a complex disease state and is often undiagnosed and undertreated. Appropriate treatment of patients immediately after sepsis identification has been tied to improved patient outcomes, including mortality. Due to the importance of proper initial treatment, the Surviving Sepsis Campaign has created sepsis guidelines and bundles to guide the care of these patients. Two main areas of focus that are specific to pharmacist involvement include administration of appropriate antibiotics and fluids within three hours of sepsis identification. The purpose of this study is to identify patients diagnosed with sepsis while hospitalized at SwedishAmerican and assess the appropriateness of their initial fluid replacement and antibiotic treatment. **Methods:** This study was submitted and approved by the Institutional Review Board. This single-center, retrospective chart review assessed patients who have an ICD-10 diagnosis code of sepsis at discharge from February 1, 2017, to July 31, 2017. The following data was collected and assessed: age, gender, weight, length of hospitalization, white blood cell count, serum creatinine, serum lactate, vital signs, fluids and antibiotic selection with administration times, and sepsis order set utilization. The appropriateness of antibiotic regimens and fluid boluses was assessed, as well as whether these therapies were administered to patients within the recommended three hour time frame. The goal of this assessment was to identify potential areas for improvement specifically from an inpatient pharmacy standpoint. **Results:** Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the importance of proper initial treatment in sepsis
Recognize monitoring parameters to identify early onset of sepsis

Self Assessment Questions:

Which of the following is required by CMS to be completed within the first 3 hours after sepsis identification?

- A Blood cultures after antibiotic administration
- B: Start appropriate IV antibiotics
- C: Colloid rapid fluid bolus of 30 mL/kg
- D: Measure triglyceride level

Which of the following is not a sign of potential onset of sepsis?

- A Decreased temperature (<36 C/96.8 F)
- B Elevated respiratory rate (>20)
- C Decreased heart rate (<50 bpm)
- D Elevated white blood cell count (>12,000)

Q1 Answer: B Q2 Answer: C

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(if ACPE number listed above)

COMPARISON OF FACE-TO-FACE VERSUS CHART REVIEW MEDICATION RECONCILIATION USING A PHARMACY LAYERED LEARNING PRACTICE MODEL

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Purpose: At Robley Rex Veterans Affairs Medical Center (VAMC), pharmacy admission medication reconciliation is completed by inpatient pharmacists' medication chart review. This process differs from other facilities that traditionally utilize face-to-face patient interaction to complete admission medication reconciliation. VA and non-VA facilities alike have begun to utilize pharmacy students to complete this process. The purpose of this study is to compare pharmacy face-to-face admission medication reconciliation to pharmacy chart review medication reconciliation at Robley Rex VAMC. A layered learning model between students, pharmacy resident, and preceptors will be used to facilitate the face-to-face medication reconciliation process.

Methods: Pharmacy students will be performing face-to-face admission medication reconciliation, and inpatient pharmacists will continue their current procedure for admission medication reconciliation through chart review. The pharmacy resident will educate students on proper medication interview techniques and orient them to the process of data collection. Students will be collecting information from the face-to-face interaction with the patient and logging it into an Excel spreadsheet. Students will go over recommendations and findings with their rotation preceptor and notify physicians if needed. The pharmacy resident will examine the medical records for the same patients the students interviewed and obtain and log the data from the inpatient pharmacist encounter. The primary endpoint is mean number of medication discrepancies per patient after face-to-face medication reconciliation in comparison to chart review medication reconciliation. Secondary endpoints include: type of discrepancy documented, intervention initiated, type of intervention initiated Institute for Safe Medication Practices (ISMP) high alert medication intervention, new allergies/adverse drug events reported by the patient, non-VA pharmacies utilized, mean/median time to completion of medication reconciliation, and effectiveness of layered learning model. Descriptive statistics will be used when analyzing the primary and secondary endpoints and patient demographics. When comparing the two data groups, a paired student's t-test will be used. **Results:** to be determined **Conclusions:** to be determined

Learning Objectives:

Describe barriers to conducting accurate medication reconciliations
Recall potential benefits of face-to-face medication reconciliation compared to chart review

Self Assessment Questions:

Which of the following is a potential barrier to conducting accurate medication reconciliations?

- A Clear delineation of assigned roles across healthcare team members
- B: One pharmacy utilized by patient
- C: Inability of patient to communicate
- D: Patient knowledgeable about his/her medications

Which of the following is a potential benefit of face-to-face medication reconciliation compared to chart review medication reconciliation?

- A Review of recently filled medications on medication list
- B Discovery of OTC medications utilized by patient
- C Time to complete medication reconciliation is decreased
- D Resources utilized to complete medication reconciliation are less

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-875-L05-P

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

EVALUATION OF CURRENT HEPARIN-PLATELET FACTOR 4 (PF4) ORDERING PRACTICES FOR PATIENTS SUSPECTED OF HEPARIN INDUCED THROMBOCYTOPENIA (HIT)

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Purpose: To evaluate current heparin-platelet factor 4 (PF4) assay ordering practices for patients suspected of having heparin induced thrombocytopenia (HIT). Currently at Community Hospital (CH) there was concern that practitioners may be unnecessarily ordering heparin-PF4 panels and initiating non-heparin anticoagulants. This retrospective chart review was intended to assess the current ordering practices and to make recommendations for improvement in the workflow for diagnosis and treatment of heparin-induced thrombocytopenia. HIT is considered a major complication of heparin therapy that can occur in 0.5% - 5% of patients, with an associated mortality rate of 20 - 30%. The Serotonin Release assay (SRA) is an additional diagnostic test that is 99% sensitive and specific for HIT antibodies and is often used to confirm positive results from the Platelet Factor 4 assay. The probability of HIT was clinically assessed using the validated 4T score. Patients with a 4T score of 4 or greater were considered to be at moderate to high risk of HIT and warrant laboratory testing with possible alternative anticoagulation. **Methods:** This study was approved by the Community Healthcare System - Community Hospital Institutional Review Board. There were 60 patients randomly selected from July 1, 2016 - June 30, 2017 at Community Hospital who had a PF4 lab ordered. The following data were collected: patient's age, heparin product used, days of heparin, 4T score, PF4 results, and time to heparin discontinuation after HIT diagnosis. The primary endpoint was to assess the appropriateness of heparin-PF4 assay orders based on 4T score of 4 or greater. The secondary endpoints were the immediate discontinuation of all heparin products, choice of non-heparin anticoagulation agent, and documentation of heparin allergy. **Results:** Data collection and analysis are currently in progress **Conclusions** will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify patients who are indicated to have a serotonin release assay ordered

Recognize the importance of ordering a PF4 assay for patients with intermediate to high 4T scores

Self Assessment Questions:

Which of the following statements is correct?

- A It is reasonable to order an SRA assay if the PF4 assay is positive
- B: Patients with an intermediate risk should not have a PF4 assay ordered
- C: The PF4 is the gold standard used to diagnosis heparin induced thrombocytopenia
- D: Patients should have the PF4 and SRA assay when the 4T score is intermediate to high

Which of the following patients should have a PF4 assay ordered?

- A When the 4T score is not calculated
- B Intermediate 4T score
- C Low 4T score
- D Low-intermediate 4T score

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-467-L01-P

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

CREATION AND IMPLEMENTATION OF A HOSPITAL INITIATIVE WITHIN THE EMERGENCY SERVICES DEPARTMENT TO INCREASE PATIENT ACCESS TO ON-HAND NALOXONE

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Background: Of the nearly 64,000 deaths in the US in 2016 that occurred from drug overdoses, over half (approximately 34,000 deaths) were attributed to opioids. Despite the progress that has been made, immediate access to on-hand naloxone (a potent opioid antagonist) at the time of emergent need continues to be a challenge. **Methods:** The primary objective of this residency project is the implementation of a program within the emergency services department for at-risk patients to receive education and leave with naloxone in-hand upon discharge. To accomplish this, a pilot study is being created to provide a proof-of-concept design. Key stakeholders include the coordination of the pharmacy and emergency services departments, as well as the medical foundation to help secure funding. A decision tool will be created and used to determine which patients are to receive the naloxone product, and how the education will be provided prior to discharge. Pre- and post implementation measures will be analyzed to determine the success of the pilot program. Secondary objectives of this residency project include creation of system-wide educational materials about opioid overdoses and naloxone use intended for both patients and staff, and expansion to outpatient behavioral health and opioid treatment departments to broaden the reach of this program. **Results:** Ongoing - pending continued work and implementation of the pilot program. **Conclusions:** When used as an emergency rescue agent, prompt and immediate access to on-hand naloxone can be lifesaving in cases of opioid overdoses.

Learning Objectives:

Identify at-risk patient populations who may be indicated for naloxone.
Discuss multiple strategies to increase patient access to on-hand naloxone.

Self Assessment Questions:

Which of the following is correct for patient populations indicated to have access to naloxone?

- A Patients with chronic pain are not indicated for naloxone as they are
- B: Patient populations of both prescribed and illicit opioid use are indicated
- C: After a period of abstinence and treatment for opioid misuse, a patient is not indicated
- D: Only patients prescribed for high-dose regimens of opioids are indicated

Increasing patient access to on-hand naloxone can best be accomplished by:

- A Deferring discussion and decision for naloxone solely to a patient's discretion
- B Only focusing on patient populations that are at an increased risk for overdose
- C A multifaceted approach within the health system to reach patients
- D Fully relying on a patient to obtain naloxone as an outpatient prescription

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-468-L01-P

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

IMPLEMENTATION OF A STANDARDIZED PROCESS FOR ORDERING, PREPARING AND DISPENSING OF SPECIALTY STERILE COMPOUNDED PRODUCTS FOR SURGICAL PROCEDURES AT A COMMUNITY HEALTH SYSTEM

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Purpose: Medications are used daily in all types of surgeries. While some of the medications are available in a ready to use form, specialty products often require preparation by the pharmacy. In the fast-paced operating room environment, all medications and supplies need to be readily available. Current practice at this health system includes placing requests for specialty sterile compounded items needed for the case in advance by phone or fax to avoid delays. Specialty sterile compounds are also prepared in advance utilizing surgeon and case-specific pick lists. This process bypasses the placement of an order using computerized physician order entry (CPOE) within the electronic health record (EHR), as well as the utilization of scanning technology to ensure safe preparation of these products. Therefore, to increase safety and prevent delays in patient care, this community health system will develop a workflow for the ordering, preparing and dispensing of specialty sterile compounded products used in the operating rooms using the institution's EHR and CPOE. **Method:** A taskforce of selected pharmacists and pharmacy technicians was assembled to analyze the current pharmacy workflow and assist in identifying areas of improvement. To understand workflow in the operating room, meetings were held with perioperative staff. With the new workflow and EHR tools specialty sterile compounded products will be added to order sets and can be ordered by providers for the specific patient using CPOE. In addition, safety will be enhanced by allowing barcode scanning to be used during the preparation and dispensing stages of the process for orders placed using CPOE. This project is a quality improvement project and is therefore exempt from review by the Institutional Review Board. **Results and conclusion:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify limitations in the workflow for ordering, preparing, and dispensing specialty sterile compounds needed during surgery.
Describe the benefits of using CPOE within the EHR to order products needed during surgery.

Self Assessment Questions:

Which step in the current workflow for ordering, preparing, and dispensing specialty sterile compounded products for surgery is identified as an area of improvement?

- A Surgery departments place manual orders via fax
- B: The product is automatically charged to the patient upon dispensing
- C: Pharmacy prepares and dispenses the product using patient specific orders
- D: Nurse can scan the barcode before administration

What is an advantage of using the CPOE within the EHR to place patient specific orders?

- A Reduce errors
- B Increase patient harm
- C Increase verification time
- D Increase preparation time

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-876-L05-P

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

IMPLEMENTATION OF AN INPATIENT ONCOLOGY FORMULARY STEWARDSHIP PROGRAM AT A COMMUNITY, NOT-FOR-PROFIT HEALTH SYSTEM

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Background: Throughout the United States, healthcare costs continue to rise, reaching a value of \$2.9 trillion in 2013. Oncology-related care is one of the most dynamic categories within this increased drug expenditure. In fact, oncology is third only to rheumatoid arthritis and multiple sclerosis in specialty pharmacy spending. While the United States continues to spend more on oncology agents, life expectancy has fallen, with the United States ranked 27th out of the 34 countries in the Organization for Economic Co-operation and Development. Health systems from around the country have focused on how to best combat rising costs while providing the best care possible. In 2016 OhioHealth Pharmacy Services joined in this journey, with a value-based initiative to provide oncology care in a setting that benefits patients, providers, and society. The objective of this study is to describe the benefit of an oncology inpatient chemotherapy restriction policy to a large, not-for-profit health system through the measurement of change in restricted chemotherapy usage during a three month time period both before and after implementation of an oncology inpatient chemotherapy restriction policy. **Methods:** This IRB approved study used a retrospective chart review of all patients receiving "restricted" inpatient chemotherapy within the OhioHealth health system. This chart review spanned over two separate time periods, allowing for a usage evaluation of these chemotherapy agents both pre- and post-policy implementation. The initial chart review allowed for the evaluation of the total usage of restricted chemotherapy prior to policy implementation. The second, post-implementation, chart review evaluated usage, along with pharmacy-led interventions and escalations. **Results/Conclusions:** Data analysis is currently ongoing. Results and conclusions will be shared at the 2018 Great Lakes Residency Conference

Learning Objectives:

Describe potential pharmacy-led interventions and policies that can contribute to the ability of a health system to provide value-based oncology care.

Discuss strategies to prevent the usage of "convenience chemotherapy" in the inpatient setting, while providing oncology care at a large health system.

Self Assessment Questions:

Which of the following does not reflect a potential strategy to decrease an institution's usage of unnecessary oncology agents in the inpatient setting?

- A: Establishment of an Oncology P&T Subcommittee
- B: An inpatient stewardship policy
- C: Pharmacy-led interventions and collection of data in relation to patients
- D: Singular hospital specific oncology policies within a large health-system

The American Society of Clinical Oncology states "physicians have a societal responsibility to provide care that minimizes _____ and is _____"

- A: Waste/Evidence-based
- B: Cost/Convenient
- C: Patient Harm/Painless
- D: Waste/Cost-Effective

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-747-L04-P

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

SINGLE-AGENT IRINOTECAN VERSUS PACLITAXEL FOR THE TREATMENT OF RELAPSED OR REFRACTORY SMALL CELL LUNG CANCER

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Background/Purpose: Despite favorable response rates following initial treatment for small cell lung cancer (SCLC), the majority of patients relapse within one year of completing standard first-line, platinum-based chemotherapy. For patients with progressive disease within six months following completion of first-line treatment, single-agent chemotherapy is recommended. Agents that have shown activity in this setting include topotecan, irinotecan, paclitaxel, docetaxel, gemcitabine, and others; however, there is limited data available. At The James Cancer Hospital, irinotecan and paclitaxel are the agents most commonly used for patients who have relapsed within six months following completion of first-line treatment. The objective of this study is to characterize the efficacy and toxicity of single-agent irinotecan and paclitaxel for relapsed SCLC in patients with prior exposure to platinum-based chemotherapy.

Methods: A retrospective cohort analysis will be completed consisting of patients with SCLC who received treatment with irinotecan or paclitaxel monotherapy at The James between January 1, 2010 and July 31, 2017. To be included, patients must have a diagnosis of SCLC, received platinum-based chemotherapy and have disease progression within six months following completion of platinum-based chemotherapy, and received single-agent irinotecan or paclitaxel during the study time period. Patients will be excluded if they are pregnant, incarcerated, younger than 18 years old, and older than 89 years old. Additionally, patients will be excluded if they received single agent paclitaxel or irinotecan as the next line of therapy following a response that lasted more than six months after completion of platinum-based chemotherapy. The primary outcome will be time to treatment failure, defined as time to progression or death following initiation of paclitaxel or irinotecan therapy. Secondary outcomes will include toxicity assessments using the Common Terminology Criteria for Adverse Events version 4.0. **Results/Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the treatment options for relapsed and refractory small cell lung cancer.

Recognize the side effects of single agent irinotecan and paclitaxel for the treatment of relapsed and refractory small cell lung cancer.

Self Assessment Questions:

What is the recommended treatment option for patients with small cell lung cancer who relapse within 6 months of completing standard first-line, platinum-based chemotherapy?

- A: Carboplatin + Etoposide
- B: Cisplatin + Etoposide
- C: Single agent therapy (i.e. irinotecan or paclitaxel)
- D: Cisplatin + Vinorelbine

What is a common side effect of irinotecan?

- A: Diarrhea
- B: Red Urine
- C: Conjunctivitis
- D: Cardiomyopathy

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-469-L01-P

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

EVALUATION OF VANCOMYCIN USE AT A COMMUNITY HOSPITAL

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Purpose: With almost one decade since implementation of an antimicrobial stewardship program, Blessing Hospital has incorporated strategies to improve patient care, minimize resistance, lower healthcare costs, and enhance longevity of antimicrobials. A retrospective evaluation of vancomycin management will provide important feedback and potentially identify opportunities for improvement. The purpose of this study is to evaluate the efficacy and safety of vancomycin use at Blessing Hospital. **Methods:** This is a single center, retrospective chart review evaluating patients admitted to the inpatient service between August 1, 2017 and November 30, 2017 receiving vancomycin managed by pharmacy for indications that warrant a goal trough of 15 to 20 ug/mL. Patients were at least 18 years of age, had a least one vancomycin trough collected during treatment course, and received vancomycin for at least 72 hours. Patients were not included in the study if they had underlying renal insufficiency. The primary outcomes include time to therapeutic vancomycin range for the study population, and to characterize the percentage of patients receiving vancomycin that developed vancomycin-associated nephrotoxicity. Secondary objectives include number of vancomycin troughs drawn per course of therapy, time to antimicrobial de-escalation after negative cultures or after 72 hours of therapy in the setting of clinical improvement, and incidence of concomitant therapies of piperacillin-tazobactam or cefepime in those patients that developed nephrotoxicity. Data collection will include laboratory values, microbiologic results, antimicrobial selection, administration times, indication, and length of therapy. **Results:** To be determined. **Conclusion:** To be determined.

Learning Objectives:

Identify the core elements of hospital antimicrobial stewardship programs (ASPs) as defined by the CDC.

Describe the risks associated with vancomycin troughs that fall below 10 ug/mL and above 20 ug/mL.

Self Assessment Questions:

LR has negative blood cultures, Gram positive cocci in pairs on respiratory culture, and reduced O2 demands after 72 hours of vancomycin and cefepime for pneumonia. What is the best recommendation?

- A: Discontinue vancomycin and continue cefepime
- B: Continue current regimen
- C: Discontinue vancomycin and cefepime and initiate ceftriaxone
- D: Discontinue vancomycin and cefepime and initiate levofloxacin

Which of the following is considered a risk with supratherapeutic vancomycin troughs that would likely not occur with subtherapeutic troughs?

- A: Hepatotoxicity
- B: Drug Resistance
- C: Nephrotoxicity
- D: Inadequate Response

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-470-L01-P

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

EVALUATING THE IMPACT OF CLINICALLY INTEGRATED MEDICATION MANAGEMENT BY PHARMACISTS FOR HIGH RISK PATIENTS WITH UNCONTROLLED TYPE 2 DIABETES IN A PRIMARY CARE MEDICAL HOME

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Purpose: The patient-centered medical home (PCMH) is a multidisciplinary approach to primary care, emphasizing clinical integration rather than referral. Pharmacists on the team improve medication safety and adherence through comprehensive medication management, leading to improved control of chronic diseases such as diabetes. Clinical pharmacists at our system's PCMHs in underserved areas of Chicago see patients with physicians for integrated, collaborative visits, and also provide targeted interventions for diabetic patients with poor glucose control. The purpose of this study is to assess how this targeted medication management by clinical pharmacists correlates with diabetes health outcomes in a high risk PCMH population. **Methods:** This will be a prospective study following patients at Near South and Englewood Health Centers that seen by a pharmacist for integrated medication management between October 1, 2017 and January 31, 2018. Inclusion criteria will be: adult patients with type 2 diabetes and glycated hemoglobin (HbA1c) levels of 7 or greater. All patients contacted by a pharmacist will be included regardless of adherence to visits. The primary outcome will be HbA1c. Additional data collected for secondary outcomes include: average fasting plasma glucose over past 30 days, average 2-hour post-prandial glucose over the last 30 days, blood pressure, GFR, lipid panel, 10-year atherosclerotic cardiovascular disease risk score, population health risk score, body mass index, presence of an eye exam in the past year, history of pneumococcal vaccination. Clinical measures will be collected at baseline, at 3 months, and at 6 months after initial contact. Physicians and patients will be asked to complete a brief satisfaction survey at baseline and at 6 months. **Results and Conclusions:** In Progress

Learning Objectives:

Define the patient-centered medical home model.

Describe the pharmacist's role in primary care.

Self Assessment Questions:

What are the core principles of the patient-centered medical home model?

- A: Primary care which is oriented around the patients and based on the patient's needs
- B: Primary care which is comprehensive, team-based, coordinated, and patient-centered
- C: Patients are welcome to partake in the medical home only if they are able to do so
- D: The medical home is a place where patients come to stay through the course of their illness

How does the Patient-Centered Primary Care Collaborative (PCPCC) define comprehensive medication management?

- A: The process of developing treatment plans and writing prescriptions
- B: Pharmacists serve as the patient's de facto primary care provider.
- C: Patient education occurs at the time of dispensing.
- D: The standard of care that ensures each patient's medications are i

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-748-L04-P

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

OBESITY AND THERAPEUTIC ENOXAPARIN DOSING OPTIMIZATION BASED ON ANTI-XA LEVELS

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Purpose: The purpose of this study is to compare anti-Xa levels in patients weighing ≥ 150 kg receiving therapeutic anticoagulation with low molecular weight heparin (LMWH) dosed at less than 0.85 mg/kg every 12 hours as compared to those who receive greater than or equal to 0.85 mg/kg every 12 hours. **Methods:** This will be a retrospective cohort study of patients weighing ≥ 150 kg admitted to Northwestern Memorial Hospital between January 2010 to December 2017 that received therapeutic anticoagulation with LMWH that was either less than 0.85 mg/kg/dose of LMWH or greater than or equal to 0.85 mg/kg/dose. Patients 18 years of age and older weighing ≥ 150 kg that received therapeutic anticoagulation with LMWH and had an appropriately drawn anti-Xa level will be included for analysis. Patients with a creatinine clearance < 30 mL/min or on hemodialysis will be excluded. The primary endpoint of this study is compare the mean anti-Xa levels in patients dosed with LMWH greater than or equal to 0.85mg/kg/dose versus those dosed less than 0.85mg/kg/dose. Secondary endpoints will include rates of bleeding and thrombosis in the respective groups. **Results/Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Describe pharmacokinetic and pharmacodynamic considerations associated with therapeutic enoxaparin dosing in obese patients
Discuss alternative dosing regimens of therapeutic enoxaparin in obese patients and the associated effects on anti-Xa levels

Self Assessment Questions:

Which of the following statements is FALSE regarding the pharmacokinetics of drugs in obese patients:

- A Slightly Liposoluble compounds have little or no change in volume
- B: Obesity is associated with changes in certain circulating proteins t
- C: Highly lipophilic substances show significant decreases in volume
- D: Alterations in cardiac structure and function, as well as a reductor

According to CHEST guidelines, therapeutic anticoagulation with enoxaparin is dosed:

- A 0.75 mg/kg every 12 hours
- B 1 mg/kg every 12 hours
- C 0.85 mg/kg every 12 hours
- D 1 mg/kg every 24 hours

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-471-L01-P

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

IMPLEMENTATION OF A PHARMACIST DIRECTED MEDICATION THERAPY MANAGEMENT SERVICE FOR ORAL CHEMOTHERAPY PATIENTS IN AN OUTPATIENT CANCER CENTER

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Purpose: The purpose of this study is to develop, implement, and evaluate the impact of pharmacist involvement in patients receiving oral chemotherapy with respect to drug-interactions, dosing adjustments based on laboratory parameters and patient adherence. **Methods:** Electronic health records will be used to conduct a retrospective chart review of all oral chemotherapy prescriptions prescribed by oncology physicians at the Creticos Cancer Center from January 1, 2017 through March 31, 2017. All prescriptions will be evaluated for proper indication, dosing, drug-drug interactions, pertinent laboratory parameters, appropriate adjustments based on toxicities, as well as documentation for adherence. A prospective review of adult patients prescribed oral chemotherapy will be conducted from December 15, 2017 through March 15, 2018. Prescriptions will be evaluated for appropriateness. Problems discovered in the prospective arm will be reported to the physician for review. One week following initiation of oral chemotherapy, the pharmacist will follow-up with a phone call to the patient. The patient will be interviewed about indication, dosing, side effects, methods of adherence, and any barriers to treatment. During this call, the patient will receive medication counseling from a pharmacist addressing all pertinent information about their prescription. The patient will be contacted again 28-days after the start of therapy to re-assess understanding of their medication post-pharmacist counseling. Patients receiving oral hormonal chemotherapy will be excluded from the study. Pharmacist interventions that led to a change in home medications or chemotherapy treatment will be documented. Additional information regarding pharmacist time commitment will be collected. Data comparison of historical data versus post-implementation data will be analyzed focusing on the overall impact of pharmacist intervention and patient adherence. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the oral chemotherapy practice standards for patient education set forth by the American Society of Clinical Oncology and the Oncology Nursing Society.

Identify the main areas in the oral chemotherapy prescribing process where pharmacists can make the most impact.

Self Assessment Questions:

Practice standards for patient education set forth the American Society of Clinical Oncology and the Oncology Nursing Society

- A Only verbal education should be provided
- B: Education does not need to provide a plan for missed doses
- C: Patient feedback is unnecessary during education
- D: Patients should be provided with written education materials

Which stage of the oral chemotherapy prescribing process contains the most medication errors?

- A Monitoring
- B Ordering
- C Dispensing
- D Administration

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-749-L04-P

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

AN EVALUATION OF PRESCRIBING PATTERNS AT THE JESSE BROWN VETERANS AFFAIRS MEDICAL CENTER (JBVAMC) OF HYDROCODONE/ACETAMINOPHEN AFTER RESCHEDULING BY THE DRUG ENFORCEMENT AGENCY (DEA)

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Purpose: Overprescribing of opioids has led to misuse, addiction, and death, and is undoubtedly correlated to the use of illicit opioids. To address this crisis, hydrocodone combination products were rescheduled by the DEA from Schedule III to Schedule II on October 6, 2014. Although evidence shows opioids may benefit patients acutely, there is limited evidence for using opioids to treat pain chronically. There are known risks associated with chronic opioid use including cognitive dysfunction, cardiovascular events, fractures, and hormonal dysregulation. The purpose of this study is to determine whether prescribing patterns changed in the primary care setting and its subsequent impact on chronic pain management at the JBVAMC as a result of rescheduling hydrocodone/acetaminophen. **Methods:** The study will be a retrospective, electronic chart review of patients who were prescribed a total cumulative daily supply of greater than or equal to 90 days of hydrocodone/acetaminophen between April 6, 2014 through October 6, 2014. Subjects who received a prescription during the study period will be identified from a report generated from the Computerized Patient Record System. The primary endpoint is the number of patients maintained on hydrocodone/acetaminophen versus the number of patients who were discontinued, tapered, tapered and switched to other pharmacologic therapy, and/or initiated on nonpharmacologic therapy after the rescheduling date. The secondary endpoints include the average change in numeric rating scale pain scores, change in number of opioid and non-opioid medications prescribed, and change in number of nonpharmacologic therapies utilized pre- and post-scheduling change. For patients that were tapered and/or switched to another opioid or tramadol, the average change in morphine equivalent daily dose will be calculated pre- and post-scheduling change. Documented adverse drug reactions to hydrocodone/acetaminophen will be evaluated as well. Results and conclusion will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define chronic pain according to the Centers for Disease Control and Prevention (CDC) "Guideline for Prescribing Opioids for Chronic Pain" and Veterans Affairs/Department of Defense (VA/DoD) "Clinical Practice Guideline for Opioid Therapy for Chronic Pain".

Recall the maximum morphine equivalent daily dose (MEDD) recommended per the CDC and VA/DoD guidelines for treating chronic non-cancer pain.

Self Assessment Questions:

According to the CDC and VA/DoD chronic opioid therapy guidelines, chronic pain is defined as pain lasting greater than or equal to _____?

- A: 2 months
- B: 3 months
- C: 6 months
- D: 9 months

Because the risk for opioid use disorder and overdose starts at any dose and increases in a dose-dependent manner, the CDC and VA/DoD chronic opioid therapy guidelines recommend against opioid doses of

- A: 50 mg
- B: 75 mg
- C: 90 mg
- D: 100 mg

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-472-L01-P

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

IDENTIFYING RISK FACTORS FOR ARRHYTHMIAS DURING HEMATOPOIETIC STEM CELL TRANSPLANTS: KEEP THE RHYTHM

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Introduction: The transplant team at Advocate Lutheran General Hospital (ALGH) no longer requires telemetry monitoring in all patients during admission for hematopoietic stem cell transplants (HSCT) unless clinically indicated. This decision was due to the perception of over utilization and increased cost associated with telemetry monitoring. Recently new-onset arrhythmias have been reported in patients during HSCT admission at ALGH. A literature review was conducted to determine risk factors associated with new-onset arrhythmias during HSCT. New-onset arrhythmias have been reported to be associated with longer median hospital stay, increased risk of intensive care unit admission, and increased risk of death within one year after completing HSCT therapy. We hope to identify select patients at ALGH at high risk of developing cardiac arrhythmias who may need telemetry monitoring during HSCT. **Statement of Purpose:** To identify the incidence and risk factors associated with new-onset arrhythmias of during HSCTs at ALGH in order to develop telemetry monitoring criteria for patients at risk of new-onset arrhythmias. **Statement of Method:** We conducted a single-center, retrospective chart review. Patients included were ≥ 18 years of age and admitted for autologous or allogeneic HSCT at ALGH between January 2015 and December 2017. Type of arrhythmias (i.e. atrial fibrillation, atrial flutter, supraventricular tachycardia), patient demographics, past medical history, home medications, diagnosis, conditioning regimen, diagnostic data, past surgical history, and laboratory values were collected for analysis. A regression analysis is to be conducted to determine risk factors associated with documented new-onset arrhythmias. **Results/Conclusion:** To date, 45 (37.2%) out of the 121 patient charts reviewed reported a new-onset arrhythmia during their admission. Data collection is underway. A full report of the results and conclusion will be presented at the conference.

Learning Objectives:

Name three common new-onset arrhythmias associated with autologous and allogeneic hematopoietic stem cell transplants

Identify patient characteristics that increase the risk of developing new-onset arrhythmias during hematopoietic stem cell transplants.

Self Assessment Questions:

The incidence of arrhythmias has been reported to range between 9-27% during hematopoietic stem cell transplants. Which of the following arrhythmias have been found to occur most frequently?

- A: Ventricular tachycardia
- B: Second-degree (AV) heart block (Mobitz II)
- C: Bradycardia
- D: Atrial fibrillation

A 75 year-old male with a diagnosis of Hodgkin's Lymphoma is admitted to begin the conditioning regimen prior to an allogeneic stem cell transplant. This past medical history includes coronary artery

- A: 1
- B: 2
- C: 3
- D: The patient has no risk factors

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-473-L01-P

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

EVALUATION OF THE EFFECT OF A PHARMACIST INTERVENTION ON THE TIME TO URINE ALKALINIZATION FOR HIGH-DOSE METHOTREXATE ADMINISTRATION

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Purpose: Hospital admission is required for administration of high-dose methotrexate therapy ($\geq 1,000$ mg/m²) to ensure adequate drug clearance and prevent toxicity. Methotrexate clearance and hospital discharge may be delayed by inadequate urinary alkalization and medication interactions. Pre-admission pharmacist intervention could help identify potential medication interactions and reinforce adherence to the outpatient sodium bicarbonate regimen to expedite the administration of methotrexate with the goal of decreased length of stay. The purpose of this project was to implement a standardized pre-admission pharmacist intervention to improve the time to urinary alkalization to facilitate earlier administration of high-dose methotrexate. The primary outcome was time to urine alkalization defined as time from admission to the fourth consecutive urine pH ≥ 7.5 . Secondary endpoints include time to methotrexate administration, time to methotrexate clearance, incidence of acute kidney injury, and length of stay. **Methods:** The project utilized a quasi-experimental design to evaluate pre- and post-intervention groups for those patients who received high-dose methotrexate as an elective chemotherapy admission. The retrospective arm included patients from July 31, 2016 to July 31, 2017 while the prospective arm started November 2017. The intervention consisted of the inpatient oncology pharmacist contacting the patients prior to admission to reinforce the proper administration of sodium bicarbonate and screen for clinically significant medication interactions. Additional information that was collected included patient demographics, cancer type, chemotherapy regimen, time to administration of high-dose methotrexate, time to clearance of high-dose methotrexate, and time to discharge. The pre- and post-intervention arms will be compared using the appropriate bivariate test depending on the normality and continuity of the data. **Results and Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the toxicities associated with high dose methotrexate.
Identify clinically significant interventions that a pharmacist can perform to ensure adequate methotrexate clearance.

Self Assessment Questions:

Which of the following is a toxicity associated with high dose methotrexate?

- A: Myelosuppression
- B: QT prolongation
- C: Renal insufficiency
- D: A and C

Which of the following may a pharmacist do to help ensure adequate methotrexate clearance?

- A: Screen for medication interactions prior to admission
- B: Encourage adequate oral hydration prior to admission
- C: Provide education on the proper administration of pre admission s
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-474-L01-P

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

IMPLEMENTATION AND EVALUATION OF PHARMACIST-PROVIDED INJECTIONS IN THE OUTPATIENT PHARMACY DRIVEN BY PRIVATE PAYER SITE-OF-CARE POLICIES.

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Purpose: Patients may receive medications in various health-system settings, also known as "sites of care." Charge formulas and reimbursement amounts for the same treatment vary widely depending on the site of care. These variances are among the greatest in high-cost specialty injectable medications. Insurers are implementing policies restricting specific high cost injectable medications to non-hospital-based settings. Affected patients at The Ohio State University Wexner Medical Center (OSUWMC) are receiving these injections through their pharmacy benefit or being referred to non-hospital-based sites of care. Pharmacy services can provide a mitigating strategy to improve continuity of care for these patients. Through a collaborative practice agreement, pharmacists will begin to provide specific injections at the OSU Outpatient Pharmacy located in the lobby of the main hospital. This service strives to enhance continuity of care for patients, increase patient satisfaction, and maintain revenue associated with these medications. The primary objective of this study is to evaluate the patient volume and financial outcomes of this pharmacist-provided injection service. The secondary objective is to measure and analyze patient satisfaction with the injection service provided by pharmacists. **Methods:** A voluntary patient satisfaction survey will be conducted for patients receiving filgrastim and pegfilgrastim injections at the OSU Outpatient Pharmacy between February 1, 2018 and May 31, 2018. The number of patients retained at OSUWMC for restricted injections will be measured. Cost data of restricted injections will be analyzed through prescription claims data and profit margin and total revenue generated by retained prescriptions will be calculated. **Results and Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference in April 2018.

Learning Objectives:

Review factors influencing payer site-of-care restrictions
Discuss the impact of site-of-care-restrictions on patients and the health system

Self Assessment Questions:

Which of the following is the main driver for site-of-care policies?

- A: Private payers can provide better care for their patients.
- B: Patients receive better care though home healthcare than hospital
- C: The cost of care is typically higher in the hospital-based outpatient
- D: None of the above.

Which of the following is NOT a concern for patient's receiving injectable medications through a specialty pharmacy?

- A: Improper medication storage prior to injection.
- B: Patients injecting the medication at an incorrect injection site.
- C: Patients injecting at the wrong scheduled time.
- D: Patients receive their injectable medication at the right scheduled t

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-750-L04-P

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

EFFECT OF CLINICAL GUIDELINE IMPLEMENTATION ON USE OF KETAMINE FOR ACUTE AGITATION, PAIN, AND PROCEDURAL SEDATION IN THE EMERGENCY DEPARTMENT

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Purpose: Ketamine is a dissociative agent that is frequently utilized in the emergency department setting for its ability to provide analgesia, amnesia, and sedation while maintaining cardiorespiratory stability. Variability in ketamine dosing has been observed in practice and thus a need for an evidence-based clinical guideline has been identified in the emergency department at the study institution. The primary objective of this study is to assess rates of appropriate utilization of ketamine for acute agitation, pain, and procedural sedation in the emergency department pre- and post-implementation of an evidence-based clinical guideline. The secondary outcome evaluated will be rate of reported adverse effects of ketamine administration. Evaluation of study outcomes will help determine if pharmacist intervention through education and development of a ketamine clinical guideline will aid in increasing appropriate and safe use of ketamine in the emergency department. **Methods:** This is a retrospective followed by a prospective chart review. The study will review patients that received ketamine in the emergency department for acute agitation, pain, and procedural sedation from May 1st, 2017 through April 1st, 2018. A clinical guideline for ketamine use will be implemented on February 1, 2018, along with provider education on guideline content prior to the date of implementation. Patient data will be collected prior to and post-implementation of the clinical guideline to allow a comparison. Data collected will include patient age, patient weight, indication for ketamine, dose of ketamine administered, comorbidities, route of administration, co-administration of adjunctive agents, and reported side effects. **Results/conclusion:** Data collection and analysis are currently in progress. Results and conclusion will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Select the most appropriate dose of ketamine and route of administration based on indication

Discuss appropriate management of common adverse effects associated with ketamine administration

Self Assessment Questions:

HM (5'4", 70kg) presents to the ED with complaints of severe headache, nausea, and sensitivity to light. What is the correct initial dose of ketamine and route of administration for treatment of pain?

- A: 17.5 mg IM
- B: 14 mg IV over 2 minutes
- C: 280 mg IM
- D: 70 mg IV over 2 minutes

Which of the following is the most appropriate medication to pre-medicate with in order to manage an anticipated adverse effect of ketamine?

- A: Quetiapine 50 mg PO to prevent dysphoric emergence reaction
- B: Ondansetron 4 mg IV to prevent sialorrhea
- C: Atropine 0.5 mg IV to prevent sialorrhea
- D: Diphenhydramine 25 mg PO to prevent nausea/vomiting

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-475-L01-P

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

EVALUATION OF A BENZODIAZEPINE-OPIOID COMBINATION NEW START REQUEST E-CONSULT SERVICE

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Purpose: The risk of overdose associated with concurrent benzodiazepine and opioid use is widely documented. To promote safer opioid prescribing, the Lexington Veterans Affairs Medical Center implemented a Benzodiazepine-Opioid Combination New Start Request E-Consult to proactively review cases in which chronic dual opioid and benzodiazepine therapy is desired. Through this service, a Clinical Pharmacy Specialist in mental health or pain management determines the appropriateness of simultaneous benzodiazepine and opioid use. The primary aim of this study is to assess the utilization of the e-consult and its effect on benzodiazepine-opioid co-prescribing. Secondly, we aim to review common characteristics of patients for whom this combination therapy is requested. **Methods:** This quality improvement project will utilize chart review. Patients with a Benzodiazepine-Opioid Combination New Start Request E-Consult placed on their behalf during the post-implementation period of June 1, 2017 to December 31, 2017 will be included. To capture patients for whom an e-consult was not placed, any chronic benzodiazepine or opioid user who received a new prescription for an opioid or benzodiazepine during the study period will also be identified. Hospice patients, cancer patients, and those using dual benzodiazepine-opioid therapy for a planned duration of 4 weeks or less will be excluded. The following data will be collected: patient demographics (age, race, sex), pertinent medical conditions (chronic obstructive pulmonary disease, asthma, sleep apnea, substance abuse disorder, mental illness), prescribing services, drug, indication, service of the consulting prescriber, e-consult approval or disapproval, reasoning behind disapproved e-consults, alternative therapy recommendations made by pharmacists, and drug therapy prescribed following e-consult disapproval. Dual benzodiazepine and opioid use in the study period will be compared with similar data from a pre-implementation period to determine the e-consult's effect on benzodiazepine and opioid co-prescribing. **Results:** Data collection and analysis are ongoing and will be presented at the 2018 Great Lakes

Learning Objectives:

Recall common risk factors for opioid overdose

List common drug classes implicated in opioid overdose deaths

Self Assessment Questions:

Which of the following patients is at the lowest risk for drug overdose?

- A: A 90 year-old male with stage III chronic kidney disease
- B: A 59 year-old female with history of myocardial infarction
- C: A 47 year-old female taking 120 morphine equivalents daily
- D: A 32 year-old male with past admission to a substance abuse rehab

Which of the following statements is correct?

- A: Drug overdose rates have risen slowly over the past 10 years
- B: Deaths from drug overdose occur equally in the veteran and non-veteran
- C: Chronic opioid use has been shown to improve function and quality of life
- D: Benzodiazepines are the most common pharmaceutical to be involved in overdose

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-877-L05-P

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

RENAL EFFECTS OF VASOPRESSIN ON CIRRHOTIC PATIENTS WITH SEPTIC SHOCK

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Background: Circulatory changes during septic shock promote vasodilatory effects with an increase in serum catecholamine concentrations and activation of the renin-angiotensin-aldosterone system (RAAS). The most progressive prerenal acute kidney injury (AKI) in cirrhotics is the development of hepatorenal syndrome (HRS). In the largest vasopressin sepsis study to date (VANISH), vasopressin decreased catecholamine requirements yet did not improve renal outcomes. This study, however included <5% cirrhotic patients, a population known to benefit from vasopressin analogs in AKI. The aim of the current study is to evaluate the potential benefit of vasopressin on renal outcomes in cirrhotic patients with septic shock. **Methods:** This was an IRB-approved, retrospective cohort at the University of Kentucky Medical Center from 2011 to 2017. Adult patients admitted to the medical ICU with diagnosis of cirrhosis and septic shock were included. Patients were excluded for any of the following reasons: admission from outside hospitals, previous vasopressin during admission, death within 24 hours, and a vasopressor duration of less than 12 hours. The primary outcome was number of kidney-failure free days (KFFD) when comparing the addition of vasopressin to norepinephrine versus norepinephrine alone for hemodynamic support. Kidney function was assessed using serum creatinine and staged using Kidney Disease: Improving Global Outcomes (KDIGO) scores. **Results:** Preliminarily, there were no differences in gender, age, Charlson Index, or incidence of ESRD at baseline. Patients receiving vasopressin had a higher MELD (27.7 vs. 30.8; $p=0.02$) and a higher SOFA score (14 vs. 15; $p=0.002$) upon admission. Patients with previous diagnosis of end stage renal disease (ESRD) comprised 16% of the patients. **Conclusion:** To be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the impact of vasopressin analogues on renal function in patients with cirrhosis

Explain the correlation between renal dysfunction and the vasodilatory effect that occurs in both patients with cirrhosis and septic shock

Self Assessment Questions:

According to recent studies, what impact does vasopressin have on renal function compared to catecholamines alone in septic shock?

- A: Increased Urine Output
- B: Decreased Urine Output
- C: Decreased Creatinine Clearance
- D: Increased needs for renal replacement therapy

What vasodilatory effects occur during septic shock and cirrhosis?

- A: Decreased RAAS activation
- B: Decrease in endogenous catecholamines
- C: Decrease in serum vasopressin
- D: Decreased sensitivity of vasopressin receptors

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-476-L01-P

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

EVALUATION OF URINARY TRACT INFECTION SCREENING AT A 300-PARTICIPANT PROGRAM FOR ALL-INCLUSIVE CARE FOR THE ELDERLY (PACE)

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Background: According to the Infectious Diseases Society of America 2005 asymptomatic bacteriuria guidelines, a urinalysis (UA) should not be ordered unless a patient exhibits symptoms of a urinary tract infection (UTI). In the geriatric population, UTIs may present as mental status changes or confusion, which can make differentiating UTIs from other diagnoses difficult. Two PACE facilities in West Michigan order urinalyses based on symptom criteria to facilitate appropriate ordering; however, the criteria used did not match the most recent guideline recommendations as they included non-specific symptoms such as cloudy or foul-smelling urine and new onset confusion or delirium in participants without a catheter. **Purpose:** To develop a guideline-based urinalysis order form for use at the PACE facilities. **Methods:** Baseline data was collected in November 2017. Subsequently, a new guideline-based UA order form was created and physicians and nursing staff were educated on how to properly utilize the urinalysis order form. After adoption of the new form in January 2018, a retrospective review was conducted. For each urinalysis ordered, the following data regarding the episode was collected: signs/symptoms of UTI, urinalysis results, culture result (if applicable) and antibiotic(s) received (if applicable). The primary endpoint was the percent of UAs resulting in a positive urine culture. Secondary endpoints included the number of UAs ordered per month, percent of UAs with documented symptoms, and percent of UAs ordered in compliance with the guideline-based symptom criteria. **Results:** In progress **Conclusion:** In progress

Learning Objectives:

Explain the differences in urinary tract infection symptom criteria for patients with and without an indwelling catheter

Identify techniques which encourage appropriate ordering of urinalyses

Self Assessment Questions:

According to the Centers for Disease Control and Prevention, which of the following is NOT a symptom criterion for a suspected urinary tract infection for patients without an indwelling catheter?

- A: Confusion
- B: Suprapubic pain
- C: Urinary urgency
- D: Dysuria

Which of the following techniques may help encourage appropriate ordering of urinalyses?

- A: Utilizing a urinalysis order form with guideline-based symptom criteria
- B: Educating providers, nurses, and other members of the health care team
- C: Providing weekly audit and feedback to providers on the appropriateness of urinalyses
- D: All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-477-L01-P

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

IMPACT OF ONGOING THERAPEUTIC COMPETENCY TRAINING TO STAFF MEMBERS IN A HEALTH SYSTEM BASED SPECIALTY PHARMACY

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Objectives: Specialty Pharmacy is a rapidly evolving field that requires continuous training to ensure that staff is prepared to serve patients. The objective of this study is to develop and administer annual ongoing therapeutic competency training at an accredited health system based specialty pharmacy that improves staff proficiency on specialty pharmacy topics. At UI Health Specialty Pharmacy, there is currently no formal ongoing training process for specialty disease states and drugs. Our hypothesis is that completion of mandatory, well designed therapeutic training will improve staff competency and expertise. Completion of training will help to maintain accreditation standards and promote compliance with PBM contracts. **Methods:** New educational training modules will be developed by the principal investigator and administered to 20 staff members. The modules will cover specialty drug and disease state management updates from the previous 12 months for autoimmune disorders, oncology, multiple sclerosis, and infectious disease. Topics include new specialty drug approvals, new or revised treatment guidelines, labeling changes and new indications from the FDA, clinical trials, new safety information, and other information relevant to specialty pharmacy practice. There will be separate modules for pharmacists and technicians. A pre-test assessing baseline knowledge will be administered. After completion of the training, an identical post-test will be administered. The tests will consist of fill-in-the-blank and multiple-choice questions. The scores will be compared using descriptive statistics to assess proficiency achieved from the training experience. **Results:** Research in progress. Ten medication trainings and one disease-state training have been completed at this time. **Implications/Conclusions:** It is expected that post-test scores will improve significantly compared to the pre-test scores. Effective ongoing therapeutic competency training will also empower staff members in providing comprehensive care to our patients. This may enhance staff problem-solving and clinical expertise. This ongoing training approach may be replicated in other specialty pharmacies.

Learning Objectives:

Describe ways that ongoing training can be incorporated in a health system based specialty pharmacy
Recognize the benefits of implementing ongoing training at a health system based specialty pharmacy

Self Assessment Questions:

All of the following are acceptable methods of ongoing training for specialty pharmacy staff except:

- A: Mandatory initial training
- B: Encouraging staff to attend CE lectures
- C: Medication and disease state updates presented at staff meetings
- D: Recruiting clinicians from clinics to provide updates in therapy

What are examples of the benefits of ongoing training?

- A: Improve staff competency
- B: Meet accreditation standards
- C: The training approach can be replicated at other specialty pharmacies
- D: All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-478-L04-P

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

TIMEOUT! HOW IS THE ANTIBIOTIC TIMEOUT IMPLEMENTED AND DOES IT IMPACT ANTIMICROBIAL USE?

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Purpose: An antibiotic timeout (ATO) is an antimicrobial stewardship initiative recognized by the Centers for Disease Control and Prevention as a method for improving the utilization of antibiotics; however, the evidence to date regarding its impact is lacking. Furthermore, there is little guidance available on how to best implement an ATO within an inpatient healthcare institution. The purpose of this study is to characterize current ATO strategies and to assess the impact of an antibiotic timeout on antibiotic utilization in a variety of hospitals. **Methods:** A point prevalence study was designed in conjunction with the Vizient™ Antimicrobial Stewardship Network Taskforce and participants were recruited through the Vizient™ network. Demographic information and descriptions of institutional antimicrobial stewardship activities were collected from participating institutions through an online survey. Antibiotic data for each participating institution was collected as a single snapshot within a 5-week window and submitted to a REDCap® database. Data was analyzed with descriptive statistics and comparative tests to describe current practices and determine impact of the timeout on antibiotic utilization. **Preliminary Results:** Demographic information was collected from 73 institutions (35 academic medical centers, 35 community hospitals, 2 critical access hospitals, and 1 rehabilitation hospital); 61 of these participants submitted de-identified antibiotic utilization data for 6184 patients. Antibiotic timeouts were conducted in 818 of these patient encounters. The timeouts were implemented by 17 unique participating sites primarily as alerts incorporated in the electronic medical record directed to either the prescriber or decentralized pharmacist and were triggered 48 to 72 hours after initiation of antibiotic therapy. Additional data analysis is ongoing regarding the timeout's impact on directed antibiotic therapy. **Conclusions:** Antibiotic utilization and demographic data and was collected from a heterogeneous group of inpatient medical centers. This information is being used to describe ATOs and its impact on antibiotic utilization.

Learning Objectives:

Describe the goals and components of an antibiotic timeout
Discuss the available evidence supporting the antibiotic timeout

Self Assessment Questions:

Which of the following organizations currently includes the antibiotic timeout as a condition of participation?

- A: The Joint Commission
- B: The Centers for Disease Control and Prevention
- C: The Centers for Medicare and Medicaid
- D: None of the above; the antibiotic timeout is not specifically required

Which core element from the Centers for Disease Control and Prevention's Core Elements of Hospital Antibiotic Stewardship Program does the antibiotic timeout fulfill?

- A: Leadership commitment
- B: Drug expertise
- C: Action
- D: Education

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-751-L04-P

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

IMPACT OF EMERGENCY DEPARTMENT AND INFECTIOUS DISEASE PHARMACISTS ON THE MANAGEMENT OF ASYMPTOMATIC BACTERIURIA

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Purpose: Excessive antimicrobial use can lead to the development of multi-drug resistant organisms which infect over 2 million people and cause over 23,000 mortalities in the United States per year. An example of unwarranted antimicrobial use is in the treatment of asymptomatic bacteriuria in non-pregnant patients who are not undergoing a genitourinary procedure. At Mercy Health Saint Mary's (MHSM), the infectious disease (ID) pharmacist and emergency department (ED) pharmacists are well-positioned to conduct antimicrobial stewardship, especially regarding asymptomatic bacteriuria. The purpose of this study is to evaluate the impact that pharmacy services have on antimicrobial stewardship, specifically as it relates to the management of asymptomatic bacteriuria in patients discharged from the ED. This project intends to compare the treatment rates of asymptomatic bacteriuria before and after the ID and ED pharmacist services became available at MHSM. **Methods:** This is an interrupted time series looking at three cohorts: before, during early, and during established ED/ID pharmacy services. Included patients are adults with a positive urine culture obtained from the ED. The primary objective of the study is to compare the treatment rates of asymptomatic bacteriuria among the three cohorts. Patients are excluded if they are pregnant, undergoing a genitourinary procedure, unable to verbalize symptoms of a urinary tract infection, have had a recent renal transplant, admitted as an inpatient, or have any symptoms of a urinary tract infection. Outcomes measured on a nominal scale will be assessed using a Chi-square test or Fisher's exact test and those measured on a continuous scale will be assessed using a Student's t-test. Non-normally distributed continuous data will be assessed using the Mann-Whitney U test. Three group comparisons will be conducted using the ANOVA test. **Results/Conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss clinical scenarios in which treatment for asymptomatic bacteriuria is appropriate.

Identify an appropriate, antimicrobial stewardship-focused treatment plan for patients with symptomatic bacteriuria.

Self Assessment Questions:

In which of the following patient populations would treatment of asymptomatic bacteriuria be appropriate?

- A: An 80 year-old male with hematuria
- B: A 28 year-old female who is 20 weeks pregnant
- C: A 5 year-old boy with pyuria
- D: A 50 year-old female with abnormal urine odor

A 19 year-old female with no past medical history arrives to the emergency department complaining of urinary frequency and burning with urination. Her creatinine clearance is 109 mL/min, and she has a

- A: Ciprofloxacin 500mg twice daily for 7 days
- B: Nitrofurantoin 100mg twice daily for 5 days
- C: Cephalexin 500mg daily for 14 days
- D: Sulfamethoxazole-trimethoprim 800mg-160mg daily for 5 days

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-480-L01-P

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

A PHARMACIST-LED EDUCATIONAL INTERVENTION TO INCREASE USAGE OF STATIN MEDICATIONS AMONG PATIENTS WITH DIABETES AGES 40-75

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Purpose: Current guidelines provide strong recommendations for initiation of statin therapy in patients with diabetes aged 40-75 years with or without atherosclerotic cardiovascular disease (ASCVD). Evidence continues to show that statin treatment reduces risk of ASCVD morbidity and mortality, yet the number of patients identified with this gap in therapy remains alarmingly high. Previous studies have shown the impact a community pharmacist can have on this gap when contacting the physician directly. The goal of this study is to assess if a pharmacist-to-patient educational intervention increases prescribing of statin medications among patients with diabetes in this age group. **Methods:** This study was approved by the Ferris State University Institutional Review Board. The Electronic Quality Improvement Platform for Plans & Pharmacies (EQuIPP) performance scores were used to identify HomeTown Pharmacy stores for study inclusion. Nine stores with Statin Use in Persons with Diabetes performance scores below 80% were randomized to one of three treatment arms: standard practice, educational handout, or informational phone call. All patients identified as EQuIPP "outliers" for a given store were allocated to the designated treatment arm. In early 2018, the educational interventions were provided to patients in the experimental groups. After completion of the intervention, patient prescription records were monitored for a statin medication. The primary endpoint is the number of statin prescriptions initiated and/or dispensed within 3 months of intervention. The secondary endpoint is percent change in quarterly EQuIPP scores following intervention. **Results:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the utilization of STAR Ratings and EQuIPP for measuring performance metrics of pharmacies and health insurance plans.

Describe the impact community pharmacists can have in addressing statin therapy for patients with diabetes (recommending, counseling, etc.).

Self Assessment Questions:

Which of the following is a STAR Rating Display Measure currently measured by EQuIPP?

- A: MTM Program Completion Rate for CMR
- B: Medication Adherence for Hypertension (RAS antagonists)
- C: Statin Use in Persons with Diabetes
- D: Drug-Drug Interactions

Which of the following is a reason a patient may be resistant to the initiation of a statin medication?

- A: History of an adverse drug reaction
- B: Normal cholesterol levels
- C: Usage of a non-statin cholesterol-lowering medication
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-479-L01-P

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

ASSESSMENT OF FLUID RESUSCITATION ON TIME TO HEMODYNAMIC STABILITY IN OBESE PATIENTS WITH SEPTIC SHOCK

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Purpose: Early initiation of antibiotics and fluids have shown to improve mortality in septic shock. Current guidelines recommend an initial fluid resuscitation of 30 ml/kg within the first 3 hours of sepsis onset, however the appropriate volume in obese patients has yet to be elucidated. The purpose of this study will be to compare the volume of initial fluid resuscitation on clinical outcomes in obese patients with septic shock. **Methods:** This multicenter, retrospective, cohort study will compare obese patients receiving < 30 ml/kg to ≥ 30 ml/kg of initial fluid resuscitation within the first 3 hours of sepsis onset. All obese patients admitted to a medical intensive care unit at OSUWMC or Methodist Le Bonheur Healthcare Hospitals between the dates of January 2012 through September 2017 with septic shock requiring vasopressor support will be included. Patients will be excluded if they are < 18 years of age, pregnant, incarcerated, transferred from an outside hospital, received advanced cardiac life support in the first 48 hours, or have acute hepatic failure or decompensated cirrhosis requiring albumin for resuscitation. The primary outcome will be time to hemodynamic stability, defined as the start of vasopressor support to discontinuation of vasopressor support for 24 continuous hours. Secondary outcomes will include ventilator free days, initial fluid administered in the first 3 hours, total and net fluid administered in the first 24, 48, and 72 hours, time to lactate normalization, diuretic use, the development of acute kidney injury in first 7 days, length of stay, and hospital mortality. A sample size of 120 patients in each group will be used to provide 80% power to detect a cause-specific hazard ratio of 1.6, assuming a 30% mortality rate in each group. **Results/Conclusion:** Final data analysis is ongoing and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the differences in the amount of initial fluid resuscitation given to obese versus nonobese patients in septic shock based on current literature

Identify risk factors that are associated with worse clinical outcomes in obese patients with septic shock

Self Assessment Questions:

Patient LO is a 65 year old male who is admitted to the emergency department with a chief complaint of fever and shortness of breath. His past medical history includes hyperlipidemia, obesity (BMI 45

- A 3,000 ml
- B: 4,500 ml
- C: 2,500 ml
- D: None of the above

Which patient risk factors can lead to an increase in number of days on mechanical ventilation?

- A Obesity
- B Obstructive sleep apnea
- C Chronic obstructive pulmonary disease
- D All the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-481-L01-P

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

EVALUATION OF OUTCOMES IN TRAUMA PATIENTS IN RELATION TO PARALYTIC ADMINISTRATION AND TIMING DURING RAPID SEQUENCE INTUBATION IN THE EMERGENCY DEPARTMENT

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Purpose: The process of rapid sequence intubation (RSI) has been shown to reduce intubation attempts and complications, but outcomes related to timing of induction agent and paralytic administration have not been evaluated. Providers may elect to omit or delay paralytic administration when a difficult airway is anticipated to avoid inability to ventilate the patient if intubation is unsuccessful. Delaying paralytic administration may prolong the desaturation period following sedation and reduce time to perform laryngoscopy safely. The purpose of this study is to determine if omission or delay in paralytic administration affects intubation success and complications compared to traditional RSI in trauma patients. **Methods:** This was a single-center, retrospective cohort study evaluating trauma patients who underwent emergent intubation in the emergency department from January 1, 2015 to May 31, 2017. All trauma patients 18 years of age or older who underwent intubation will be included. Patients will be excluded if cardiac arrest occurred prior to arrival, blind nasal intubation was performed, or intubation was performed by services other than emergency medicine. The primary outcome is time to successful intubation using traditional RSI compared to non-traditional RSI. Traditional RSI is defined as administration of paralytic immediately (less than one minute) following induction agent. Non-traditional RSI is defined as delay in paralytic administration (greater than or equal to one minute) or use of induction agent only. Secondary endpoints include complications related to intubation, in-hospital mortality, and intensive care unit length of stay. Complications related to intubation are defined as hypotension (systolic blood pressure less than 90 mmHg), hypoxemia (oxygen saturation less than 90 percent), aspiration, esophageal intubation with delayed recognition, main stem bronchial intubation, and cardiac arrest. Data will be analyzed using a time-to-event analysis, descriptive statistics, Chi-square tests, and logistic regression. **Results/Conclusions:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the medication classes used to facilitate rapid sequence intubation.

List benefits associated with rapid sequence intubation compared to sedation-only intubations.

Self Assessment Questions:

Which of the following agents are traditionally used to facilitate rapid sequence intubation in the emergency department?

- A Sedative agent only
- B: Paralytic agent only
- C: Both a sedative and a paralytic agent
- D: No medication therapy is required

Literature evaluating rapid sequence intubation (RSI) shows what benefits compared to using sedation alone?

- A RSI has been associated with lower rates of aspiration.
- B Higher rates of hypoxemia have been associated with sedation-only
- C Higher success rates on first intubation attempt have been associated
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-482-L01-P

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

CONTINUOUS INFUSION KETAMINE ADJUNCT TO PROPOFOL FOR DIFFICULT TO SEDATE TRAUMA INTENSIVE CARE PATIENTS REQUIRING MECHANICAL VENTILATION

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The 2013 American College of Critical Care medicine guidelines for Pain, Agitation, and Delirium (PAD) recommend various strategies for achieving adequate sedation and decreasing the occurrence of undertreated pain and agitation. Achieving and maintaining adequate analgesia and sedation is a fundamental aspect of care in the ICU. The drugs commonly used for sedation in the ICU include propofol, dexmedetomidine and benzodiazepines. Long term infusion with these sedatives are associated with hemodynamic effects, increased incidence of delirium, and increased risk of propofol related infusion syndrome. Ketamine is a unique sedative and analgesic agent with reported properties of not producing significant respiratory depression, preserving spontaneous respiratory reflexes, and favorable hemodynamic effects. Ketamine use has been rarely studied in the difficult to sedate trauma intensive care patients. This retrospective chart review describes our institutional experience using continuous infusion ketamine adjunct to propofol. An informatics query of patients with an injury severity score (ISS) of nine or greater and who also received continuous infusion ketamine adjunct to propofol from 9/1/2016 to 9/30/2017 were included (N=11). The majority of the patients were admitted for motor vehicle crash with blunt force trauma. Five patients (45%) suffered from traumatic brain injury. Median duration of ketamine infusion was 9.5 days. Median minimum and maximum infusion rates were 0.22 mg/kg/hr and 0.71 mg/kg/hr. The maximum dose used was 1.2 mg/kg/hr. Median maximum systolic blood pressure, diastolic blood pressure and heart rate post ketamine were 113 mmHg, 73 mmHg, and 87. No patients had the ketamine infusion discontinued secondary to tachycardia or hypertension. Overall, the dose of propofol was decreased post ketamine infusion. Ten patients had decreases in concomitant sedatives and analgesic doses. Continuous infusion of ketamine adjunct to other sedatives and analgesics appear to be safe to use in mechanically ventilated trauma intensive care unit patients.

Learning Objectives:

Describe potential benefits of continuous infusion ketamine adjunct to other sedatives and analgesics in difficult to sedate mechanically ventilated trauma patients in the ICU.

Review appropriate management and assessment of adequate sedation and analgesia in mechanically ventilated ICU patients.

Self Assessment Questions:

What is a potential benefit of ketamine adjunct to other sedatives and analgesics over other ICU sedatives for mechanically ventilated patients

- A: Reported to not produce significant respiratory depression, preserve
- B: Proposed to negate adverse events of propofol such as hypotension
- C: Emergence reactions leading to hallucinations.
- D: A and B

The 2013 SCCM guidelines on pain, agitation and delirium recommend the following agents over benzodiazepines in order to improve outcomes in mechanically ventilated ICU patients?

- A: Dexmedetomidine
- B: Ketamine
- C: Propofol
- D: B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-483-L01-P

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

IMPACT OF OHIO'S LEGISLATION TO PREVENT DIVERSION OF OPIOIDS IN HOSPICE PROGRAMS

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Background: Most hospice patients are prescribed opioids in end of life, oftentimes resulting in unused opioids after death. Proper disposal of opioids may be a critical factor in reducing diversion. Under Ohio Revised Code (ORC) 3712.062, all Ohio-licensed hospice programs providing hospice care within the patient's home are required to establish a written policy indicating procedures for prevention of opioid diversion. The legislation specifies that opioid disposal must be conducted or witnessed by, and documented by, a hospice employee at time of death or when the opioids are no longer needed. The purpose of this study is to determine the impact of ORC 3712.062 on hospice programs' policies and procedures to prevent opioid diversion in the home. Methods: A 35-question electronic survey was distributed to all directors of Ohio-licensed hospices to assess the percentage of programs with a written policy in place for disposal of opioids. Additionally, a compliance score was calculated based on percentage of positive responses to eight survey questions directly assessing hospice compliance with legislation components. Two-sided Fisher's exact tests were conducted to assess association between study outcomes and contributing covariates such as hospice profit status, size, and setting. Results: Of 132 distributed surveys, 52 were completed (39.4%). All survey respondents reported having a written policy in place; 98% of respondents provide this policy in written format during the admission process. A 95.5% average compliance score was calculated with the largest disparity occurring with timing of opioid disposal. While ORC 3712.062 requires opioid disposal immediately at the time opioids are deemed no longer needed, only 84% of respondents report disposing opioids immediately upon discontinuation.

Conclusion: The study results showed a high compliance rate among hospice programs indicating this regulation is manageable to meet. Further studies are needed to determine if such legislation can directly reduce opioid diversion.

Learning Objectives:

Discuss hospice program requirements under Ohio Revised Code (ORC) 3712.062: Policies to prevent diversion of opioids in hospice care programs

Identify recommended methods for disposal of opioids that are relinquished or no longer needed

Self Assessment Questions:

Under Ohio Revised Code (ORC) 3712.062, at what time are hospice programs required to administer a written policy to the patient/patient's family indicating procedures for opioid disposal to prevent diversion?

- A: Before providing hospice care and services
- B: After admission to hospice program
- C: When an opioid is discontinued
- D: At the time of patient's death

Which of the following is an acceptable method for opioid disposal by ultimate users, according to the US Drug Enforcement Administration (DEA)?

- A: Return to prescriber or pharmacy
- B: Mix in an undesirable substance (e.g., used kitty litter, coffee grounds)
- C: DEA-designated drug take-back program (e.g., drop box, drug take-back)
- D: B or C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-681-L03-P

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

RAPID IDENTIFICATION OF BLOODSTREAM INFECTIONS COMBINED WITH RAPID PHARMACY NOTIFICATION AND TREATMENT IN A COMMUNITY HOSPITAL

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Purpose: Rapid diagnostics for bloodstream infections have been shown to improve patient outcomes. Our institution has implemented a rapid blood culture identification (BCID) system with Gram-Positive (BC-GP) and Gram-Negative (BC-GN) identification panels. This system will be utilized in combination with rapid notification to pharmacy to promote appropriate antibiotic stewardship interventions. This proactive, stewardship-focused approach will be used to evaluate effects on antimicrobial therapy-related outcomes in patients with bloodstream infections. The primary objectives of this study are the difference in time to organism identification and time to optimal antibiotics from culture draw between pre and post-intervention. The secondary objectives are the difference in time to pharmacy intervention, time on broad spectrum antibiotics, and time on multiple antibiotics. **Methods:** A pre-post quasi-experimental study will be conducted to assess the impact of a rapid BCID system with pharmacy driven interventions in patients with bloodstream infections. At our institution, the laboratory department performs continuous monitoring for positive blood cultures. In both the pre- and post-intervention period, laboratory staff perform a Gram stain and call results to the bedside nurse for all positive blood cultures. In the pre-intervention period, pharmacy reviewed culture data passively and made recommendations as appropriate, based on the pharmacist's discretion. In the post-intervention period, rapid BCID is performed continuously and results are called to a pharmacist around the clock. Pharmacists assess current antibiotic therapy and call the provider with appropriate recommendations for antibiotic therapy optimization based on a standardized protocol approved by the local antimicrobial stewardship team. Necessary escalations are recommended 24 hours per day; de-escalation recommendations are made from 8 A.M. – 7 P.M. to maximize institution resources. **Results and Conclusions:** Preliminary results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the potential benefits of a rapid blood culture identification system paired with pharmacy intervention
Discuss interventions that pharmacists may make from information provided by a rapid blood culture identification system as they relate to antimicrobial stewardship.

Self Assessment Questions:

Which of the following is a benefit of a rapid blood culture identification system paired with pharmacy intervention?
A: Patients receive multiple antibiotics for an extended period of time
B: Patients receive less broad spectrum antibiotics
C: The costs associated with care increases
D: The amount of contaminants that receive treatment increases

Which of the following is a stewardship intervention that pharmacists may make from information provided by a rapid blood culture identification system?
A: Escalation to carbapenem therapy in a patient with a CTX-M positive
B: Continuation of vancomycin therapy in patients with a mecA negative
C: De-escalation to nafcillin in a patient with a mecA positive Staphylococcus aureus
D: No changes should be recommended based on results of a rapid blood culture

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-484-L01-P

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

AN EVALUATION OF PATIENT ACCESS AND SATISFACTION FOR VENOUS THROMBOEMBOLISM DISCHARGES FROM THE EMERGENCY DEPARTMENT

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Purpose: Patients with low risk of complications from deep vein thrombosis (DVT) have been managed on a widespread outpatient basis for some time. More recently, a new practice movement has evolved where low risk pulmonary embolism (PE) patients are also managed as outpatients. Considering the incidence of venous thromboembolism (VTE) in the U.S. is projected to double from approximately 950,000 patients in 2006 to 1.82 million in 2050, there is a clear need to ensure patients are not experiencing medication or follow-up access issues after discharge from emergency departments (EDs). The aim of this study was therefore to evaluate patient access to anticoagulation therapy and follow-up arrangements upon discharge from the ED with an acute diagnosis of VTE. **Methods:** This was a single-center, multi-campus quality assessment study in two EDs. Patients > 18 years discharged with an acute VTE diagnosis as well as new anticoagulation therapy were included. Patients were excluded if on current anticoagulation therapy at the time of ED encounter. Patients received a phone call at 72 hours post discharge and asked series of study questions. After completion of the patient phone call, the community pharmacy was called to obtain the date/time the patient picked up the prescription. The primary outcome was time (hours) from ED discharge to anticoagulant prescription pickup. Secondary outcomes were time (hours) from ED anticoagulant dose to outpatient anticoagulant pickup, time (hours) from ED anticoagulant dose to outpatient anticoagulant administration by patient, the rate and characteristics of anticoagulant education in the ED, and the rate of adherence with follow-up arrangements including location (anticoagulant clinic vs primary care provider). Patient satisfaction outcomes were measured in Likert-Scale for helpfulness of anticoagulant education, level of ease to understand the follow-up arrangements, and convenience of discharge prescription process. **Results and Conclusions:** Data collection is ongoing and results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss advantages and disadvantages of discharging acute VTE patients from the ED for outpatient management
Describe common reasons of medication access issues/delays after discharge from the ED with an acute VTE diagnosis

Self Assessment Questions:

What are some of the necessary factors for successful outpatient management of VTEs?
A: Education and counseling on the discharge anticoagulant
B: Affordable access to the anticoagulant
C: Assurance of outpatient follow-up to manage any unexpected complications
D: All of the above

Based upon the presented results, what was the most common medication access issue patients experienced after discharge when attempting to pick up their prescription?

- A: Pharmacy did not have any or full medication in stock
- B: Insurance did not cover the medication
- C: Prescription was electronically prescribed to an incorrect pharmacist
- D: Patient was not aware that medication needed to be filled

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-752-L04-P

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

IMPACT OF PROTON PUMP INHIBITORS ON SUSTAINED VIROLOGIC RESPONSE IN VETERANS TREATED WITH SOFOSBUVIR/VELPATASVIR (PRO-VET)

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Purpose: Chronic Hepatitis C Virus (HCV) is one of the most prevalent infections in the United States. Untreated, HCV can lead to complications including cirrhosis, hepatocellular cancer, and death. Advancement in HCV treatment, including the development of oral direct acting antivirals, has significantly increased sustained virologic response (SVR) rates. Literature suggests velpatasvir absorption may be reduced when administered concomitantly with a proton pump inhibitors (PPI). Phase I and II trials demonstrate only pharmacokinetic evidence on this potential drug-drug interaction. Our study aims to determine the clinical relationship between PPI use and SVR rates in Veterans treated with sofosbuvir/velpatasvir therapy for HCV infection. **Methods:** A retrospective electronic chart review will be conducted to evaluate the impact of PPI use on SVR rates in Veterans treated with sofosbuvir/velpatasvir following Institutional Review Board approval. Data from Veterans Affairs Medical Centers nationwide will be pulled utilizing the VA Information and Computing Infrastructure (VINCI) program. Analysis of the primary endpoint, which is the comparison of SVR rates in Veterans on sofosbuvir/velpatasvir with or without active PPI prescription, will be completed utilizing a logistic regression. Secondary endpoint will examine additional variables that may influence SVR rates including race, presence of cirrhosis, prior treatment, and HCV genotype. The following data will be collected: gender, Body Mass Index (BMI), HCV ribonucleic acid (RNA) at baseline, 4, 12, 24 and 12 weeks after completion of treatment (SVR12), as well as sofosbuvir/velpatasvir and PPI prescribing information including name of therapy, dose, frequency, fill dates, and fill quantities. **Results:** The results of this study are currently pending. **Conclusions:** The conclusions of this study are currently pending

Learning Objectives:

Explain the relationship between SVR and PPI use in Veterans who completed a full course of sofosbuvir/velpatasvir

Describe factors that may impact SVR in Veterans utilizing sofosbuvir/velpatasvir

Self Assessment Questions:

Proton pump inhibitor use in Veterans taking sofosbuvir/velpatasvir may

- A Increase their chance of obtaining SVR.
- B: Decrease their chance of obtaining SVR.
- C: Have no impact on their chance of obtaining SVR.
- D: Eliminate their chance of obtaining SVR.

Which of the following statements is correct?

- A HCV genotype does not impact SVR rates.
- B Veterans with a FIB-4 score >3.25 have higher SVR rates.
- C African Americans may have lower SVR rates than non-African Ar
- D Treatment-experienced patients are easier to treat than treatment-

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-485-L01-P

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

EVALUATION OF A PNEUMONIA ANTIMICROBIAL DURATION RECOMMENDATION GUIDE AT DISCHARGE

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Antimicrobial Stewardship programs are vastly important for preventing the overutilization of antimicrobials. Anecdotally, it has been noted at our institution that many patients are discharged with a prolonged duration of antibiotic therapy compared to the recommendations put forth by guidelines. This study has been created to evaluate this data and to evaluate the implementation of a guide to decrease the duration of antimicrobial use upon discharge for patients with a diagnosis of pneumonia. This study is a retrospective single center cohort that includes two groups: a pre-guide implementation group and a post-guide implementation group. Each of these groups will be studied for four months to obtain a goal sample size of 100 to 150 patients in each group. Patients with a diagnosis of pneumonia will be identified using ICD10 codes. Any interventions made through the use of the outlined guideline recommendations by the pharmacist performing discharge counseling will be documented in the electronic medical record. The rate of compliance with guideline recommendations for the duration of treatment for pneumonia will be assessed as the primary outcome, with secondary outcomes including the differential in duration of therapy in the post-implementation group, cost savings in the post-implementation group, rate of recommendation acceptance in the post-implementation group, and the number of re-admissions with *Clostridium difficile*. Preliminary results within the pre-guide implementation group support the reports of many patients being discharged with prolonged courses of antimicrobials. Data collection and analysis will continue through the conclusion of February, 2018.

Learning Objectives:

State the guideline recommended duration of antimicrobial treatment for pneumonia.

Recognize the impact of a guide at discharge on the duration of antimicrobials that a patient receives for pneumonia.

Self Assessment Questions:

According to guideline recommendations, for how many days should a patient with hospital-associated pneumonia be treated?

- A 5
- B: 7
- C: 10
- D: 14

Which of the following is a reason that a patient with community-acquired pneumonia may receive treatment with antimicrobials for longer than five days?

- A Patient cannot take medications by mouth.
- B Patient has COPD.
- C Not afebrile for 48-72 hours.
- D No immediate improvement seen on imaging.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-753-L04-P

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

ASSESSING MORTALITY OUTCOMES OF BETA-LACTAM-ALLERGIC PATIENTS PRESENTING WITH SEPSIS

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Sepsis is considered a medical emergency that requires prompt initiation of effective antimicrobial therapy to improve clinical outcomes. There is increasing evidence to support the claim that delayed antibiotic therapy results in increased mortality among patients with sepsis or septic shock. Beta-lactam-allergic patients often pose a challenge to clinicians during initial antibiotic selection to ensure the regimen covers the majority of likely pathogens. In this study, we investigate the difference in mortality rates in septic patients who report a beta-lactam allergy and those who report no beta-lactam allergy. This is a retrospective, single-center, cohort study designed to compare the difference in mortality between beta-lactam-allergic patients and non-beta-lactam-allergic patients in the setting of sepsis or septic shock. The study is being conducted at a 433 bed tertiary care, community hospital, in central Kentucky with data gathered from October 1, 2016 through June 30, 2017. Baseline demographics and other markers of disease severity, including age-adjusted Charlson Comorbidity Index and Sequential Organ-Failure Assessment (SOFA) scores, will be used to compare the study cohorts. Secondary outcomes include overall and ICU length of stay, incidence of *C. difficile* and multidrug-resistant organism infections, 30-day readmission, and total cost per case. Allergies that are listed to other classes of antibiotics will also be considered as a potential confounder. 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:

Discuss differences between sepsis, severe sepsis, and septic shock according to CMS and other critical care societies
Identify barriers to successful outcomes in patients presenting with a beta-lactam allergy

Self Assessment Questions:

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

- A: Systolic blood pressure of 103mmHg
- B: Respiratory rate of 19
- C: Heart rate of 80 bpm
- D: Lactate of 4.7 mmol/L

Why is the timely administration of appropriate antibiotics important in the setting of septic shock?

- A: It is a cost savings measure for all hospitals
- B: It improves patient compliance upon discharge
- C: It has been shown to reduce patient mortality
- D: It helps with inventory turnover to prevent antibiotic expiration

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-754-L01-P

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

THE INCIDENCE OF POLYOMAVIRUS-BK AND CYTOMEGALOVIRUS INFECTIONS IN RENAL TRANSPLANT RECIPIENTS FOLLOWING RITUXIMAB ADMINISTRATION.

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Background: Rituximab is a chimeric monoclonal antibody that binds to the CD20 antigen on the surface of B cells resulting in rapid and prolonged depletion. In renal transplantation, rituximab may be used for desensitization or treatment of antibody mediated rejection. At Northwestern Memorial Hospital (NMH), a single dose of rituximab is also given to renal transplant recipients who have documented historical donor specific antibodies (DSA). There is concern that the administration of rituximab may lead to increased risk of infectious complications. **Purpose:** This study aims to determine if the administration of rituximab for historical DSA in renal transplant recipients who also received alemtuzumab induction leads to an increased rate of polyomavirus-BK and cytomegalovirus (CMV) infectious complications. **Methods:** This is a single center, retrospective cohort study of renal transplant recipients who received a single dose of rituximab for historical DSA with alemtuzumab induction. Patients ≥ 18 years old who were transplanted between January 1st 2007 and October 31st 2016 were included. These patients were matched 1:1 based on induction immunosuppression and donor/recipient CMV serostatus with patients who did not receive rituximab. Incidence of polyomavirus-BK viremia, viremia, nephropathy and CMV viremia within one year post-transplant were evaluated.

Results: A total of 326 patients (163 patients in both the rituximab and control groups) were included in the study. Incidence of polyomavirus-BK viremia ($p < 0.01$), viremia ($p < 0.01$) and nephropathy ($p = 0.05$) were significantly greater in the rituximab group compared to the control group. There was no difference in CMV viremia between the rituximab ($n = 10$) and control ($n = 6$) ($p = 0.31$). **Conclusions:** Rituximab administration for historical DSA in renal transplant recipients also receiving alemtuzumab induction was associated with higher rates of polyomavirus-BK infectious complications within one year post-transplant.

Learning Objectives:

Identify the types of infections that can occur post kidney transplantation
Describe the impact of rituximab on post kidney transplant infections.

Self Assessment Questions:

Rituximab is a monoclonal antibody that binds to the CD20 antigen present on the surface of what type of cells.

- A: B cells
- B: Plasma Cells
- C: T cells
- D: Monocytes

What are some of the risk factors associated with polyomavirus-BK viral infections?

- A: Steroid exposure
- B: Use of lymphocyte depleting agents
- C: Prior rejection episodes
- D: All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-755-L01-P

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

EVALUATION OF LOW MOLECULAR WEIGHT HEPARIN VERSUS SUBCUTANEOUS HEPARIN FOR VENOUS THROMBOEMBOLISM PREVENTION IN ELDERLY, HIGH-RISK TRAUMA PATIENTS

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Purpose: Trauma patients are at high risk of venous thromboembolism (VTE) leading to increased morbidity and mortality. The Risk Assessment Profile (RAP) score identifies trauma patients at increased risk for developing VTE, characterized by a score of five or greater. Low molecular weight heparins, such as enoxaparin, are recommended over subcutaneous unfractionated heparin (SQH) for VTE chemoprophylaxis in high-risk trauma patients without contraindications. While age is a RAP score component, a paucity of data exists regarding the effectiveness, safety, and appropriateness of VTE chemoprophylaxis agent selection among elderly, high-risk trauma patients. **Methods:** This retrospective, single center study includes patients 65 and older admitted to the trauma service with a RAP score greater than or equal to 5 who receive either enoxaparin or SQH for VTE chemoprophylaxis. Patients are excluded for any of the following criteria: pregnancy, prisoner, VTE prophylaxis delayed greater than 24 hours from admission, death within 24 hours of admission, or a diagnosis of VTE outside of lower extremities prior to the initiation of chemical VTE prophylaxis. The primary objective is to compare VTE incidence between elderly high-risk trauma patients receiving chemoprophylaxis with SQH versus enoxaparin. Secondary objectives include identifying independent VTE risk factors, evaluating effectiveness of a novel age-modified risk assessment profile (RAP-AM) score in predicting VTE risk in elderly trauma patients, and comparing incidences of bleeding. A chi-squared analysis will be employed to test for a difference of VTE rates in patients. A p-value of less than 0.05 will represent statistical significance at 80 percent power. **Results:** Data collection and analysis are ongoing.

Learning Objectives:

Review options for pharmacologic VTE prophylaxis in trauma
Explain VTE scoring systems and the University of Cincinnati Medical Center (UCMC) trauma VTE prophylaxis protocol

Self Assessment Questions:

- Why does the RAP Score incorporate age as a risk factor?
- A Risk of VTE increases as age increases
 - B: Risk of VTE decreases as age increases
 - C: Risk of VTE increases as age decreases
 - D: The risk assessment profile score does not utilize age as a risk factor

RD is stable and the trauma team wants a recommendation on which prophylactic anticoagulant to start. Knowing his RAP is 6, CrCl of 120 and no contraindication to pharmacologic prophylaxis, you recommend

- A Subcutaneous heparin only
- B Enoxaparin only
- C Mechanical prophylaxis only
- D Enoxaparin and mechanical prophylaxis

Q1 Answer: A Q2 Answer: D

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(if ACPE number listed above)

EVALUATION OF CURRENT OPIOID PRESCRIBING PRACTICES WITHIN A HEALTH-SYSTEM

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Purpose: The purpose of this study is to evaluate potential risky prescribing practices at OhioHealth, which could have a community impact and role in the opioid epidemic. This is a retrospective chart review seeking to determine the proportion of patients given opioid prescriptions upon discharge with a morphine milligram equivalent (MME) ≥ 50 /day, overall and by provider specialty, as well as the proportion of patients given opioid prescriptions upon discharge that are considered high risk for addiction, overdose, and overall harm.

Methods: The study population of this retrospective, single-center chart review will include patients age 18 and older who are opioid-naïve (no opioids on home medications list), and are prescribed an opioid upon discharge between April 1, 2017 and July 1, 2017 (3 months) at OhioHealth Riverside Methodist Hospital. Patients pursuing palliative care, end-of-life care, or active cancer treatment will be excluded from the study. A time period of 3 months was chosen in order to avoid the potential confounder of opioid legislation (90 day limit, 14 days to fill) that went into effect on April 6, 2017. **Preliminary Results:** Total of 2989 opioid-naïve patients were discharged with opioids within the identified three month time window. Morphine milligram equivalents were calculated for each patient and ranged from 2 to 600 MME/day. Of the 2989 patients, 2667 were considered high-risk for addiction, overdose, or overall harm based on current sedating medications (benzodiazepines or muscle relaxants; either on home medications list or prescribed at discharge), increased risk for respiratory depression [congestive heart failure, obesity (BMI >30 kg/m²), sleep apnea, chronic obstructive pulmonary disease, smoker (current or 20 pack-year or greater history)], hepatic impairment, renal impairment (creatinine clearance <40 ml/min), age greater than 60 years, history of alcohol abuse, mental health condition (depression, anxiety, or schizophrenia), and pregnancy. **Conclusion:** Pending statistical analysis.

Learning Objectives:

Recognize potential risky opioid prescribing practices, which could have a community impact and role in the opioid epidemic.
Identify the proportion of patients given opioid prescriptions upon discharge with a morphine milligram equivalent (MME) ≥ 50 /day, overall and by provider specialty, and the proportion of patients given opioid prescriptions upon discharge that are considered high

Self Assessment Questions:

Which of the following is considered a high risk factor for opioid addiction, overdose or overall harm?

- A Paraplegia
- B: Age Greater than 50
- C: Congestive Heart Failure
- D: Current anticoagulant use

Which of the following morphine milligram equivalent (MME) does the CDC Guidelines for Prescribing Opioids designate as the "press pause" mark?

- A 60 MME/day
- B 90 MME/day
- C 50 MME/day
- D 30 MME/day

Q1 Answer: C Q2 Answer: C

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STRENGTH OF SPECIFIC MEDICATION LITERACY AND CLINICAL CORRELATES IN OLDER ADULTS WITH ASTHMA

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Purpose: It has been demonstrated that medication use literacy impact chronic disease outcomes, however the role of specific medication literacy has not been thoroughly explored. This study aims to characterize the knowledge of older adults with asthma regarding individual medications and to compare clinical correlates to the spectrum of specific medication literacy strength. **Methods:** This study is a supplement to a NIH RO1 grant funded, IRB approved, parent study conducted at a single-site in Louisville, KY. The inclusion criteria include: age ≥ 60 , meet standard diagnostic criteria for asthma, current non-smokers, and have no other chronic respiratory disease. Exclusion criteria include: residence in a skilled nursing facility, dementia, or recent major illness. The parent study includes an intake assessment followed by 9- and 18-month in-home follow-up. This supplement study will add a specific medication literacy assessment to the in-home follow-up visits. The assessments were objectively scored based on answers in 8 categories- name, purpose, route, time of day, special instructions, appropriateness, side effects, and interactions. A descriptive analysis will be performed as well as a multivariate analysis to test if the specific medication literacy score impacts clinical correlates of asthma control.

Preliminary Results: Participants did well with name, route, and time of day with the average percent correct of 99.4%, 96%, and 96.8% respectively. However, alarming few side effects of medications were listed (21.9%) and no participants listed an interaction. A correlation was found between participants with ≥ 12 medications having a higher specific medication literacy score: 73% (66.1%-80.2%) vs. 67.6% (58.3%-75.0%). Multivariate analysis pending study completion.

Conclusions: This is the first study to examine a patient-centered correlate of self-management by exploring the role of literacy regarding specific individual medications. Gaps were found in knowledge necessary for self-management and monitoring. Also, individuals with higher rates of comorbidities were found to have increased specific medication literacy.

Learning Objectives:

Define specific medication literacy and the impact it potentially has on self-management of chronic disease states
Recognize the gaps found in knowledge that are necessary for the self-management of a chronic disease

Self Assessment Questions:

Specific medication literacy refers to:

- A Understanding general information about medications
- B: Ability to read medication-related information
- C: Understanding specific information about one's own medications
- D: Ability to read specific medication bottles

Which of the following are knowledge gaps that were identified based on the preliminary study results of this study?

- A Name of each medication
- B Side effects related to each medication
- C Time of day to take each medication
- D Route to take each medication

Q1 Answer: C Q2 Answer: B

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

EFFECTIVENESS OF LEVETIRACETAM AS A FIRST LINE ABORTIVE AGENT FOR SEIZURE MANAGEMENT IN A NEONATAL INTENSIVE CARE UNIT

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Purpose: Neonatal seizures arise from multiple causes including hypoxic ischemic encephalopathy, congenital malformations, infection, neonatal abstinence, and inborn errors of metabolism. Uncontrolled seizures place the neonate at an increased risk for neurologic impairment, developmental delay, and even death. Optimal treatment for neonatal seizures remains unclear and management among U.S. hospitals is highly varied. Historically, the primary treatment option for neonatal seizures has been phenobarbital, followed by phenytoin or fosphenytoin. Efficacy data for phenobarbital and phenytoin indicates that these medications successfully control neonatal seizures in fewer than 50% of patient cases when used as monotherapy. In combination or sequentially, they have been shown to be marginally more effective. Additionally, new evidence suggesting that both phenobarbital and phenytoin may be implicated in neuronal apoptosis in the neonate, supports the identification of safer, more effective treatment options. The pharmacokinetic and safety profile of levetiracetam has led to its emergence as an alternative in the treatment of neonatal seizures. Despite promising evidence for levetiracetam's role in neonatal seizures there is a lack of published data regarding its use as a first-line agent. The primary objective of this study will be to evaluate the effectiveness of levetiracetam as first line treatment for neonatal seizures.

Methods: This is a single-center, non-randomized, retrospective cohort study of patients 0-28 days postpartum, with clinically or electrographically confirmed seizures, who receive levetiracetam as first line therapy. Patients will have been admitted to University of Kentucky Children's Hospital between June 1, 2015 and June 30, 2017. Data collected will include effectiveness of levetiracetam as a primary agent by clinical or EEG resolution, any additional therapies required before resolution, and patient and seizure specific characteristics that may improve outcomes. **Results and Conclusion:** Data collection and analysis are ongoing. Preliminary results and conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Discuss the current literature regarding the debate behind the optimal management of neonatal seizures.
Identify the pharmacokinetic and safety profile of levetiracetam that has led to its role in neonatal seizures.

Self Assessment Questions:

Which of the following may help explain the ineffectiveness of traditional anti-epileptic medications, phenobarbital and phenytoin, specifically for the neonatal population?

- A Overexpression of glutamate receptors
- B: Under development of GABA receptors
- C: Inversion of the chlorine gradient
- D: All of the above

Which of the following is a novel receptor levetiracetam targets that circumvents the problems other antiepileptic drugs face in the neonatal population?

- A α -amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid (AMPA) receptors
- B Synaptic vesicle glycoprotein 2a (SV2a) receptors
- C Protein kinase (PK) receptors
- D Mammalian target of rapamycin (mTOR) receptors

Q1 Answer: D Q2 Answer: B

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EARLY RECOGNITION OF AUGMENTED RENAL CLEARANCE AND ASSOCIATED ANTIMICROBIAL DOSING ADJUSTMENTS IN TRAUMA PATIENTS

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Purpose: Augmented renal clearance (ARC) occurs in 50-85% of major trauma patients. This manifests via increased glomerular filtration which may dramatically alter the clearance of beta-lactam antibiotics. While ARC has been discussed in recent literature, little evidence is available detailing a clinical workflow to reliably detect and manage ARC in clinical practice. The objective of this study is to evaluate a protocol incorporating ARC testing and result-dependent antibiotic dosing into ICU workflow. **Methods:** This study will be a prospective, observational study which will assess the effectiveness of a protocol to identify trauma patients with ARC and ensure appropriate renal dosing of antibiotics. Patients included in the study will be 18-75 years old and admitted to the ICU for trauma. Patients with a history of chronic kidney disease, baseline serum creatinine greater than 1.3, or an inability to perform accurate urine collection will be excluded from this study. Patients will be screened for risk of ARC using Augmented Renal Clearance in Trauma Intensive Care (ARCTIC) score. Those who are considered high-risk (ARCTIC Score ≥ 5) will be tested with 8-hour urine collection to assess renal function. Patients exhibiting ARC (creatinine clearance greater than 125 mL/hr) will have beta-lactam antibiotics adjusted to compensate for this increased clearance. The study will assess admissions over a six-month period. The primary outcome will be the number of patients with antibiotics that were adjusted due to ARC. Secondary outcomes will include the number of patients identified as high-risk for ARC, number of patients found to have ARC, number of patients with ARC receiving beta-lactam therapy, and time from admission to unit to change in antibiotic dosing in patients with ARC on beta-lactams. **Results/Conclusion:** Will be presented at 2018 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Describe augmented renal clearance and its impact on pharmacotherapy
Identify methods to incorporate augmented renal clearance monitoring into ICU workflow

Self Assessment Questions:

Which of the following is not an individual risk factor augmented renal clearance?

- A Body weight
- B: Serum creatinine
- C: Age
- D: Traumatic injury

Augmented renal clearance has not been studied in patients with a baseline serum creatinine above:

- A 1.0
- B 1.3
- C 1.5
- D 1.7

Q1 Answer: A Q2 Answer: B

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IMPACT OF PHARMACY-RELATED WORK EXPERIENCE ON STUDENT PERFORMANCE IN ASSESSMENTS RELATING TO SELF-CARE

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Purpose: Previous studies have evaluated pharmacy school admission criteria to determine what factors may be predictors of pharmacy students' academic success in pharmacy school. These studies have shown that some markers can predict academic success in pharmacy school, but pharmacy-related work experience does not. However, there is no data on how pharmacy-related work experience impacts a student's ability to address self-care topics during pharmacy school. The term "self-care" generally refers to the management of conditions with products available to patients without a prescription. Proficiency in this area is especially important for pharmacists working in the community in order to provide appropriate recommendations to patients that are seeking self-care advice. The purpose of this study is to determine if pharmacy-related work experience impacts pharmacy students' performances on assessments pertaining to self-care. Participants included in the study are students enrolled in their final year of the Sullivan University College of Pharmacy (SUCOP) accelerated three-year Doctor of Pharmacy program. These students have various assessments throughout the curriculum testing their competency with self-care related topics. **Methods:** The pharmacy-related work experience data will be obtained via a voluntary, electronic survey that will be sent to the third-year students for them to complete. The academic data will be obtained from the SUCOP Office of Academic Affairs and will include scores in the following assessments: a self-care course completed in the students' first year; any self-care objective structured clinical examination from the first and second year; and self-care related questions from two standardized exams through Kaplan completed between the second and third year. The work experience data will then be matched to the academic data and all results will be identified before being given to the researchers for analysis.

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

Learning Objectives:

Identify the relationship between various pharmacy school admission criteria and pharmacy students' academic performance

Discuss the benefits of academic success in self-care related assessments as it pertains to pharmacy practice

Self Assessment Questions:

Which of the following admission criteria have been shown to positively correlate with didactic performance in pharmacy school?

- A Pharmacy College Admission Test (PCAT) score
- B: Previous pharmacy work experience
- C: Grade point average (GPA)
- D: A and C

Which of the following is a benefit of utilizing self-care practices effectively in pharmacy practice?

- A It allows patients to self-diagnose their ailments and make their own
- B It can prevent patients from ever needing to visit their primary care
- C It helps pharmacists make therapeutically appropriate recommendations
- D It gives pharmacists the ability to prescribe medications for patients

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-758-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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A COMPARISON OF PANTOPRAZOLE CONTINUOUS INFUSION TO TWICE DAILY INTRAVENOUS INTERMITTENT DOSING IN PATIENTS WITH NON-VARICEAL UPPER GASTROINTESTINAL HEMORRHAGE

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Current American College of Gastroenterology guidelines recommend proton pump inhibitor (PPI) therapy with an 80mg bolus followed by 8mg/hour continuous infusion for 72 hours for most patients with severe non-variceal upper gastrointestinal hemorrhage. Recent literature supports the use of intravenous (IV) intermittent PPI for subjects receiving successful endoscopic hemostatic therapy. The objective of this study was to determine if the use of IV intermittent PPI demonstrates similar rates of recurrent bleeding compared to continuous infusion PPI, including subjects that did not receive endoscopic hemostatic therapy. Additionally, we aimed to demonstrate the cost-saving effects of a pharmacist-driven protocol to convert patients from continuous infusion to IV intermittent PPIs. The study was a retrospective chart review of patients from two cohorts that were diagnosed with an upper gastrointestinal bleed via esophagogastroduodenoscopy (EGD) and received either pantoprazole continuous infusion (8mg/hour) or intermittent (40mg twice daily). Prevalence of recurrent bleeding during index admission was determined for each cohort. Secondary objectives include examining rates of surgical interventions, red blood cell transfusion requirements, and length of hospitalization. Additionally, medication cost for continuous infusion and intermittent groups were calculated to demonstrate potential for savings following implementation of pharmacist-driven administration route conversion protocol. The results of this study are pending.

Learning Objectives:

Review current American College of Gastroenterology guideline recommendations for the treatment of overt upper gastrointestinal bleeding

Discuss updates within the medical literature and the potential impact of upper gastrointestinal bleeding treatment

Self Assessment Questions:

According to current American College of Gastroenterology guidelines, a patient with an actively bleeding ulcer should receive which of the following intravenous medical treatments?

- A: Intermittent H2RA
- B: Continuous infusion H2RA
- C: Intermittent PPI
- D: Continuous infusion PPI

A meta-analysis of treatment of upper gastrointestinal hemorrhage with continuous infusion vs. intermittent PPIs proposed which of the following conclusions?

- A: Intermittent PPI was associated with statistically more recurrent bleed
- B: Intermittent PPI was non-inferior to continuous infusion PPI when
- C: Intermittent PPI was associated with statistically more surgical interventions
- D: Intravenous pantoprazole 40mg twice daily is the intermittent PPI

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-489-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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IMPLEMENTATION OF A PROSPECTIVE, PHARMACIST-DRIVEN CLOSTRIDIUM DIFFICILE PCR PRE-AUTHORIZATION TO OPTIMIZE APPROPRIATE TESTING

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Purpose: Clostridium difficile infection (CDI) has become one of the most prevalent healthcare-associated infections in the United States. There are over 300,000 CDI-associated hospitalizations annually, and each case costs about \$15,000. Recent data suggest the rise in CDI may be due to new molecular diagnostic testing such as polymerase chain reaction (PCR). Individual hospitals have reported a 50-100% increase in the CDI rate once facilities adopted PCR testing. The lower sensitivity of toxin immunoassays compared to molecular methods led the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA) to recommend toxin immunoassays as a suboptimal approach to diagnose CDI. Many institutions have transitioned to molecular diagnostics; however, this has led to gaps in the literature due to reference standard variances and inaccurate reporting. The purpose of this study was to improve the appropriateness of Clostridium difficile PCR testing. Methods: This single-center, quasi-experimental study assessed appropriateness of Clostridium difficile PCR testing pre- and post-implementation of a prospective, pharmacist-led, pre-authorization. The Antimicrobial Stewardship Team (AST) created institutional guidelines that included appropriate clinical criteria required to proceed with the CDI-PCR based on the IDSA and American College of Gastroenterology guidelines. The AST prospectively reviewed all CDI-PCR cases sent to the lab prior to specimen processing twice daily, 7 days a week. Bone marrow transplant patients were excluded. If a patient did not meet clinical criteria, the provider was contacted to discontinue the PCR. CDI-PCR appropriateness was assessed for all patients with a CDI-PCR during the preceding year as a retrospective, comparative cohort. The primary objective was to assess appropriateness of the CDI-PCR pre- and post-intervention. Secondary objectives assessed safety, cost-avoidance, and hospital-onset CDI standardized infection ratio. Descriptive statistics will be used to analyze the data. Results and conclusions: Project ongoing. Results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the rationale for a pharmacist-led prospective review of CDI-PCR sent to the lab for analysis.

List the appropriate clinical criteria that are required to send a CDI-PCR.

Self Assessment Questions:

Which of the following points helps justify a pharmacist driven prospective review of CDI-PCR sent to the lab for analysis and pre-authorization?

- A: Molecular diagnostic testing such as PCR is less sensitive than toxin
- B: Clostridium difficile infection is one of the least common healthcare-associated infections
- C: Molecular diagnostic testing has resulted in a 50-100% increase in CDI
- D: Hospital-acquired CDI can be a complicated but overall inexpensive

Which of the following patients meets the clinical criteria to assess for CDI via PCR?

- A: A patient with four watery bowel movements with a history of recurrent CDI
- B: A patient who has received polyethylene glycol within the previous 48 hours
- C: A patient having diarrhea shortly after the initiation of tube feeds at the hospital
- D: A patient that had a positive CDI PCR five days prior and is preparing for discharge

Q1 Answer: C Q2 Answer: A

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EFFECT OF PRE-INJURY ANTICOAGULANT AND ANTIPLATELET USE ON MORTALITY IN THE TRAUMA POPULATION

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While there is data suggesting that warfarin use prior to an injury can lead to worse outcomes for patients, the data is scarce regarding outcomes of patients who have a traumatic injury while using one of the newer direct oral anticoagulant (DOAC) medications. There is a clear need for more data regarding outcomes of pre-injury use of the new oral anticoagulant agents in the general trauma population. The objective of this study is to determine the effect that pre-injury use of DOAC medications has on patient outcomes compared to warfarin, antiplatelet agents, and no anticoagulation at all. This study will be a multicenter retrospective review of data accessed from the Michigan Trauma Quality Improvement Program (MTQIP) database ranging from February 22, 2012 to July 1, 2017. The following data points will be collected: age, sex, pre-injury agent used, comorbidities, mechanism of injury, ICD-10 primary external cause of injury, ICD-10 injury diagnoses, level of trauma center, catalog of injuries, injury severity score (ISS), ED discharge disposition, incidence of hemorrhage, need for surgical intervention, total days in hospital, total ICU length of stay, total ventilator days, hospital discharge disposition (mortality or hospice), disposition at admission, hospital complications, hemorrhage control, withdrawal of life support, and type of insurance that patient has. All data will be reported without patient identifiers and maintained confidentially. There will be four arms to the study: DOACs, warfarin, antiplatelet agents, and no anticoagulation. The primary outcome of this study is the composite of mortality or hospice care at discharge when comparing DOACs vs. warfarin vs. no anticoagulation. Secondary outcomes include length of stay, blood product usage, need for operation, and ventilator days and will be analyzed through direct comparison of each arm of the study.

Learning Objectives:

Discuss barriers of prescribing DOACs versus warfarin in patients requiring anticoagulation

Describe the Michigan Trauma Quality Improvement Program (MTQIP)

Self Assessment Questions:

Which of the following is currently true regarding the prescribing of DOACs or warfarin for anticoagulation

- A There is no commercially available reversal agent for warfarin
- B: There is no commercially available reversal agent for all DOAC medications
- C: There are no commercially available reversal agents for neither warfarin or DOACs
- D: There are commercially available reversal agents for both warfarin and DOACs

Which of the following is true regarding the Michigan Trauma Quality Improvement Program (MTQIP)?

- A Houses trauma data from 29 Level I and Level II centers across the state
- B Trauma data is collected and submitted by trauma nurses, who are not physicians
- C Data from the MTQIP database is used to study and improve standards of care
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-491-L01-P

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ASSESSMENT OF ANTIBIOTIC PRESCRIBING AND PHARMACIST INTERVENTIONS FOR UTIS IN A LARGE COMMUNITY TEACHING HOSPITAL'S EMERGENCY DEPARTMENT

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Study objective: The objective of this study was to assess the impact of emergency department (ED) pharmacists' assistance to ED providers or interpreting urine cultures and adjusting antimicrobial therapy in patients discharged from Indiana University (IU) Health Methodist Hospital ED with a urinary tract infection (UTI). Methods: This was a retrospective cohort study of patients discharged from the ED with urine cultures performed from 07/01/2017 to 09/30/2017 when the ED provider was solely responsible for interpreting urine culture results. Data was also collected retrospectively from 10/01/2017 to 12/31/2017 when the ED pharmacist began reviewing urine culture results and assisting the ED provider in assessment of antibiotic therapy. A report of urine cultures collected in the ED was obtained using the hospital's electronic medical record. Primary outcome was incidence of appropriate intervention on positive urine cultures pre and post pharmacist involvement. Secondary outcomes were the incidence of patients treated for asymptomatic UTI and appropriateness of empiric antimicrobial selection for UTI treatment based on pathogen's susceptibility. Baseline characteristics were collected via manual chart review of each patient's electronic medical record. Results: Data collection and analysis is on-going at this time. Full results will be presented at the Great Lakes Pharmacy Resident Conference in April 2018. Conclusions: Conclusion is on-going at this time. Full results will be presented at the Great Lakes Pharmacy Resident Conference in April 2018.

Learning Objectives:

Describe symptoms of uncomplicated UTIs.

Describe common pathogens associated with uncomplicated UTIs.

Self Assessment Questions:

The gold standard for diagnosis of a symptomatic uncomplicated UTI is:

- A Urinalysis with < 10 WBC
- B: Urinary frequency
- C: Urine culture with $\geq 10^5$ colony forming units (cfu)/mL
- D: Compliments of dysuria

The most common causative pathogen of uncomplicated UTIs is:

- A Proteus mirabilis
- B Klebsiella pneumoniae
- C Escherichia coli
- D Pseudomonas aeruginosa

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-492-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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A PRIVILEGING AND PEER REVIEW PROCESS FOR A PRIMARY CARE PHARMACIST HYPERTENSION SERVICE

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Purpose: In an effort to improve hypertension control across University of Wisconsin (UW) Health, primary care leadership supported the implementation of a pharmacist hypertension management service. Effective assessment of pharmacist ability to manage hypertension prior to implementation and ongoing was required. The purpose of this project was to develop and implement a required privileging program and evaluation process for a pharmacist-led hypertension service in primary care. **Methods:** Internal feedback from primary care pharmacists was collected and external resources were reviewed to identify necessary components for a required privileging program. Each of the following was developed to comprise the program: multi-disciplinary training, didactic protocol and guideline training and knowledge assessments, and collaborative patient case reviews to reinforce protocol and guideline concepts. A passing score was set at 80% for the respective knowledge assessments. This score was utilized to determine initial success of the privileging program. Questions commonly answered incorrectly were reviewed for improvement.

Ongoing success of the privileging program and pharmacist hypertension service was evaluated through a peer review process using the following endpoints: adherence to the protocol, clinical decision-making, and blood pressure control. Internal and external peer review processes were evaluated to identify the optimal number of patients to evaluate and the optimal frequency of peer reviews. A standardized rubric was developed and utilized in the review process. **Results:** All participating pharmacists passed the knowledge assessments. Scores ranged from 95-100% for the protocol assessment and 95-100% for the guideline assessment. Wording modifications were made to 12 of 40 questions to improve clarity. Results of the peer review process will be presented at the Great Lakes Pharmacy Resident Conference. **Conclusions:** A comprehensive privileging program for a pharmacist-led service can be successfully created using external resources and internal pharmacist feedback. Additional conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify key components of a successful pharmacist privileging program
Describe an optimal pharmacist peer review process

Self Assessment Questions:

What is the purpose of a privileging program?

- A To grant a provider/pharmacist the authorization to provide a spec
- B: To confirm provider/pharmacist credentials
- C: To ensure providers/pharmacists are providing optimal/safe patient
- D: To evaluate outcomes of a provided service

Which of the following should be utilized in a peer review process to allow for efficient and consistent evaluation of a pharmacist service?

- A Direct observation of the process by a medical assistant
- B Pharmacist review of the provided service using a standardized rubric
- C Pharmacist review of outcomes not related to the provided service
- D Survey of provider opinion on pharmacist performance

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-759-L04-P

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

USE OF TECHNOLOGY AND PHARMACY WORKFLOW CHANGES TO DECREASE RETURN TO STOCK VOLUME IN AN OUTPATIENT PHARMACY WITHIN A FOUR HOSPITAL COMMUNITY HEALTH SYSTEM.

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Purpose: Prescriptions filled but not picked up by patients can lead to poor inventory control and inefficient workflow in pharmacies. This project will evaluate if implementation of technology and pharmacy workflow changes reduces return to stock prescription volume in an outpatient pharmacy. **Methods:** The existing return to stock prescription workflow within the health systems' outpatient pharmacies is currently completed by a pharmacy technician. An evaluation of technology solutions available from the pharmacy software system and current pharmacy workflow will be completed in one of the four outpatient pharmacies as a pilot project. Interventions will be developed and implemented to minimize the amount of prescriptions that are not picked up within 10 days. Training materials will be developed and presented to pharmacy staff on the technology solutions and workflow changes. The project will assess the return to stock prescription volume, the amount of time it takes for the technician to complete the task, the type of prescriptions that are being returned (maintenance or acute), and the time frame from when a prescription that is returned to stock is filled again. All will be evaluated compared to baseline. **Results:** Results in progress. **Conclusions:** Results in progress.

Learning Objectives:

Discuss the negative consequences of excessive return to stock prescription volume.

Discuss technology methods available for notification of a filled prescription.

Self Assessment Questions:

What are the negative consequences of excessive return to stock prescription volume?

- A Efficient use of technician time
- B: Poor inventory control
- C: Improved employee satisfaction
- D: Improved patient outcomes

Patients can be notified that their prescription(s) is/are ready through all of the following ways EXCEPT _____.

- A Text message
- B Phone call
- C Fax
- D Email

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-760-L04-P

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

RADIATION ONCOLOGY SYMPTOM MANAGEMENT: A QUALITY IMPROVEMENT PROJECT

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Purpose: Nearly two thirds of patients diagnosed with cancer will have radiation therapy as a part of their treatment plan. Toxicities of radiation vary widely, as do treatment options, which can include both pharmacologic and nonpharmacologic agents. Current literature and treatment guidelines do not clearly outline symptom management strategies for radiation toxicities. The radiation oncology department at Riverside Methodist Hospital (RMH) is seeking pharmacist-involvement to optimize symptom management for their patients. Starting in fall 2017, a pharmacy practice resident at RMH will work alongside the radiation oncology department to understand how pharmacist-involvement in symptom management can optimize and standardize treatment approaches. **Methods:** The pharmacy practice resident will attend the radiation oncology clinic for one half day each week throughout the course of the 2017-2018 residency. The first several weeks will be used to observe patient interactions, understand current symptom management practices, and answer drug information questions. Next, the resident, radiation oncologist, and nurses in the department will collaborate to determine which specific side effects of radiation therapy are difficult to manage in their patients. The resident will then utilize the literature to create standardized symptom management protocols for those specific side effects. After the symptom management protocols are developed, they will be implemented into patient visits accordingly. Each time the protocols are used during a patient visit, that information will be documented to assess their usefulness. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify common toxicities that patients experience while undergoing radiation therapy

Discuss the utility of pharmacist-developed symptom management protocols for patients undergoing radiation therapy

Self Assessment Questions:

Which of the following is the most common acute toxicity among patients undergoing pelvic and abdominal radiotherapy?

- A: GI bleed
- B: Constipation
- C: Diarrhea
- D: Vomiting

According to the National Cancer Institute's "Common Terminology Criteria for Adverse Events," a patient with an increase of 4-6 stools per day over baseline is considered to have what grade of diarrh

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

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-493-L01-P

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

CONCOMITANT USE OF OPIOIDS AND BENZODIAZEPINES AND THE IMPACT ON OPIOID-RELATED EMERGENCY DEPARTMENT VISITS

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PURPOSE: The use of opioids for the treatment of chronic pain has greatly increased over the past decade. Opioids used concurrently with benzodiazepines can increase the risk of adverse effects and potentially fatal overdoses. Because of this, both the Centers for Disease Control and the Food and Drug Administration have addressed the harms and risks associated with prescribing opioids and benzodiazepines. These associated risks of co-prescribing opioids and benzodiazepines may lead to an increase in opioid-related emergency department (ED) visits. The objective of this study is to assess the risk for opioid-related ED visits in patients with concomitant use of opioids and benzodiazepines in their home medication list compared to opioids alone. **METHODS:** This study is a retrospective, cohort study of adults (≥ 18 years of age) who visited the ED from January 2015 to August 2017 with any opioids or concomitant opioids and benzodiazepines documented in their home medication list on the day of the ED visit. Data collected will include baseline demographics; date of ED visit and discharge; the opioids and benzodiazepines on the home medication lists (including drug, dose, route, and frequency); ICD-9 or ICD-10 codes documented for the ED visit and any associated inpatient admission. The primary endpoint is percentage of patients with opioid-related ED visits for those receiving opioids at home versus those receiving opioids and benzodiazepines. Opioid-related ED visits are defined as any ICD-9/ICD-10 code indicating opioid abuse, poisoning by opioids, or respiratory depression. Secondary endpoints include percentage of ED visits for the individual ICD code categories of opioid abuse, poisonings by opioids, and acute respiratory failure. Lastly, percentage of opioid-related ED visits in patients with one opioid versus two or more opioids on their home medication list will be assessed. **RESULTS/CONCLUSION:** To be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Discuss risk factors for opioid-related adverse effects, such as respiratory depression and fatal overdose

Describe the potential impact of concomitant use of prescription opioids and benzodiazepines.

Self Assessment Questions:

Which of the following is NOT a risk factor for opioid-related respiratory depression?

- A: Tobacco use
- B: Renal insufficiency
- C: Adults ≥ 65 years
- D: Hepatic insufficiency

Which of the following is true regarding the use of concomitant opioids and benzodiazepines?

- A: The CDC has recommended against the use of both together, but
- B: Use of opioids and benzodiazepines when taken together can cau:
- C: Epidemiologic studies suggest patients who have filled both prescri
- D: Epidemiologic studies suggest the use of benzodiazepines with op

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-878-L05-P

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

EVALUATING THE TRANSITION FROM DEXMEDETOMIDINE INFUSION TO CLONIDINE FOR THE PREVENTION OF WITHDRAWAL IN CRITICALLY ILL PEDIATRIC PATIENTS

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Purpose: Dexmedetomidine is an alpha-2 adrenergic receptor agonist used for sedation in critically ill pediatric patients, often in conjunction with benzodiazepines and/or opioids. When administered as a prolonged continuous infusion, it has the potential to cause withdrawal symptoms if it is not appropriately tapered off. Due to the structural and mechanistic similarity of clonidine to dexmedetomidine, patients can be transitioned to clonidine to aid in withdrawal prevention, but the dose conversion is not well defined. At Advocate Children's Hospital-Park Ridge (ACH-PR), patients receiving prolonged dexmedetomidine infusions are transitioned to clonidine at initial and maintenance dosages determined by individual clinicians, including physicians and pharmacists, based on their experience. The purpose of this study is to evaluate our use of clonidine for the prevention of withdrawal from dexmedetomidine infusions.

Methods: This is a single-center, retrospective, descriptive study of patients in the ACH-PR pediatric intensive care unit (PICU) who received ≥ 72 hours of dexmedetomidine continuous infusion followed by ≥ 48 hours of clonidine between January 1, 2015 and August 31, 2017. The primary outcome is the need for any increase in the sedation regimen (i.e. increase in dose or frequency of clonidine, rescue doses of clonidine, and/or any increase in rate of the dexmedetomidine infusion). The secondary outcome includes Withdrawal Assessment Tool-1 (WAT-1) scores and/or subjective withdrawal symptoms. The safety outcome is the incidence of adverse cardiovascular effects including hypotension and bradycardia, defined as values below the fifth percentile of the normal range for age. **Results and Conclusions:** Data analysis is ongoing. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference in April 2018.

Learning Objectives:

Discuss the rationale for using clonidine to prevent withdrawal in critically ill patients who have received prolonged continuous infusions of dexmedetomidine.

Review monitoring parameters for withdrawal in pediatric critically ill patients, including the use of the WAT-1.

Self Assessment Questions:

Which of the following statements is true regarding dexmedetomidine?

- A Abrupt discontinuation of prolonged dexmedetomidine may precipitate withdrawal symptoms.
- B Dexmedetomidine and clonidine have equal affinity for the alpha-2 adrenergic receptor.
- C Dexmedetomidine is FDA-approved for sedation of intubated and mechanically ventilated patients.
- D Like opioids and benzodiazepines, dexmedetomidine can cause respiratory depression.

Which of the following statements is true regarding the WAT-1?

- A Objective and subjective withdrawal symptoms are assessed on a scale of 0-4.
- B Scores < 2 are indicative of clinically significant withdrawal, associated with increased mortality.
- C The WAT-1 should not be used in pediatric patients with age < 1 year.
- D Withdrawal symptoms may include autonomic dysregulation, gastrointestinal symptoms, and tachycardia.

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-495-L01-P

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

IMPACT OF TACROLIMUS TROUGH LEVELS ON EFFICACY AND TOXICITY IN ALLOGENEIC HEMATOPOIETIC CELL TRANSPLANT PATIENTS

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Purpose: Existing literature suggests that attainment of tacrolimus trough levels > 12 ng/mL in the first four weeks following transplantation correlates with reduced incidence of acute graft-versus-host-disease (GVHD) in allogeneic hematopoietic cell transplant (HCT) patients. Limited data exists to demonstrate a correlation between maintenance of higher trough levels during the entire duration of preventative therapy and incidence of acute GVHD. The purpose of this study is to determine whether a relationship exists between mean tacrolimus trough levels during the first 100 days following transplantation and incidence of acute grade II-IV GVHD. **Methods:** A retrospective chart review will be conducted of adult allogeneic HCT patients who received tacrolimus for GVHD prophylaxis from February 1, 2013 through May 24, 2017. The primary objective is to determine the relationship between mean tacrolimus trough levels through day 100 and incidence of grade II-IV acute GVHD. Secondary objectives are to evaluate the correlation between supratherapeutic (> 15 ng/mL) levels and development of nephrotoxicity and to identify risk factors for subtherapeutic (< 5 ng/mL) and supratherapeutic levels. Kaplan Meier survival curves with log rank tests will be utilized for assessment of the primary objective. Secondary outcomes will be analyzed with t-test, chi-square, and ANOVA as appropriate. **Results and Conclusions:** Of 126 patients screened for enrollment, 76 met the inclusion criteria. The majority of patients were male (64.9%, n=50), of Caucasian descent (85.7%, n=66), and received transplants from matched unrelated donors (75%, n=57). Acute myeloid leukemia was the most common underlying primary disease (50.6%, n=39). Nearly 60% of patients received reduced intensity conditioning regimens (58.4%, n=45). Twenty seven patients developed grade II-IV acute GVHD despite tacrolimus prophylaxis (35.1%). Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe standard of care regimens for graft-versus-host disease prophylaxis

Identify adverse effects of supratherapeutic tacrolimus levels

Self Assessment Questions:

What regimen would be most appropriate as standard of care for graft-versus-host disease prophylaxis?

- A cyclosporine
- B sirolimus
- C tacrolimus + mycophenolate
- D tacrolimus + sirolimus

Which adverse effect has been associated with supratherapeutic tacrolimus levels?

- A hypotension
- B nephrotoxicity
- C hirsutism
- D diabetes insipidus

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-494-L01-P

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

ASSESSMENT OF A NOVEL CHRONIC KIDNEY DISEASE EDUCATIONAL AND GOAL SETTING TOOL AMONG LIVER TRANSPLANT RECIPIENTS

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Purpose: Advanced chronic kidney disease (CKD) among liver transplant (LT) recipients is common and associated with diminished patient and graft outcomes. As identified through patient survey, some patients who have CKD have limited knowledge about their disease state. A similar knowledge gap is predicted in LT recipients with CKD. The objective of this study is to assess CKD knowledge among LT recipients at baseline and then again after administration of a personalized education and goal setting intervention. **Methods:** This is a prospective cross-sectional patient study with patient education and post-survey analysis of LT recipients. Participants were identified during a multidisciplinary LT clinic visit and offered a "Knowledge of Chronic Kidney Disease after Liver Transplant" (KCALT) survey between July 2016 and September 2017. The KCALT survey was then repeated after LT recipients received the CKD education and goal setting discussion or lifestyle modifications. The pre- and post-education CKD education knowledge scores were compared using the paired t-test. Linear regression was used to assess the independent predictors of change in knowledge score. **Results:** results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify factors that place liver transplant recipients at high risk of developing chronic kidney disease

Recognize how patient educational interventions have been used to improve patient knowledge in chronic kidney disease

Self Assessment Questions:

Which of the following factors places patients at risk for developing chronic kidney disease following a liver transplant?

- A: Diabetes
- B: Obesity
- C: Acute dialysis prior to liver transplant
- D: All of the above

Based on the results of this study, a patient-specific educational intervention improved patient's scores on a kidney knowledge test by ____%.

- A: 0
- B: 5
- C: 10
- D: 30

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-761-L01-P

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

BETTER TAKE YOUR VITAMINS: ASCORBIC ACID, THIAMINE, AND HYDROCORTISONE FOR THE TREATMENT OF SEPTIC SHOCK

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Septic shock is a serious condition that is associated with high mortality rates despite improvements in recognition and early treatment. Extensive research in the treatment of sepsis have produced limited improvements in patient outcomes. One recent clinical trial demonstrated a decrease in mortality rates when intravenous ascorbic acid, thiamine, and hydrocortisone were added to standard therapy. The purpose of this study is to assess the management of septic shock patients before and after implementation of this adjunctive protocol. This retrospective, pre- and post-protocol study includes patients who are 18 years and older with a primary diagnosis of septic shock within 24 hours of admission. Patients are also required to be on vasopressors and be admitted to the intensive care unit (ICU). This study was approved by the Institutional Review Board. The primary efficacy endpoint is hospital survival. Secondary endpoints include: duration of vasopressor use, intensive care unit length of stay, and change in quick Sepsis Related Organ Failure Assessment (qSOFA) score. Data was collected by electronic chart review and included: patient demographics, admitting diagnosis, comorbidities, requirement for mechanical ventilation, vasopressor use, isolated pathogens, infection source, mental status assessment, qSOFA score, vitals, and pertinent laboratory values. Data is to be collected post-implementation for 3 months. Pre-protocol data collection will be reviewed from the year before in the same time frame to avoid any confounding factors. Data collection is currently in process.

Learning Objectives:

Review evidence based approaches to the appropriate management of patients with septic shock.

Discuss available data regarding the use of intravenous ascorbic acid, thiamine, and hydrocortisone in septic shock patients.

Self Assessment Questions:

Which of the following vasopressors is recommended as first-line per the 2016 International Guidelines for Management of Sepsis and Septic Shock?

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

Which of the following are potential mechanisms of ascorbic acid, hydrocortisone, and thiamine in septic shock patients?

- A: Increased sensitivity to vasopressors
- B: Accelerated bacterial eradication
- C: Preservation of endothelial function and microcirculatory flow
- D: Both A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-496-L01-P

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

THE IMPACT OF PATIENT CONTACT ON THE RATE OF PRIMARY NON-ADHERENCE TO ELECTRONICALLY PRESCRIBED MEDICATIONS IN A COMMUNITY PHARMACY SETTING

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Purpose: Medication non-adherence in chronic disease states can increase morbidity and mortality in patients as well as increase healthcare costs, and new prescriptions are three times more likely to be abandoned than refills. The purpose of this study is to determine if a personal phone call reminding patients about a new prescription ready at the pharmacy will decrease the rate of primary non-adherence.

Methods: Following IRB approval, pharmacy staff at a community pharmacy will use a computer generated report to identify adult patients who are sent an electronic prescription for a renin-angiotensin system antagonist, statin, or anti-diabetic and have not filled a medication in that class in the previous six months. If not picked up within nine days, a phone call to the patient by a pharmacy staff member will be provided, reinforcing the importance of the medication, reviewing patient concerns and reminding them the medication is ready. Patients who do not answer will be left one message regarding a new prescription being ready. Data collection will include patient demographics, medication fill information, and the type of pharmacy staff member making contact. Data collection will occur for three months, with a baseline period of three months prior to the intervention. Prescriptions will be considered abandoned if not claimed or transferred within thirty days of receipt. Primary non-adherence rates will be measured by calculating the number of new electronic prescriptions abandoned over the study period compared to the baseline period. Secondary outcomes will include determining if the type of pharmacy staff member making contact influences the rate of primary non-adherence. **Results/conclusion:** Investigators anticipate the study intervention will decrease the rate of primary non-adherence for new electronic prescriptions for diabetes, hypertension, or hyperlipidemia medications. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe various ways to measure primary non-adherence to medications.

Identify factors that can influence a patient's primary adherence to medications.

Self Assessment Questions:

Primary non-adherence is most difficult to measure for which method of prescription transmission?

- A: Electronic prescriptions
- B: Hard copy prescriptions
- C: Telephoned prescriptions
- D: Faxed prescriptions

Which of the following is a predictor for higher rates of primary non-adherence?

- A: Brand medications
- B: Lower copays
- C: Higher income areas
- D: Patients >65 years

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-762-L04-P

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

DEVELOPING A STANDARDIZED PROCESS TO IMPROVE THE DISPLAY OF PERTINENT INFORMATION DURING MEDICATION ORDER VERIFICATION

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Purpose: Medication order verification is the step in the medication-use process where pharmacists are strategically placed to prevent prescribing errors from reaching patients. With the widespread adoption of the electronic medical record (EMR), pharmacists also have the unique opportunity during the verification process to enhance patient care. The American Society of Health-System Pharmacists recommends that technology utilized in the medication-use process should be designed to support pharmacy workflows to improve patient outcomes. In order to optimize medication safety and ensure efficiency at the point of verification, display of pertinent information must be transparent and accessible without leaving the verification screen. The purpose of this project is to develop a process that will improve the presentation of relevant information in order to ensure medication safety and efficiency at the point of medication order verification. **Methods:** This project is a quality improvement initiative using define, analyze and improve methodology to outline the need for and implement change to the medication order verification process. The define step will identify the EMR's programming and display capabilities in the medication order verification workflow. The analyze step will generate a decision tree to prioritize information needed at the time of medication order verification. The improve step will utilize a pilot project to implement an optimized display of relevant information at medication order verification. The primary outcome of this project is to test the change of programming and display features of the EMR during medication order verification before making changes across the healthcare system. **Results/Conclusion:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the need for a standardized process to improve medication order verification.

Identify relevant information needed to optimize medication safety and ensure efficiency of medication order verification.

Self Assessment Questions:

Which of the following justify the need for a standardized process to improve the display of pertinent information at the time of medication order verification?

- A: Lack of relevant information at the time of verification
- B: Suboptimal presentation of information at the time of verification
- C: Abundance of information contained within the electronic medical record
- D: All of the above

Which of the following has NOT been identified as relevant information needed to optimize medication safety and ensure efficiency of verification?

- A: Timing of antibiotic administration
- B: Patient specific address and telephone number
- C: Patient specific clinical information
- D: Clinical decision support

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-763-L04-P

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

INFUSION SITE-OF-CARE ALGORITHM UTILIZATION REVIEW

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Purpose: Frequent shifts in payer policies regarding infusion medications require institutions to endure the burden of perpetually monitoring changes or risk losing financial reimbursement. To address these challenges, OhioHealth developed a patient-focused clinical algorithm to determine the best treatment based on medical necessity that was implemented on June 1st, 2017. The algorithm was created by a multidisciplinary team of physicians and pharmacists, then endorsed by finance, revenue cycle, and managed care teams. We analyzed all infusion site referrals from June 1st, 2017 to August 31st, 2017 in a retrospective, quality improvement review to assess the appropriate utilization of the site of care clinical algorithm by providers and billing coordinators. **Methods:** The Centers for Medicare and Medicaid Services' place of service descriptions of site 11, office-based infusion, and site 22, hospital-based infusion, were used to consistently define the site of care across all payers. Medications were then categorized based on the level of acuity associated with each medication. Referral data was used to compare the referred site of infusion against the appropriate site of infusion as denoted by the site of care clinical algorithm. Appropriateness was determined based on a retrospective chart review of the electronic health record. **Results:** Among 714 referrals, the site of care clinical algorithm was utilized correctly 95% of the time. Variances most often occurred with sometimes site 11 medications and site 11 medications being inappropriately referred to site 22. Site 22 medications were always referred appropriately to site 22.

Conclusions: Our study shows that the site of care algorithm is utilized correctly the majority of the time. Adherence data obtained from the study will aid in the adoption of future site of care strategies.

Learning Objectives:

Explain the rationale for developing a site of care policy.

Recognize key stakeholders and potential obstacles when implementing a site of care policy.

Self Assessment Questions:

High acuity infusion medications, such as oncologic therapies, are most commonly infused at what place of service?

- A: Site 03
- B: Site 09
- C: Site 11
- D: Site 22

Who are key stakeholders to consider when developing a site of care policy?

- A: Revenue Cycle
- B: Clinical Leadership
- C: Managed Care
- D: All of the Above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-764-L04-P

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

ASSESSING THE EFFICACY AND SAFETY OF PRE-OPERATIVE ADMINISTRATION OF INTRAVENOUS ACETAMINOPHEN IN OUTPATIENT ORTHOPEDIC SURGICAL PATIENTS: A RETROSPECTIVE COHORT STUDY

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Purpose: Acetaminophen is commonly used as an agent in conjunction with opiates for multimodal analgesia. Acetaminophen administration has been shown in some studies to improve pain control and to reduce opiate consumption and adverse effects. However, overall data is conflicting and questions remain regarding clinical significance of findings. The purpose of this study is to identify any outcome differences present between pre-operative administration of intravenous acetaminophen compared to no administration in relation to various efficacy and safety variables. **Method:** Two groups of surgical patients will be compared based on receipt of preoperative acetaminophen or lack thereof. Patients were excluded if they possessed a pain contract or carried a diagnosis of cirrhosis or chronic kidney disease stage IV-V. The cohort included 331 cases of patients receiving an arthroscopic medial meniscectomy procedure: 221 patients received 1000mg of intravenous acetaminophen prior to procedure and 110 patients received no acetaminophen. Analgesic efficacy of acetaminophen was assessed by the first pain score post-procedure and breakthrough opiate consumption as assessed by number of post-operative opiate doses received, as well as total quantity of opiates utilized in oral morphine equivalents. Secondary outcome measures to be examined are length of stay in the recovery area/post-anesthesia care unit, as well as safety assessments as measured by post-operative receipt of medications for nausea/vomiting, pruritus or respiratory depression/over-sedation prior to discharge. **Results/Conclusions:** Results and analysis to be presented at Great Lakes Pharmacy Resident Conference

Learning Objectives:

Identify possible outcome variables where pre-operative intravenous acetaminophen could provide efficacy or safety benefits when included in multimodal analgesic strategies

Describe considerations in the decision to institute routine pre-operative intravenous acetaminophen use in surgical populations

Self Assessment Questions:

Which of the following is not an outcome variable that could be impacted with pre-operative intravenous acetaminophen use according to literature?

- A: Amount of breakthrough opiate use required for acceptable analgesia
- B: Incidence of thrombocytopenia
- C: Incidence of respiratory depression
- D: Incidence of nausea

Which of the following would not be potential factors in the decision to employ routine pre-operative intravenous acetaminophen use in surgical patients?

- A: Nephrotoxic excipients within the formulation
- B: Costs associated with drug acquisition, storage and administration
- C: Conflicting and variable nature of published literature in regards to
- D: Formulation packaging, such as container materials and size

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-497-L01-P

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

DEXMETOMIDINE AS ADJUNCT THERAPY FOR ALCOHOL WITHDRAWAL SYNDROME IN CRITICALLY ILL PATIENTS

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Purpose: Alcohol withdrawal syndrome (AWS) is a compilation of physical symptoms that can occur with interruption or acute reduction of alcohol consumption. There are currently no standard practice guidelines for the management of AWS, which leads to variability in clinical practice. The mainstay pharmacologic therapy is symptom-triggered benzodiazepines (BZDs) based on a withdrawal scale score such as the Clinical Institute Withdrawal Assessment of Alcohol Scale (CIWA). Adjunct therapies such as antipsychotics, neuroleptic agents, and centrally acting alpha-2 agonists have demonstrated variable clinical benefit in AWS. Dexmedetomidine is a highly selective α_2 -agonist that is being used more frequently because of its ability to produce sedating, anxiolytic, and sympatholytic activity. More importantly, it may help control AWS without causing respiratory depression. The objective of this study is to compare the intensive care unit (ICU) length of stay (LOS) in patients who received BZD compared to BZD and dexmedetomidine for management of AWS in critically ill patients.

Methods: This was a retrospective cohort study that included patients admitted to the adult medical, trauma/surgical, or neurosurgical ICU at Loyola University Medical Center and received treatment for AWS within the first 48 hours of the ICU admission between July 1, 2014 and June 30, 2017. Patients were excluded if they had a history of seizures or use of clonidine prior to dexmedetomidine therapy. The primary endpoint was discharge from the ICU within 96 hours. Secondary endpoints included cumulative BZD dose, need for a continuous BZD infusion, ICU LOS, hospital LOS, need for mechanical ventilation, infection (defined as use of antibiotics for ≥ 72 hours), treatment for aspiration pneumonia, hospital mortality, peak CIWA scores, adjunctive therapies, discharge disposition, new medications upon discharge, and adverse reactions. Data collection and analysis are currently ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify adjunctive therapies for treatment of alcohol withdrawal syndrome.

Describe the role of dexmedetomidine in alcohol withdrawal syndrome.

Self Assessment Questions:

What is an adjunctive therapy for treatment of alcohol withdrawal syndrome?

- A Phenobarbital
- B: Dexmedetomidine
- C: Gabapentin
- D: All the above

What is the mechanism of action of dexmedetomidine?

- A GABA agonist
- B Postsynaptic dopaminergic D2 receptor blocker
- C Selective alpha-2 agonist
- D NMDA receptor antagonist

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-498-L01-P

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

IMPLEMENTATION OF PHARMACOGENOMICS IN A COMMUNITY HOSPITAL

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Purpose: Pharmacogenomics (PGX) is the study and clinical application of human genetic variation and its impact on drug therapy. Evidence linking genetic variations to differences in drug response is increasing. Information about a patient's genetic variations may help clinicians choose the best drug regimen for each individual patient. Pharmacogenomics testing has the potential to prevent adverse drug reactions (ADRs) by predicting the right dose that the patient needs. The purpose of this project is to develop the necessary pharmacogenomics infrastructure to aid clinicians in using pharmacogenomics testing as a tool to help during clinical decision making at Monroe Clinic. **Methods:** The project is multifaceted. First guidelines for when to test patients for PGX variants will be written based on available clinical evidence. A literature review for each gene-drug interaction in the chosen PGX panel will be performed. PGX clinical decision support tools will be developed and reflect current clinical evidence. Workflows and scripting for PGX testing will then be written. Patients who meet the criteria for PGX testing will be identified by working with the medical staff. Finally, outcomes in patients that have been PGX tested will be evaluated. The outcomes identified and evaluated will be specific to the patient's medication-gene interaction. Outcomes will be identified and evaluated throughout the year. **Results:** The project is ongoing. Full information will be shared at the conference. **Conclusion:** The project is ongoing. Full information will be shared at the conference.

Learning Objectives:

Explain the benefits of pharmacogenomics testing.

Describe the steps needed to develop a pharmacogenomics service.

Self Assessment Questions:

DB is a 50 year old female who qualifies for pharmacogenomics testing based on her medication profile. She asks about the benefits of testing. How would you explain the benefits of pharmacogenomics testing?

- A Pharmacogenomics testing helps in reducing side effects, prevent
- B: Pharmacogenomics testing helps in reducing side effects, analyze
- C: Pharmacogenomics testing helps in reducing trial and error methods
- D: Pharmacogenomics testing helps in reducing side effects and identify

What are the steps needed to implement a pharmacogenomics service?

- A Test, inform, identify, analyze, interpret results, document
- B Identify, inform, test, interpret results, recommend, document
- C Educate, test, identify, interpret results, analyze, document
- D Test, identify, arrange, inform, interpret results, document

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-765-L04-P

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

EVALUATION OF ANTIBIOTIC PRESCRIBING FOR URINARY TRACT INFECTIONS AND UPPER RESPIRATORY INFECTIONS IN THE EMERGENCY DEPARTMENT

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Purpose: Urinary tract infections (UTI) and acute upper respiratory infections (URI) are among the top leading causes of emergency department (ED) visits in the United States. Antibiotic resistance remains an emerging concern in both the hospital and community setting with inappropriate and unnecessary antibiotics being associated with higher rates of *Clostridium difficile* infections, morbidity, mortality, and increased financial costs. The ED represents a unique environment of interest as it interfaces with the community and inpatient setting, and often has high rates of antibiotic prescribing. With new accreditation standards for antimicrobial stewardship in place, evaluating the antibiotic prescribing practices in the ED is necessary. The primary objective is to describe compliance with institutional and national guidelines for the treatment of UTIs and URIs, including appropriate antimicrobial selection and duration of therapy. Secondary objectives include: a comparison of compliance rates and the impact on *Clostridium difficile* colitis, ED or clinic readmission rates; and prescribing practices between prescriber type to assess for inter-physician variability. **Methods:** This is a retrospective, single-center cohort study of adult and pediatric patients with a diagnosis of UTI or URI via ICD10 codes admitted to the ED from September 2015 – August 2017, and discharged home. Patients with concomitant infections affecting appropriate antibiotic therapy, currently on antibiotics prior to ED admission, and patients with recent urologic procedure in the past 30 days are excluded. Data regarding the patient's demographics, co-morbidities, infection, and antibiotic use (drug and duration) will be collected. Patient outcomes (readmission rates, *clostridium difficile* infections) will be analyzed. By identifying the current state of ED antibiotic prescribing and its impact on clinical outcomes, this will allow for the development of more targeted antimicrobial stewardship interventions in the ED. **Conclusion:** Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Describe the rates of antibiotic prescribing and diagnoses seen in the Emergency Department.

Identify the appropriate first-line antibiotic therapy for the treatment of uncomplicated lower urinary tract infections and appropriate duration of therapy.

Self Assessment Questions:

In 2014, the Center for Disease Control and Infection estimated about what percentage of antibiotic prescribing occurring in the outpatient setting?

- A: 15-25 %
- B: 40-50 %
- C: 60-70 %
- D: 80-90 %

The IDSA recommends which of the following agents as a first-line antibiotic of choice for an uncomplicated urinary tract infection?

- A Nitrofurantoin
- B Amoxicillin/Clavulanic acid
- C Ciprofloxacin
- D Cefpodoxime

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-499-L01-P

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

ASSESSMENT OF CHEMOTHERAPY-INDUCED NAUSEA AND VOMITING IN ADULT PATIENTS RECEIVING OXALIPLATIN-BASED CHEMOTHERAPY IN URBAN-ACADEMIC HOSPITAL

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Purpose: The objective of this study is to determine whether the current antiemetic practice (5-hydroxytryptamine-3 antagonist + dexamethasone) at UI health outpatient oncology clinic adequately prevents patients from chemotherapy-induced nausea and vomiting of oxaliplatin-based therapy. **Methods:** This is a retrospective observational cohort study at UI health outpatient oncology clinic. Patients that received oxaliplatin-based chemotherapy from July 2016 to July 2017 will be included. Patients will be followed up throughout entire regimen. The primary endpoint is the percentage of patients reporting uncontrolled nausea and vomiting during chemotherapy cycles. The threshold for failure/uncontrolled chemotherapy-induced nausea and vomiting is ten percent. Uncontrolled nausea and vomiting will be defined as one of the following: documented uncontrolled nausea and vomiting in the medical note or chart, patients who required additional antiemetic medications or additional breakthrough antiemetic medications, documented unscheduled clinic visit, emergency department visit or hospitalization due to nausea and vomiting in the medical note or chart. The secondary endpoints are additional antiemetic medications in subsequent cycles, additional breakthrough antiemetic medications, delayed chemotherapy, and unscheduled clinic visit, emergency department visit, and hospitalization due to nausea and vomiting. Descriptive statistics was employed for the study endpoints.

Results and conclusions In process

Learning Objectives:

List the risk factors for chemotherapy-induced nausea and vomiting
Discuss the prevention antiemetic for moderately emetogenic chemotherapy

Self Assessment Questions:

All the following are risk factors for chemotherapy-induced nausea and vomiting EXCEPT

- A: Smoke more than 10 cigarettes per day
- B: History of anxiety and motion sickness
- C: Female
- D: Age ≤ 50 years old

Which of the following antiemetic is (are) correct for moderately emetogenic chemotherapy?

- A: 5-HT3 + Dexamethasone + NK-1 RA
- B: 5-HT3 + Dexamethasone
- C: 5-HT3 alone
- D: A and B

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-500-L01-P

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

NATIONAL EVALUATION OF ANTIBIOTIC TREATMENT FOR CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CRE) AND OUTCOMES IN VETERANS WITH SPINAL CORD INJURY/DISORDER (SCI/D)

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PURPOSE: There are approximately 282,000 people in the United States with Spinal Cord Injury/Disorders (SCI/D), and an estimated 17% are veterans. Infection is a significant source of morbidity and is the leading cause of death in patients with SCI/D. This population is at increased risk of multidrug resistant infections including CRE due to multiple factors including frequent healthcare contact and antibiotic use. The emergence of CRE throughout health-systems is designated at the highest threat level for antibiotic resistance by the Centers for Disease Control and Prevention (CDC). CRE are typically resistant to most available antibiotics and are often treated inappropriately, leading to increased mortality. The objective of this study is to describe antibiotic regimens used for treatment of active CRE infection in veterans with SCI/D and the clinical characteristics and outcomes of treated patients. **METHODS:** This retrospective cohort study utilizes national VA data from a previously conducted retrospective analysis of patients with records indicating an ICD-9 code for SCI/D in the diagnostic field treated at any VA facility from January 1, 2011-December 31, 2013. Veterans with ALS and other progressive neurological deficits were excluded. This study included only patients from the cohort with active CRE infection. Additional data was collected via chart review. Primary outcomes include describing antibiotics individually, by drug class, and by empiric or definitive; determining use of monotherapy or combination therapy; and describing outcomes based on antibiotics. Outcomes include overall rate of in-hospital, 30-day, and 1-year mortality, admissions within 30 days and 1 year, and length of stay. Descriptive analyses will be conducted using SAS software with statistical significance at the 0.05 level. Continuous variables will be compared using the Student t-test or Wilcoxon two-sample test depending on distribution. Categorical variables will be compared using Chi-square tests. **RESULTS/CONCLUSIONS:** Will present at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify risk factors for CRE that are common in patients with SCI/D
Classify antibiotics as appropriate or inappropriate empiric treatment options for a patient with suspected CRE infection

Self Assessment Questions:

Which of the following are risk factors for multidrug resistant infections in patients with SCI/D?

- A: Development of pressure ulcers
- B: Increased healthcare exposure
- C: Broad spectrum antibiotic exposure
- D: All of the above

CRE isolates are most likely resistant to which of the following antibiotics?

- A: Ceftriaxone
- B: Amikacin
- C: Colistin
- D: Polymixin B

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-501-L01-P

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

EVALUATION OF FALL RISK IN DEMENTIA PATIENTS ON ATYPICAL ANTIPSYCHOTICS IN THE VETERAN AFFAIRS (VA) POPULATION

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Purpose: Antipsychotics (APs) are widely used as off-label treatment for behavioral symptoms in dementia patients. It is recognized that APs can increase the risk for falls in the elderly population. When used in dementia patients, this risk is further increased, since dementia itself is an independent risk factor for falls. The purpose of this study is to determine the difference in the incidence of falls between dementia patients living in the community living centers (CLC) at the Captain James A. Lovell Federal Health Care Center (FHCC) receiving atypical antipsychotics (APs) versus those who are not. **Methods:** This study will be a retrospective cohort study comparing two groups in the VA population: dementia patients receiving atypical APs versus dementia patients not receiving atypical APs. Veterans aged 50 years or older with dementia admitted to FHCC CLCs were included in the study. Patients who were bedridden and were on scheduled or as needed (PRN) typical APs (except PRN haloperidol and PRN fluphenazine) were excluded from the study. A total of 238 patients were reviewed, but only 62 patients were included. The primary endpoint is the difference in the incidence of falls between the two cohort groups. The secondary endpoints are the differences in the incidence of falls between subtypes of dementia, different number of fall risk increasing drugs (FRIDs), and different fall risk as defined by the Morse Scale. **Results/Conclusion:** Preliminary results show no statistically significant difference in the incidence of falls between patients on atypical APs compared to those not on atypical APs. More data collection is ongoing, and complete results will be presented at Great Lakes Pharmacy Resident Conference

Learning Objectives:

Identify the relationship between fall risk and usage of atypical antipsychotic medications
Outline risk factors for increasing fall risk in the elderly

Self Assessment Questions:

What effects of atypical antipsychotics are we worried about in increasing fall risk?

- A: Reduction in extrapyramidal symptoms
- B: Development of metabolic syndrome
- C: Increase in sedation
- D: Reduction in positive symptoms

What additional factors increases a patient's fall risk?

- A: Being independent in activities of daily living
- B: Declining cognitive status
- C: Being bed-bound
- D: Morse scale score of 20

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-767-L01-P

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

A RETROSPECTIVE STUDY TO UNDERSTAND THE RISK FACTORS/DRIVERS OF "INAPPROPRIATE" ANTIMICROBIAL USE AND THE PERFORMANCE EVALUATION OF A CLINICAL DECISION SUPPORT TOOL THAT FACILITATES PREDICTION OF OUTBREAKS

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PurposeThe purpose of the study is to improve and validate a method by which trends in antimicrobial consumption can be used to identify and predict inappropriate or unsafe antimicrobial use. The results from this proposal are expected to provide a tool for antimicrobial stewardship programs to interpret antimicrobial utilization data as a measure of quality and safety. Our previous work demonstrated antibiotic use clusters over time. We hypothesize that egregiously inappropriate vancomycin use (never events) also clusters over time. Our study aims to comprehensively classify never events based on clinical and environmental factors. Secondly, we will examine the relationship between clusters of high vancomycin use and never events.
MethodsWe select intravenous vancomycin as the study antibiotic as it is commonly overused and known to cause downstream harms. Local consumption data spanning a total of 3 years will be analyzed retrospectively. Descriptive level antimicrobial use, patient and provider demographics, and patient level outcomes data will be collected. The proportion of inappropriate vancomycin use will be classified as never events. The rate of never events will be categorized as a function of patient, provider, and disease characteristics. We also seek to identify the relationship between clusters of high antibiotic use and occurrence of never events.
ResultsResults and conclusions will be presented at the Great Lakes Pharmacy Residency Conference pending data collection and analysis.

Learning Objectives:

Classify vancomycin never events comprehensively
Identify the relationship between clusters of high antibiotic use and occurrence of never events

Self Assessment Questions:

Which of the following terms could capture the most possible "misuse" of IV vancomycin from a hospital electronic query (for measuring hospital-wide IV vancomycin use) based on the diagram?

- A All medication use
- B: Medication use in a specific ward
- C: Inappropriate use
- D: All of the above

What is one way to measure vancomycin standardized consumption across a facility (assuming all data is available for access)?

- A Days of therapy (DOT) data alone
- B Days of therapy and days present
- C Days present alone
- D Sum of unit-specific IV vancomycin consumption and unit-specific

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-766-L04-P

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

IMPACT OF A PAIN MANAGEMENT ALGORITHM ON OPIOID PRESCRIBING IN THE EMERGENCY DEPARTMENT

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Purpose: The overuse of pain medication nationwide has resulted in an opioid epidemic with greater than 420,000 emergency department visits related to the misuse or abuse of narcotic pain medications according to the Center for Behavioral Health Statistics and Quality report in 2015. The need to balance effective pain management with risk from medication is greater than ever. An opioid prescribing algorithm is a potential option to help guide prescribing to reduce opioid use in the emergency department. The primary objective of this study is to create an evidence based pain management prescribing algorithm and policy to reduce opioid use in the emergency department.
Methods: The Aspirus system consists of eight hospitals located throughout Wisconsin and Michigan. A pain management prescribing algorithm will be developed for specific pain complaints based on pain management guidelines and evidence based literature. The algorithm will be submitted to required hospital committees for approval. An emergency department physician champion will assist with education, approval, and implementation of the algorithm across the system. Emergency and pharmacy department staff at each site will be educated on alternatives to opioids for pain and use of the algorithm. Hospital policies, smart pump drug libraries, and the electronic health record (EHR) will be updated as necessary. A retrospective review using automated dispensing cabinet reports and the EHR will be conducted before and after implementation of the pain management algorithm. The primary outcome will be the percent change in opioid prescribing during the emergency room visit and upon discharge. The secondary outcome is to compare patient satisfaction scores for management of pain before and after policy implementation.
Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the role of an acute pain management policy on reducing opioid use in the emergency department.
Review the utility of ketamine and lidocaine in acute pain.

Self Assessment Questions:

Which of the following are options for reducing opioid use in the emergency department:

- A Limiting quantity of opioid prescribed on discharge
- B: Reviewing the state's prescription drug monitoring programs
- C: Utilizing an acute pain management prescribing algorithm for certain
- D: All of the above

Which of the following are methods for reducing potential side effects of IV ketamine administration for acute pain:

- A Smaller doses (<1 mg/kg)
- B IV push
- C short infusion
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-502-L01-P

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

EVALUATION OF THERAPEUTIC DRUG MONITORING OF DIGOXIN

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Purpose: Patients taking digoxin for heart failure or atrial fibrillation may require individualized dosing regimens, sometimes indicating therapeutic drug monitoring. Guidance for therapeutic drug monitoring of digoxin should describe under what circumstances monitoring is warranted, when to order a level after initiation or change in therapy, and how often to order levels. Therapeutic drug monitoring of digoxin occurs at Cleveland Clinic Main Campus without guidance or evaluation of the clinical and financial impact. This study's purpose is to evaluate current practices at Cleveland Clinic Main Campus with regards to utilization and application of therapeutic drug monitoring of digoxin by describing the indications, timing, frequency, and cost of monitoring. **Methods:** Patients 18 years of age or older admitted to Cleveland Clinic Main Campus between January 1st, 2017 and September 31st, 2017 with at least one documented serum digoxin level or at least one documented digoxin administration were included. Demographic data, digoxin administration data, and digoxin level data was attained via Cleveland Clinic electronic medical records. Patients that received digoxin during their admission were assessed on if they did or did not receive a level and how many levels each received. For patients with digoxin levels drawn during the admission, levels were assessed based on the time the level was drawn compared to the prior dose and dose after, time the level was drawn compared to admission, and if there was a therapy intervention made based on the level result. The cost of therapeutic drug monitoring was also assessed for each patient. Data will be analyzed using descriptive statistics. **Results and Conclusion:** To be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review important considerations in therapeutic drug monitoring of digoxin regarding indication and practices
Explain current digoxin therapeutic monitoring practices at Cleveland Clinic Main Campus

Self Assessment Questions:

What is the half-life of digoxin in a patient with no renal impairment?

- A: 6 hours
- B: 12 hours
- C: 36 hours
- D: 96 hours

Based on the recommended therapeutic range of digoxin in post-hoc analyses of the DIG trial, which of the following would be considered a therapeutic drug level for the treatment of heart failure?

- A: 0.4 ng/mL
- B: 0.8 ng/mL
- C: 1.5 ng/mL
- D: 2.2 ng/mL

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-503-L01-P

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

EVALUATION OF SYSTEMIC CORTICOSTEROID UTILIZATION FOR MEDICAL PATIENTS WITH EXACERBATIONS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

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Purpose: The objective of this study is to assess the utilization of systemic corticosteroids for non-ICU inpatients on the medical floor experiencing a COPD exacerbation. **Methods:** This retrospective observational study will compare the use of systemic corticosteroids at Cleveland Clinic – South Pointe Hospital with the recommendations from the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines. The primary endpoint is the utilization of systemic corticosteroids for medical patients with a COPD exacerbation. The secondary endpoints include number of days of systemic steroid therapy, total steroid dose in prednisone equivalents, days until IV steroids are converted to PO steroids, average steroid cost per day, rate of 30-day re-admission for COPD, systemic and inhaled steroid therapy overlap, patients discharged on systemic steroids, duration of antibiotic therapy, and total length of stay. Patient information will be obtained through a hospital medical record search for adult patients experiencing a COPD exacerbation during admission between January 1, 2017 and June 30, 2017. Inpatients greater than 18 years of age who have been admitted to the medical floor and who have a prior diagnosis of COPD with an admission diagnosis of COPD exacerbation will be included. Patients will be excluded if experiencing an asthma exacerbation, are admitted to the ICU, or have a need for invasive/non-invasive mechanical ventilation. **Results and conclusions:** Data collection is currently ongoing. Results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe possible complications of systemic corticosteroid use in patients experiencing COPD exacerbations.
State the GOLD guidelines' recommendations for systemic corticosteroid use in patients experiencing COPD exacerbations.

Self Assessment Questions:

Which of the following is a potential adverse effect of systemic corticosteroid use?

- A: Psychiatric disturbances
- B: Hypoglycemia
- C: Leukopenia
- D: Hyperkalemia

The GOLD guidelines currently recommend which of the following systemic corticosteroids and doses to be used in patients experiencing a COPD exacerbation?

- A: Methylprednisolone 40mg IV once daily
- B: Methylprednisolone 80mg IV once daily
- C: Prednisone 40mg PO once daily
- D: Prednisone 60mg PO once daily

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-505-L01-P

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

EVALUATION OF A PROSPECTIVE AUDIT AND FEEDBACK INITIATIVE ON DURATION OF BROAD-SPECTRUM ANTIBIOTIC

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To comply with the Joint Commission's medication management standard, and to provide more comprehensive care for patients at OhioHealth Marion General Hospital, the Antimicrobial Stewardship Committee implemented a prospective audit and feedback review of broad-spectrum antibiotics. The purpose of this study is to evaluate the impact of this process in a community hospital setting. The primary endpoints are to compare the days of therapy that patients received any of the targeted antibiotics (piperacillin/tazobactam, cefepime, or aztreonam) during a 4-month period before and after the audit/feedback implementation and to determine 24-hour acceptance rate of antimicrobial recommendations by the attending provider, after audit/feedback implementation. This was a single-center retrospective study which included patients 18 years of age and older, admitted to Marion General Hospital inpatient and observation units. Patients were excluded if antibiotics were only given in the emergency department, only given for pre- or post-operative prophylaxis, and if a patient received an infectious disease consult during their admission. A pharmacist and an infectious disease physician discussed specific patient's antimicrobial regimens biweekly, 48-72 hours after initiation of therapy. The Antimicrobial Stewardship Team (AST) did not physically evaluate the patient. When a recommendation was warranted, the AST left a note in the patient's Electronic Medical Record or called the patient's attending provider. Two time periods were evaluated: June 1st to September 30th of 2016 and June 1st to September 30th of 2017. Study subjects were identified by query of medical records database to include all patients who were admitted during these time periods and received at least one dose of targeted broad-spectrum antibiotics. It is hypothesized that after the initiation of this process, the duration of therapy of broad-spectrum antibiotics will decrease. Data analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference in April 2018.

Learning Objectives:

Identify the risks associated with prolonged use of broad-spectrum antibiotics.

Recognize the importance of antimicrobial stewardship programs within a community-based hospital setting.

Self Assessment Questions:

According to the CDC, _____ patients are infected with multidrug-resistant organisms, and these infections result in approximately _____ deaths per annum.

- A: Over two million; 23,000
- B: Over one million; 2,300
- C: Over 500,000; 2,000
- D: Over five million; 200

Which of the following entities requires hospitals to establish an Antimicrobial Stewardship program?

- A: Centers for Disease Control and Prevention (CDC)
- B: Infectious Disease Society of America (IDSA)
- C: The Joint Commission (JCAHO)
- D: American Society of Health-System Pharmacists (ASHP)

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-504-L01-P

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

STABILIZING EUGLYCEMIA IN DIABETIC KETOACIDOSIS: A RETROSPECTIVE COMPARISON OF FULL- VERSUS REDUCED-RATE INSULIN INFUSION

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Purpose: The purpose of this study is to evaluate the optimal management strategy during the euglycemic stage of diabetic ketoacidosis (DKA) and to determine if the omission of an empiric insulin rate-reduction step increases the incidence of hypoglycemia. American Diabetes Association (ADA) guidelines recommend reducing the insulin rate to 0.02 – 0.05 units/kg/hr once serum glucose <200 mg/dL is achieved. British guidelines recommend against reducing the insulin rate. A previous institutional DKA protocol maintained a full-rate insulin infusion when the patient became euglycemic. In November of 2016, a new DKA protocol was implemented to introduce the insulin rate reduction step. Methods: This retrospective cohort study examines the incidence of hypoglycemia, defined as blood glucose level <70 mg/dL, within 24 hours using a protocol similar to British DKA guidelines (cohort 1) versus current protocol similar to American DKA guidelines (cohort 2). Cohort 1 includes patients managed using the previous institutional protocol, in which the glucose-stabilizing step introduces a dextrose (D5W)-based drip at 250 mL/hr following the first blood glucose below 250 mg/dL while continuing the insulin infusion rate of 0.1 units/kg/hr. Cohort 2 includes patients managed with the revised protocol, which involves concurrent introduction of a D5W-based drip at 250 mL/hr and a decrease in insulin infusion rate to 0.05 units/kg/hr once the first blood glucose is below 200 mg/dL. Patients must be eighteen years or older, non-pregnant, have a diagnosis of DKA, and started on an insulin drip under the DKA protocol. Secondary measures evaluated include blood glucose trend following euglycemia, administration of D50W within 24 hours, time until serum bicarbonate >15, time until anion gap <12, incidence of severe hypoglycemia and rebound hyperglycemia within 24 hours, and length of intensive care unit (ICU) stay. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the current ADA and British recommendations for the management of DKA

Describe the effects of insulin infusion rates on metabolic markers of DKA resolution following the achievement of euglycemia

Self Assessment Questions:

A patient in DKA is receiving a continuous insulin infusion at 0.1 units/kg/hr and 0.45% NaCl + fluids running @250 mL/hr. Their most recent glucose level is 192, K+ 5.4, venous pH 7.03, serum bicarb

- A: Continue insulin infusion at 0.1 units/kg/hr and change fluids to D5
- B: Continue insulin infusion at 0.1 units/kg/hr and change fluids to D5
- C: Reduce insulin infusion to 0.05 units/kg/hr and change fluids to D5
- D: Reduce insulin infusion to 0.05 units/kg/hr and continue 0.45% Na

According to the ADA guidelines, which of the following lab values are consistent with the resolution of ketoacidosis?

- A: Blood glucose: 186, Anion gap: 13, serum bicarbonate 14, venous p
- B: Blood glucose: 197, Anion gap: 9, serum bicarbonate 20, venous p
- C: Blood glucose: 206, Anion gap: 6, serum bicarbonate 25, venous p
- D: Blood glucose: 153, Anion gap: 11, serum bicarbonate 14, venous p

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-506-L01-P

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

MEDICATION HISTORY COLLECTION UPON ADMISSION TO THE INPATIENT SETTING: A QUALITY IMPROVEMENT PROJECT

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Purpose: Medication reconciliation continues to be a potential source of medication errors during hospitalization. Documenting inaccurate or incomplete medication histories upon admission to the hospital can lead to administration of the wrong medication or omission of an important home medication throughout the hospital stay. Ensuring an accurate admission medication history can allow appropriate continuation of home medications. The goal of this project is to improve the accuracy of the medication histories collected for patients upon admission to the hospital. **Methods:** Baseline data was collected to assess the number of errors made during admission medication history collection. Baseline data was obtained by randomly selecting patients upon discharge, repeating the process of obtaining an admission medication history in these patients, and comparing the history obtained by the investigator with the history previously obtained by the medication history technician. To improve the medication history collection process, additional pharmacy technicians specializing in medication history collection were hired and trained, allowing around-the-clock availability of medication history technicians. A training program was developed to standardize the process of performing medication history collection. All new and existing medication history technicians participated in the training program and have implemented the standardized process for obtaining medication histories. Ongoing training sessions in the form of huddles will be conducted on a bi-weekly basis for continual process improvement. Reassessment of the number of errors made on medication history collection will be performed by collecting data after the training program has been fully implemented. **Results and Conclusion:** Data collection and analysis are currently in progress. Results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe methods to improve success in patient interviews for medication history collection

Describe the types of sources that can be used when obtaining information from multiple sources for medication history collection

Self Assessment Questions:

What is a technique that can be used to facilitate obtaining information about home medications during a patient interview?

- A Utilizing medical terminology
- B: Asking yes or no questions
- C: Repeating questions in multiple formats
- D: Asking about prescription medications only

Which source(s) of information about home medications may be sufficient to use alone without confirming with additional sources?

- A Patient and home health care nurse
- B List of medications printed from the last appointment at a physician
- C List of medications from all outpatient pharmacies, including mail order
- D Nursing home medication list

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-879-L05-P

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

RETROSPECTIVE REVIEW OF THROMBOLYSIS FOR ACUTE SUBMASSIVE PULMONARY EMBOLISM

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Purpose: While there is moderate evidence to support use of fibrinolysis in the treatment of massive pulmonary embolism (PE), the role of fibrinolysis in the treatment of submassive PE is less defined. A submassive PE is classified as an acute PE without systemic hypotension but with either evidence of right ventricular (RV) dysfunction or myocardial necrosis. Based on low quality evidence and small clinical trial sample sizes, guidelines for the management of submassive PE weakly recommend thrombolytic therapy in cases with low bleeding risk and adverse prognosis despite anticoagulation initiation. Adverse prognosis refers to cardiopulmonary deterioration or severe RV injury, which may include circulatory failure, respiratory insufficiency, major elevation of biomarkers, or RV hypokinesia. Short-term outcomes, such as hospital length of stay and oxygen requirements, have not previously been evaluated when comparing anticoagulation and thrombolytic therapy versus anticoagulation therapy alone in submassive PE. Due to the lack of literature to support a clear evidence-based treatment approach in submassive PE, the primary objective of this study is to evaluate treatment modalities and the associated short-term outcomes in submassive PE within a community hospital setting. **Methods:** This retrospective, single-center, observational study includes patients age 18 years and older with a diagnosis of submassive PE between August 1, 2015 and August 1, 2017. The primary outcome is change in oxygen support requirements from time 0 to 12 hours in patients who receive anticoagulation and thrombolytic therapy versus anticoagulation therapy alone. Secondary outcomes include change in oxygen support requirement from time 0 to 24 hours, 30-day hospital readmission rate, moderate, severe, or life-threatening bleeding events defined by GUSTO criteria, hospital length of stay, intensive care unit length of stay, and mortality. **Results/Conclusions:** Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define the subgroups for acute pulmonary embolism according to the American Heart Association

Select pulmonary embolism therapy based on patient characteristics, clinical presentation, and risk versus benefit assessment

Self Assessment Questions:

According to the American Heart Association, which of the following subgroups describes a patient with a PE who presents with sustained hypotension, pulselessness, or persistent profound bradycardia?

- A Massive
- B: Submassive
- C: Submassive intermediate-high risk
- D: Submassive intermediate-low risk

The 10th Edition of the American College of Chest Physicians (CHEST) guidelines strongly recommends which therapy in a patient with a submassive PE?

- A Anticoagulation
- B Aspirin
- C Compression Stockings
- D Thrombolysis

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-507-L01-P

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

BURDEN AND OUTCOMES OF RESISTANT GRAM-NEGATIVE ORGANISMS IN VETERANS WITH SPINAL CORD INJURY AND DISORDERS (SCI/D)

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Purpose: In the United States, the estimated incidence of new cases of SCI/D is approximately 17,500 annually. There has also been a steady increase in the prevalence of multidrug resistant gram-negative organisms (MDRGNO) causing infections, including those with SCI/D. Because of their frequent healthcare visits as well as their exposure to antibiotics, this patient population is not only at high risk for infection, but also for colonization with MDROs. It is unknown if these factors contribute to increased risk of other infections including Clostridium difficile infection (CDI). The purpose of this study is to assess the risk factors associated with having both an MDRGNO infection and CDI as compared to having an MDRGNO infection individually in SCI/D patients. **Methods:** A retrospective cohort study of national VA medical, encounter, pharmacy, and microbiology laboratory data was performed. The study sample were veterans with SCI/D seen from January 1, 2012 to December 31, 2013. MDRGNOs were considered gram-negative isolates with non-susceptibility to at least one agent in three or more antimicrobial categories. CDI was defined as a stool sample yielding a positive result for a laboratory assay for C. difficile. Demographic and medical characteristics will be described using descriptive and bivariate analyses which will be conducted using SAS software, version 9.3 and regression models will be fit using STATA software 12.1; with statistical significance at the 0.05 level. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify specific characteristics that put patients at risk for Clostridium difficile infection.

Review factors that put Veterans with spinal cord injury/disorders (SCI/D) at high risk for infections caused by multidrug resistant gram-negative organisms (MDRGNOs).

Self Assessment Questions:

Which of the following puts patients at high risk of a CDI?

- A Opioid exposure
- B: Antibiotic exposure
- C: Recent hospitalization
- D: Both B and C

Which of the following puts SCI/D patients at high risk for infections caused by MDRGNOs?

- A Frequent healthcare exposure
- B Height
- C Invasive medical devices (i.e. urinary catheters)
- D Both A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-508-L01-P

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

IMPLEMENTATION OF AN ANTICOAGULATION DOCUMENTATION TOOL TO STREAMLINE PHARMACIST MANAGED WARFARIN CONSULTS

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There are several factors that influence decisions made during the initiation and management of warfarin during an inpatient admission. These factors include drug-drug interactions, drug-disease interactions, and patient specific risk factors. Workflow processes for the management of inpatient warfarin pharmacy consults rely heavily upon the electronic medical record (EMR) for laboratory values, creation of progress notes, and notification of consults. The complexity of weighing patient specific factors and the multi-step process of searching for information within the EMR can lead to potential errors. At this community health system reports of missed consults, omission of doses, and missing or inaccurate documentation led to re-evaluation of current workflow. The purpose of this project is to implement an anticoagulation documentation tool within the EMR to streamline current pharmacist workflow. Background research was completed to assess various workflow processes from other health systems and possible EMR enhancements. A taskforce consisting of an inpatient pharmacist, information technology specialist, medication safety officer, and pharmacy managers was formed to assist in the implementation of the project. Pertinent patient specific risk factors, concurrent disease states, and drug-drug interactions were identified. The EMR enhancement was optimized to display concurrent anticoagulants, pertinent laboratory values, consults requests, outpatient anticoagulation clinic referrals. This should prompt the completion of a structured evaluation of patient specific risk factors and documentation. Reported events related to warfarin consults pre-implementation were reviewed. Events reported after implementation will be reviewed. Final conclusions and results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize various form of medications errors associated with warfarin dosing in an electronic medical record

Describe potential benefits of anticoagulation documentation tool

Self Assessment Questions:

Which of the following are considered potential risk factors when assessing patients for initiation of warfarin?

- A Liver disease
- B: Asthma
- C: Age
- D: A and C

What are the benefits of a structured anticoagulation documentation tool?

- A Complicates the note writing process
- B Prompts clinical review of patient specific risk factors
- C Reduce time writing notes
- D B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-880-L05-P

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

EVALUATION OF THE INCIDENCE OF CLOSTRIDIUM DIFFICILE-ASSOCIATED DISEASE (CDAD) IN PEDIATRIC PATIENTS RECEIVING CEPHALOSPORINS FOR PREVENTION OF IRINOTECAN-INDUCED DIARRHEA (IAD)

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Purpose: IAD is the main treatment-limiting factor of irinotecan chemotherapy, an important agent for the treatment of many refractory pediatric malignancies. The University of Chicago Medicine (UCM) implemented a practice change mandating that every protocol for all pediatric patients receiving irinotecan to receive IAD prophylaxis with a third generation cephalosporin, cefixime, before, during, and after irinotecan administration. The goal of this therapy is to eliminate the gut bacteria that leads to accumulation of the toxic metabolite of irinotecan, leading to IAD. This purpose of this project is to examine rates of IAD vs. rates of CDAD and IAD before and after practice change implementation protocol implementation. **Methods:** This is a single-center, retrospective analysis of pediatric patients who received irinotecan chemotherapy at UCM between June 1, 2008 and December 15, 2017. Patients will be excluded if they have PUD or any GI condition that could alter motility/absorption, an allergy to cefixime or cefpodoxime, or were concurrently receiving phenytoin, carbamazepine, or phenobarbital. The primary objective of the project is to determine the difference in the incidence of CDAD before and after the practice change mandating prophylactic cephalosporin use. Secondary endpoint will include severity of IAD, tumor response, treatment discontinuation rates and hospital length of stay. **Results:** Preliminary results will be presented at the Great Lakes Pharmacy Residency Conference. **Conclusions:** It is anticipated that study data will provide knowledge regarding the optimal use of third generation cephalosporins in pediatric patients receiving irinotecan to reduce IAD incidence and severity, as well as minimize incidence of Clostridium difficile infections.

Learning Objectives:

Discuss the mechanism of late IAD and how third generation cephalosporin use will theoretically prevent it
Identify the risks of adding on third generation cephalosporins to chemotherapy regimens containing irinotecan

Self Assessment Questions:

How do third generation cephalosporins work to decrease IAD incidence and severity?

- A Through inhibition of irinotecan metabolism
- B: By reducing levels of the SN-38 metabolite
- C: By coating the intestinal epithelium
- D: Through inhibition of the glucuronidation process in the liver

•What is/are potential benefit(s) to using cephalosporin prophylaxis?

- A Potential for increased maximum tolerable dose (MTD)
- B Decreased incidence of IAD
- C Increased tumor response
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-509-L01-P

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

IMPLEMENTING A MEDICATION EDUCATION WORKFLOW TO REDUCE READMISSION RATES IN HIGH RISK PATIENTS WITH HEART FAILURE (HF) IN A FOUR HOSPITAL COMMUNITY HEALTH SYSTEM

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Purpose: Hospital readmissions for patients with heart failure (HF) are an ongoing challenge. The baseline readmission rate of patients with HF at this four hospital community health system is 20.4% with a goal of 17.4%. In 2012, the Affordable Care Act required the Centers for Medicare and Medicaid Services (CMS) to reduce payments to hospitals with excess readmissions within 30 days for HF patients. Several systematic reviews have found that reducing readmission rates is multi-factorial and often times a majority of patients are unaware of changes made to their medications. At this community health system, there is a protocol that requires pharmacists and pharmacy students to provide medication education to patients with heart failure. As part of a corporate initiative to reduce HF readmission rates, workflow adjustments were implemented for inpatient pharmacists and pharmacy students to increase medication education counseling in HF patients with a high risk of readmission. **Methods:** A task force of individuals representing multiple disciplines tracks the percentage of high readmission risk HF patients counseled at this community health system. Preliminary data was analyzed to assess the accuracy of this percentage. The data revealed not all high risk HF patients were identified for pharmacists and students to counsel. **Methods:** were then created to identify this high risk patient population in the electronic health record. Training sessions were given to inpatient pharmacists and pharmacy students to quickly identify high risk HF patients. Pharmacists were re-educated on key counseling points of heart failure medications, and how to properly document that patient counseling was completed. Data on the percentage of patients counseled was collected weekly in a report and was evaluated to determine the impact made by the new workflow. **Results and conclusion:** Final conclusions and results will be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Discuss barriers in identifying HF patients with high risk for readmission in this community health system
Review the criteria and areas of development within the medication education protocol to help reduce readmission rates in high risk HF patients in this community health system

Self Assessment Questions:

1. Which of the following is a potential barrier in identifying HF patients with a high risk for readmission at this community health system?
- A Variety of patient list identifiers among all pharmacists
 - B: Counseling the same key medication education points among all p
 - C: Familiarity with health system protocol on appropriate documentati
 - D: All of the above

Which of the following statements about reducing HF readmissions is correct?

- A HF readmission rates are only dependent on inpatient pharmacist
- B HF readmission rates are multi-factorial and inpatient pharmacist c
- C HF readmission rates are only dependent on out patient pharmacist
- D HF readmission rates are only dependent on inpatient pharmacist

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-768-L04-P

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

COMPLICATIONS OF EXTRACORPOREAL MEMBRANE OXYGENATION WITH BIVALIRUDIN VERSUS HEPARIN ANTICOAGULATION

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Extracorporeal membrane oxygenation (ECMO) is a potentially life-saving intervention that may transiently support a patient through a period of reversible acute respiratory failure and/or cardiac failure; however, it mandates balancing the risk of thromboembolic complications with the risk of bleeding. Although systemic heparin is most commonly utilized for anticoagulation during ECMO, bivalirudin has theoretical advantages including the ability to bind to both free and clot-bound thrombin and avoids the risk of heparin-induced thrombocytopenia. The purpose of our study is to compare observed thromboembolic and bleeding complications with heparin to those that occur with bivalirudin in ECMO patients. In this retrospective study, the primary outcome will be composite thromboembolic events with heparin versus bivalirudin. Thromboembolic complications will be defined as the requirement for oxygenator and/or circuit exchange, laboratory values indicating acute hemolysis, new onset renal dysfunction with a urinalysis positive for urobilinogen, or systemic thromboembolism including venous thromboembolism, pulmonary embolism, intracardiac thrombus, or ischemic stroke. Secondary outcomes will include a comparison of composite bleeding complications, percent of measured activated partial thromboplastin times (aPTT) in goal range, and subgroup analyses of thromboembolic and bleeding complications within different aPTT goal ranges. Preliminary results include analysis of 100 ECMO patients of which 61% were male with a mean age of 51 years. The type of ECMO support was 36% venovenous and 64% venoarterial and the mean duration of ECMO support was 7.67 days. Within this group 54% were anticoagulated with heparin, 5% with bivalirudin, 36% switched between agents, and 5% were on no systemic anticoagulation. Complete results and conclusions will be discussed at the 2018 Great Lakes Pharmacy Residency Conference. We anticipate that the results will help standardize an approach to anticoagulation in ECMO patients.

Learning Objectives:

Discuss the benefits and risks associated with systemic anticoagulation in the setting of ECMO

Identify monitoring parameters for hemolysis and anticoagulation therapy specific to ECMO

Self Assessment Questions:

Which of the following is a theoretical benefit of bivalirudin as compared to heparin?

- A: Bivalirudin binds only to free thrombin
- B: Bivalirudin avoids the risk of HIT
- C: Bivalirudin does not require dose titration
- D: Bivalirudin is less expensive than heparin

Which of the following is a laboratory value suggesting hemolysis?

- A: Elevated activated partial thromboplastin time (aPTT)
- B: Decreased lactate dehydrogenase
- C: Increased plasma free hemoglobin
- D: Increased liver function tests (LFTs)

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-510-L01-P

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

APPROPRIATENESS OF INPATIENT FLUOROQUINOLONE PRESCRIBING BEFORE AND AFTER AN ANTIMICROBIAL STEWARDSHIP INITIATIVE AT A SMALL COMMUNITY HOSPITAL

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Purpose: Fluoroquinolones are relatively broad spectrum antibiotics with recognized potential for causing collateral damage. While many hospitals have antimicrobial stewardship teams to assess use of broad spectrum agents like fluoroquinolones, small hospitals may lack resources to implement stewardship teams. This study will be performed at a small community hospital within a 9-hospital health system that does not have an established stewardship team or criteria for fluoroquinolone use. The purpose of this study is to determine the change in appropriateness of inpatient fluoroquinolone prescribing both before and after implementing an antimicrobial stewardship initiative promoting appropriate use. Methods: This study has been approved by the Institutional Review Board. Criteria for appropriate fluoroquinolone use were developed by the investigators and approved by several infectious disease physicians. This criteria was disseminated by various methods to pharmacists and providers at a small community hospital; these methods included didactic lectures and printed materials. Pharmacists at the institution then performed prospective audit of fluoroquinolone prescribing and intervened when a prescription was deemed inappropriate based on the developed criteria. Data will be collected and analyzed from a retrospective arm and prospective arm. Data to be collected includes patient demographics, allergy information, infectious diagnosis, culture and sensitivity data, fluoroquinolone dosing and duration, prescriber information, results of Clostridium difficile toxin testing, and length of hospital stay. All data will be de-identified during the collection process to maintain confidentiality. The primary outcome will be the difference in percent of inpatient fluoroquinolone prescriptions that are appropriate per the developed criteria for use. Secondary outcomes will include days of fluoroquinolone therapy per 1000 patient days, rate of Clostridium difficile-associated diarrhea, length of hospital stay, and direct cost of antibiotic therapy. Appropriate statistical tests will be chosen for analysis. Results/Conclusions: Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the various concerns associated with inappropriate use of fluoroquinolone antibiotics.

Discuss stewardship interventions identified by the Infectious Diseases Society of America's guideline for implementing antimicrobial stewardship programs.

Self Assessment Questions:

Which of the following is a consequence of inappropriate fluoroquinolone use?

- A: Decreased rate of serious adverse events
- B: Decreased Clostridium difficile-associated diarrhea infection rates
- C: Decreased susceptibility rates
- D: Decreased collateral damage concerns

According to IDSA guidelines, which of the following antimicrobial stewardship intervention methods should be paired with other interventions to increase likelihood of success?

- A: Prospective audit and feedback
- B: Targeting antibiotics with a high risk of Clostridium difficile-association
- C: Preauthorization
- D: Didactic education

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-511-L01-P

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

COMPARISON OF HIGH DOSE AND LOW DOSE MINERALOCORTICOID RECEPTOR ANTAGONISM IN HEART FAILURE WITH REDUCED EJECTION FRACTION

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Purpose: Mineralocorticoid receptor antagonists (MRAs), spironolactone and eplerenone, are associated with significant reductions in morbidity and mortality in patients with heart failure with reduced ejection fraction (HFrEF). Data supporting use of these agents is well documented. However, the benefit (if any) of high dose MRAs in chronic heart failure is not well described. The objective of this study is to assess the effects of low dose versus high dose MRA therapy on surrogate markers (volume and symptoms) of heart failure control in patients with HFrEF. **Methods:** This is a retrospective chart review conducted from January 1, 2012 to December 31, 2017. Patients 18 years of age or older with a diagnosis of HFrEF receiving low dose spironolactone (25 mg or less) or eplerenone (50 mg or less) and admitted to Michigan Medicine for treatment of acute heart failure are included. Treatment groups consist of patients discharged on low dose MRA versus patients discharged on high dose MRA. Data collection at admission, discharge, and the first outpatient follow up visit include: age, race, gender, blood pressure, heart rate, ejection fraction, weight, jugular venous pressure, New York Heart Association functional class, past medical history, current medications, basic metabolic panel, B-type natriuretic peptide (BNP) level, and dose of MRA. The primary outcome is change in weight from hospital discharge to the first outpatient follow-up visit. Secondary outcomes include: change in BNP and jugular venous pressure, 30-day readmission rate, and incidence of hyperkalemia and worsening renal function. **Results and Conclusion:** Data collection and analysis is ongoing. Results and conclusion will be presented at Great Lakes Pharmacy Resident's Conference.

Learning Objectives:

Review current guideline recommendations for the use of mineralocorticoid receptor antagonists in heart failure with reduced ejection fraction

Discuss the RALES, EMPHASIS-HF, and ATHENA-HF trials and their implications on current use of mineralocorticoid receptor antagonists in patients with heart failure

Self Assessment Questions:

1. ML is a 68-year-old African-American female with HFrEF who is currently prescribed metoprolol succinate 100 mg once daily, losartan 100 mg once daily, and furosemide 40 mg once daily. Her eGFR is 7
- A: Eplerenone 25 mg twice daily
 - B: Eplerenone 25 mg once daily
 - C: Eplerenone 25 mg once every other day
 - D: Eplerenone 50 mg once daily

Which of the following is true regarding the ATHENA-HF trial?

- A: Patients in the high dose group had a significantly lower NT-proBNP
- B: Patients in the high dose group were assigned a dose of spironolactone
- C: Patients were followed for 2-weeks post-hospital discharge for chest X-ray
- D: Patients with reduced ejection fraction and patients with preserved ejection fraction

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-512-L01-P

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

TIMING OF ADMINISTRATION OF NEUROMUSCULAR BLOCKING AGENTS IMPACTS CLINICAL CARE IN PATIENTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME

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Background: Acute respiratory distress syndrome (ARDS) is a life threatening disease associated with mortality rates as high as 50-70%. Treatment of ARDS includes low tidal volume ventilation, conservative fluid management, prone positioning, and administration of paralytics. When utilized within the first 48 hours after diagnosis of ARDS, neuromuscular blockers (NMBs) improve gas exchange and reduce the risk of death in severe cases. Benefit outside this 48 hour window has not been established and observed benefits may be attenuated given the delay in administration. Further, serious side effects, including intensive care unit (ICU)-acquired paresis, is still a concern regardless of timing of NMB initiation. The purpose of this study was to determine if delayed administration of NMB impacts the clinical outcome of patients with ARDS requiring invasive mechanical ventilation. **Methods:** This will be a retrospective cohort study of patients greater than 18 years of age diagnosed with ARDS that received the paralytic, cisatracurium. Onset of ARDS was defined as the time of meeting all components of the Berlin definition for ARDS. Exclusion criteria includes patients with left ventricular ejection fraction <40%, history of myocardial infarction within 90 days, chronic tracheostomy or home oxygen, and diagnosis of interstitial lung disease (ILD), chronic obstructive pulmonary disease (COPD) or pulmonary hypertension. Patients will be categorized according to timing of neuromuscular blocker administration from onset of ARDS. The primary outcome is in-hospital mortality. Secondary outcomes include improvement in oxygenation, development of organ failure, administration of sedatives/analgesics, number of ventilator free days, ICU length of stay (LOS), hospital LOS, and discharge disposition.

Results/Conclusions: Will be presented at Great Lakes Pharmacy Conference.

Learning Objectives:

Review the diagnosis of acute respiratory distress syndrome.

Identify the beneficial effects of neuromuscular blockers in the treatment of acute respiratory distress syndrome.

Self Assessment Questions:

Which of the following is included in the diagnosis of ARDS according to the Berlin Criteria?

- A: Patient with P/F ratio of 94 mmHg and bilateral pleural effusions at the time of diagnosis
- B: Patient presenting with P/F ratio of 174 mmHg with a chest CT showing bilateral consolidation
- C: Patient with a P/F ratio of 126 mmHg 8 days after presenting with ARDS
- D: All of the above would be diagnosed as ARDS

Which of the following have been identified as benefits of using neuromuscular blockers in the treatment of ARDS?

- A: Lower mortality rates
- B: Improvements in oxygenation, lower plateau pressures and decreased tidal volumes
- C: Decreased inflammation
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-513-L01-P

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

IMPLEMENTATION OF A FIRST FILL MENTAL HEALTH MEDICATION CALLBACK PROGRAM IN A COMMUNITY PHARMACY

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Purpose: Many patients in the community setting are prescribed medications for depression and anxiety; however, many of these patients do not receive adequate follow-up from the initial prescriber or the dispensing pharmacy. It is especially important for these medications as patients often experience adverse effects prior to symptom improvement. Many community pharmacies have implemented callback programs for antibiotic medications to assess adherence, side effects, and symptom improvement. The first fill mental health medication callback program will include patients starting a new medication for depression or anxiety. The primary objective of this evaluation is to determine the feasibility of implementing the program and patient acceptability of the new service. **Methods:** The first fill mental medication callback program includes three patient interactions: an initial, a two-week, and a one-month pharmacist consultation. At the initial interaction, the pharmacist counsels the patient or representative as usual, introduces the service, and administers the Personal Health Questionnaire 9 (PHQ-9) and the Generalized Anxiety Disorder Assessment 7 (GAD-7). At two-weeks, the pharmacist utilizes pre-defined screening questions to assess adherence and adverse effects. At one-month, the pharmacist assesses efficacy using the screening questionnaire (PHQ-9 and GAD-7). If at any point the pharmacist identifies intolerable side effects, suboptimal medication benefit, or worsening of the condition, the pharmacist will address these issues with the patient and/or contact the prescriber to recommend medication adjustments. All recommendations made to patients and providers are within the scope of usual community pharmacy practice utilizing an algorithm developed for this service. Service evaluation will include patient acceptance and program participation, the number of recommendations made and accepted, and patient satisfaction. The pharmacists completing the service will evaluate it for feasibility and sustainability based on barriers notes and workload/time commitment. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

List the potential reasons patients with depression and anxiety would stop their medication therapy early.

Describe the role of the community pharmacist in support of patients with depression and anxiety.

Self Assessment Questions:

Which of the following are potential reasons patients with depression and anxiety would stop their medication therapy early?

- A Medication side effects
- B: Lack of perceived efficacy
- C: Fear of dependency
- D: All of the above

Which of the following is the best description for the goals of a medication call back program?

- A To promote prescription cost savings and minimize side effects
- B To promote adherence and monitor for side effects and symptoms
- C To complete patient counseling of new prescriptions when the patient is present
- D To promote adherence and improve patient satisfaction

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-769-L04-P

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

EVALUATION OF URINARY TRACT INFECTION TREATMENT AT A 300-PARTICIPANT PROGRAM FOR ALL-INCLUSIVE CARE FOR THE ELDERLY (PACE)

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Background: Urinary tract infections (UTIs) and asymptomatic bacteriuria are prevalent in the elderly, and UTI symptoms can often be difficult to determine due to atypical presentation in this population. Differentiating between UTI and asymptomatic bacteriuria is important in order to prevent the overuse of antibiotics. In addition, choosing the appropriate antibiotic regimen reduces risk of adverse events, costs, and development of antimicrobial resistance. Infection control programs and antimicrobial utilization reviews are beneficial to promote appropriate use of antibiotics. This study reviewed the appropriateness of antimicrobial use for treatment of UTI at a 300-participant PACE facility. **Purpose:** To assess appropriateness of antimicrobial use for UTI, and to develop a facility-specific guideline for empiric treatment of UTI at this PACE facility. **Methods:** Baseline data was collected on all participants who had a urinalysis performed between April 1, 2017 and September 30, 2017. Data collected included urinalysis and urine culture results, antibiotic choice, dose, and duration of treatment. The pharmacists and providers from this PACE facility then developed facility specific empiric treatment guidelines for UTI in collaboration with the infectious diseases service. This guideline was developed using local susceptibility data, Infectious Diseases Society of America urinary tract infection guidelines, and the McGeer Criteria for Long Term Care Surveillance Definitions for Infections. The pharmacists then provided education to primary care providers and clinic staff regarding UTI symptom presentation and the UTI empiric treatment guideline. The pharmacists provided audit and feedback to providers after implementation of the guideline. Post-intervention data was collected. The primary outcome was the appropriateness of antibiotic use after intervention. Secondary outcomes included appropriateness of antibiotic choice, dose, duration, and antibiotic class. **Results:** Pending **Conclusion:** Pending

Learning Objectives:

Identify benefits of appropriate empiric treatment of urinary tract infections

Recognize the role pharmacists can play in antimicrobial stewardship in the outpatient setting

Self Assessment Questions:

1. Which of the following are benefits of appropriate empiric treatment of urinary tract infection and antimicrobial stewardship efforts?

- A Reduce costs associated with antibiotic use.
- B: Decrease emergence of antibiotic-resistant pathogens.
- C: Reduce the risk of adverse drug reactions related to antibiotics.
- D: All of the above.

1. Which of the following is not an appropriate antimicrobial agent for empiric treatment of complicated UTI?

- A Cephalexin
- B Nitrofurantoin
- C Ciprofloxacin
- D Sulfamethoxazole/trimethoprim

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-514-L01-P

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

EVALUATING THE USE OF ENOXAPARIN IN PATIENTS WITH VENTRICULAR ASSIST DEVICES

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Purpose: Despite significant improvements in quality of life and survival with continuous flow ventricular assist devices (VADs), complications such as device thrombosis, ischemic and hemorrhagic stroke, and gastrointestinal bleeding may occur. VAD patients develop an intrinsic pro-thrombotic state that warrants the use of anticoagulation. Warfarin is the standard of care for the management of anticoagulation in patients with VADs. When a patient's international normalized ratio (INR) falls below the therapeutic range, parenteral anticoagulation may be used to bridge the patient until the INR is therapeutic. Historically, unfractionated heparin has been the parenteral anticoagulant of choice for bridging in VAD patients. There is limited literature evaluating the use of low molecular weight heparin, such as enoxaparin, in VAD patients. The purpose of this study is to evaluate the incidence of bleeding and thromboembolic events in continuous flow VAD patients bridged with enoxaparin. **Methods:** This was a retrospective, single-center study of all patients that underwent VAD implantation at Loyola University Medical Center from December 1st, 2011 to December 31st, 2016. Patients were stratified into two groups: those who had received bridging with enoxaparin and those who had not. The primary outcomes were incidence of major bleeding requiring hospitalization and thromboembolic events, defined as VAD pump thrombosis or ischemic stroke. The secondary outcome was major bleeding that occurred within seven days of enoxaparin administration. **Results/Conclusions:** Data collection and analysis is ongoing for 199 patients. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the rationale for anticoagulation in VAD patients
Review literature evaluating the use of enoxaparin for bridging in the VAD patient population

Self Assessment Questions:

Which factor increases the risk of major bleeding in VAD patients?

- A Shear stress generated by rotation
- B: Continuous non-pulsatile blood flow
- C: Presence of a foreign, mechanical device in the body
- D: Heat generated from pump rotors

Which of the following is a benefit of using enoxaparin in VAD patients when bridging to a therapeutic INR?

- A No dosage adjustments are needed in renal impairment
- B Short half-life allowing for rapid discontinuation of therapy
- C Monitoring is routinely recommended
- D Patients may receive outpatient therapy

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-515-L01-P

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

EVALUATION OF ANTIBIOTIC UTILIZATION ON PATIENT OUTCOMES POST SEPSIS PROTOCOL UPDATE AT A VETERANS AFFAIRS FACILITY

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Objective: The updated 2016 SSC International Guidelines for Management of Sepsis and Septic Shock incorporate the sepsis-3 criteria when defining sepsis and recommend the use of "high-end" antibiotic loading doses and administration of therapy within one hour of sepsis/septic shock recognition, as these factors are critical for improving outcomes and minimizing risk of clinical failure for patients. The Edward Hines, Jr. VA Hospital Sepsis Protocol was updated in September 2017, reflecting the 2016 SSC Guidelines recommendations. The purpose of this quality improvement project is to evaluate patient outcomes post sepsis protocol update at Edward Hines, Jr VA Hospital, focusing on antibiotic therapy. Patient outcomes will be assessed by hospital length of stay, ICU length of stay, white blood cell count 72 hours after initiation of therapy, and temperature 72 hours after initiation of therapy. The secondary objective of this study is to evaluate any associated differences in outcomes with patients who were treated with antibiotic loading doses administered within one hour of sepsis/septic shock recognition. **Methods:** Patients 18 years or older admitted to Edward Hines, Jr. VA Hospital from 11/1/16-1/31/17 or 11/1/17-1/31/18 will be considered for study inclusion. ICD-10 code A41 will be used to identify patients diagnosed with sepsis. Those who have received at least 2 days of antimicrobial therapy with vancomycin, piperacillin/tazobactam, or meropenem will be included. Descriptive statistics will be computed for all study variables, where applicable. Patient demographics, relevant medical history, vital signs, laboratory results, and medication regimens will be recorded and analyzed. Chi-square test will be used to analyze categorical data, including loading doses administered. Continuous data will be analyzed utilizing t-test, including hospital length of stay and ICU length of stay. **Results & Conclusions:** Data collection and statistical analysis is ongoing. Final conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize criteria used in identifying patients with sepsis
Describe the significance of appropriate antimicrobial dosing and timing of administration on patient outcomes in the setting of sepsis.

Self Assessment Questions:

Which of the following is NOT a component of either qSOFA or SOFA score?

- A Respiratory rate
- B: Altered mentation
- C: Temperature
- D: Systolic blood pressure

Which of the following outcomes are associated with timely administration of antimicrobial therapy in patients with sepsis?

- A Decreased mortality
- B Lower rates of antimicrobial-related adverse effects
- C Increased rates of antimicrobial resistance
- D Prolonged hospital length of stay

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-516-L01-P

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

ASSESSING FACTORS FOR ENGAGEMENT OF PARTICIPANTS IN / DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT (DSMES) PROGRAM

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PurposeAs one of today's fastest growing health crises, diabetes has become increasingly prevalent across the United States. The CDC estimates that by 2050, one in three Americans will develop type 2 diabetes. Diabetes self-management education and support, or DSMES provides the foundation to help people with diabetes navigate the multitude of daily decisions and complex care activities, and has been shown to improve health outcomes. In January of 2014, the DSMES program was first implemented at Eskenazi Health. The main goal of this study is to improve the rates of DSMES attendance among Eskenazi Health patients diagnosed with diabetes referred for DSMES.

MethodsThe study methods included both a phone survey and retrospective data collection. The phone survey was focused to identify factors associated with the decision to either attend or not attend DSMES classes. A retrospective, observational chart review was conducted from January 2014 to October 2016 to collect health outcomes data including A1c, LDL, and BMI for patients referred for DSMES. ResultsThe survey results showed that the primary reason for attending DSMES was to learn more about diabetes, and that the most interesting topic was diet. Additionally, the primary reason why patients chose not to attend the classes was because of a time conflict, transportation issues, or a disinterest in the topics. The data collection results showed an average A1c reduction of 1.1% among those who attended the DSMES classes after twelve months, compared to an increase of 0.3% in those who chose not to attend (p=0.027).

ConclusionsIn conclusion, this study confirms previous research that shows that DSMES can reduce A1c levels by approximately 1%. In addition, our findings identify the strengths and weaknesses of the DSMES program at Eskenazi Health, which will help to improve future DSMES engagement and topics covered.

Learning Objectives:

Describe the many benefits of diabetes self-management education and support (DSMES) at both the patient and organizational levels.

List barriers to DSMES attendance.

Self Assessment Questions:

Which of the following is a documented benefit of diabetes self-management education and support (DSMES)?

- A Reducing hemoglobin A1c levels by more than 3% in patients with
- B: Improving lifestyle behaviors (such as healthy eating patterns and
- C: Increasing the incidence of diabetes-related distress and depressi
- D: Worsening patient survival and quality of life

Which of the following was a barrier of attending a diabetes self-management education and support (DSMES) program identified by this study?

- A Hemoglobin A1c was already under control
- B Could not afford the DSMES program
- C Transportation issues
- D Not allowed to complete more than one program

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-770-L04-P

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

EVALUATION OF THE IMPACT OF CHRONIC METFORMIN USE ON B12 STATUS IN A VETERAN POPULATION.

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Purpose of the Research: Current guidelines for type 2 diabetes mellitus (T2DM) recommend metformin as the drug of choice in primary treatment of disease. The Huntington, WV VA Medical Center (VAMC) has numerous patients with T2DM, many of which receive metformin. A multitude of recent studies have documented that metformin use is associated with increased prevalence of vitamin B12 deficiency in patients with diabetes. A significant symptom of B12 deficiency is neuropathy, which can be misinterpreted as diabetic neuropathy in diabetic patients. The purpose of this study is to assess the prevalence of vitamin B12 deficiency and concomitant neuropathy in veterans with T2DM on chronic metformin therapy at the Huntington VAMC. Through a retrospective chart review, vitamin B12 levels and evidence of neuropathy will be evaluated with the goal of determining if B12 levels need assessed in all chronic metformin users. **Methods:** A retrospective chart review to evaluate vitamin B12 deficiency and neuropathy with respect to chronic metformin use in T2DM patients. Specific parameters for evaluation include: vitamin B12 level, hemoglobin A1C, B12 supplementation, metformin dose and duration and presence of medication to treat neuropathy and/or diagnosis of neuropathy. Patients with T2DM on chronic metformin therapy with vitamin B12 labs before and after initiating therapy will be evaluated.

Results: Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the mechanism and common signs/symptoms of B12 deficiency incidental to metformin therapy and discuss the implications of metformin on vitamin B12 levels in patients with type 2 diabetes.

Identify the need for vitamin B12 level assessment before and after metformin prescription.

Self Assessment Questions:

Which of the following is a sign/symptom of B12 deficiency?

- A Cough
- B: Neuropathy
- C: Increased energy
- D: Anxiety

What monitoring should be performed in patients on long term metformin therapy?

- A A1C, SCr
- B B12 levels
- C B12 levels, A1C, SCr
- D B12 levels, A1C, SCr, ejection fraction

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-771-L01-P

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

VANCOMYCIN AREA UNDER THE CURVE (AUC) / MINIMUM INHIBITORY CONCENTRATION (MIC) VERSUS SERUM TROUGH IN THE CLEARANCE OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) BACTEREMIA

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Purpose: The standard treatment for methicillin-resistant Staphylococcus aureus (MRSA) bacteremia is vancomycin in combination with prompt source control. Literature has been published supporting an AUC greater than or equal to 400 as the most accurate predictor of vancomycin efficacy. In practice, serum trough levels continue to be used due to convenience. The objective of this study is to compare the correlation of vancomycin AUC versus serum trough concentration in the clearance of MRSA bacteremia at three OhioHealth hospitals. **Methods:** This study is a retrospective, multi-center chart review of patients who were initiated on vancomycin therapy with a diagnosis of MRSA bacteremia at OhioHealth Riverside Methodist Hospital (RMH), Grant Medical Center (GMC), and Doctors Hospital (DH) during the time period of June 2015 through December 2017. Patients age less than 18 years, pregnant or breastfeeding, quadriplegic, on hemodialysis, or with a vancomycin MIC greater than 1 will be excluded. The primary outcome of this study is to evaluate whether goal vancomycin AUC is more strongly associated with the clearance of MRSA bacteremia at the time of blood culture confirmation as compared to serum trough level. Investigators will determine the proportion of patients that experience either goal AUC or serum trough at bacteremia clearance overall, and between ICU and non-ICU patients as well as obese and non-obese patients. Therapeutic AUC will be defined as 400-700, and therapeutic trough as 15-20 mcg/mL. Secondary outcomes include the incidence of acute kidney injury with a supra-therapeutic trough or AUC and hospital length of stay. Data will be collected using the electronic medical record. Data points collected will include: medical record number, age, gender, body mass index, hospital length of stay, vancomycin MIC, vancomycin serum troughs, blood culture results, whether or not source is known and status of source control.

Learning Objectives:

Define current treatment recommendations for methicillin-resistant Staphylococcus aureus (MRSA) bacteremia
Identify limitations of vancomycin serum trough monitoring in critically ill patients

Self Assessment Questions:

Per IDSA guidelines, treatment failure can be deemed if blood cultures are not cleared following how many days of appropriate antimicrobial therapy?

- A: 5 days
- B: 7 days
- C: 10 days
- D: 14 days

Which of the following represents drug exposure over an entire 24 hour period?

- A: Serum peak concentration
- B: Serum trough concentration
- C: Area under the curve (AUC)
- D: Minimum inhibitory concentration (MIC)

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-517-L01-P

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

JUSTIFYING A VACCINATION POPULATION HEALTH SOFTWARE PLATFORM: ANALYSIS OF PNEUMONIA AND INFLUENZA RATES

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Purpose: The benefits of vaccination in preventing disease are well established. Pneumococcal and influenza vaccinations have the potential to reduce the frequency of disease, prevent hospitalizations, and prevent exacerbations of chronic diseases, particularly in high-risk populations. Despite the strong evidence behind vaccinations, many patients do not receive vaccinations recommended by the Centers for Disease Control and Prevention (CDC) when they are seen by their healthcare provider. At Henry Ford Health System, our clinics do not use a systematic approach to identify patients who are due for vaccinations, order immunizations, or reconcile vaccinations administered outside of the health system. The purpose of this project is to assess vaccination rates in select clinics and identify practices that lead to better vaccination rates. This project will also assess the prevalence of vaccine preventable disease, including pneumonia, influenza, and COPD and asthma exacerbations. The results of this project will be used to demonstrate the effects of suboptimal vaccination practices on vaccine-preventable illness and encourage the use of a population health vaccination tool and pharmacy-driven immunization protocol to identify patients due for vaccinations. **Methods:** Vaccination rates for PPSV23, PCV13, and influenza vaccines in select clinics will be assessed. Vaccination practices will be assessed in clinics with high and low vaccination rate to identify best practices. Data collected includes vaccine eligibility date, vaccination status, time from vaccine eligibility to vaccination, and incidence of and time to event for pneumonia, influenza, and COPD or asthma exacerbation. Descriptive statistics will be used to describe vaccination rates, vaccination status, time to vaccination, and incidence of vaccine-preventable illnesses. A cox proportional hazard model will be used to describe time to event for the vaccine-preventable illnesses. **Results and Conclusions:** Results and conclusions to be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patient populations due for influenza, PPS23, and PCV13 vaccinations
Describe barriers to vaccination and the effect of not vaccinating on the incidence of vaccine-preventable illness

Self Assessment Questions:

Which of the following patients is due for the PCV13 vaccine?

- A: 60 year old female with diabetes and heart failure
- B: 59 year old male with hypertension
- C: 39 year old female with ESRD on dialysis
- D: 20 year old male with asthma

Which of the following is considered a vaccine-preventable illness?

- A: Copd
- B: Heart failure exacerbation
- C: PCP Pneumonia
- D: Influenza

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-911-L06-P

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

EVALUATION OF PHARMACY SERVICES FOR HEART FAILURE MANAGEMENT IN THE PRIMARY CARE SETTING AT A VETERAN AFFAIRS MEDICAL CENTER

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Purpose: Heart failure with reduced ejection fraction (HFrEF) is associated with morbidity, mortality, and high rates of hospital readmissions. Current guidelines for HFrEF management recommend the utilization of angiotensin converting enzyme inhibitors (ACE-I) or angiotensin receptor blockers (ARB) as well as beta-blockers to improve morbidity and mortality rates. Locally, a large percentage of patients are not prescribed target doses of heart failure medications and readmission rates remain elevated. Heart failure is managed by primary care providers and cardiologists. Evidence supports pharmacy services for heart failure within a cardiovascular clinic, but the role of a pharmacy heart failure services in the primary care setting has not been established. This study aims to assess heart failure management at the Richard L. Roudebush Veteran Affairs Medical Center (VAMC) after the implementation of pharmacist-driven heart failure medication titration services in the primary care setting. **Methods:** A Pharmacy Heart Failure Medication Protocol was implemented at the Richard L. Roudebush VAMC to improve the outcomes of patients with HFrEF in primary care clinics. This study will be a retrospective electronic chart review of all patients who are seen by a clinical pharmacist for HFrEF management in the primary care setting at the Richard L. Roudebush VA Medical Center between October 1, 2016 and March 31, 2018. Descriptive statistics will be utilized to characterize subjects and assess the primary outcome, which is the percentage of patients on target doses of an ACE-I or ARB and beta-blocker. Secondary outcomes include the percentage of patients on maximally tolerated doses of heart failure medications, time to target dose in days and number of visits, and rate of heart failure related hospitalizations and emergency department visits. **Results and Conclusions:** Results and conclusions are pending and will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify target doses of medications shown to reduce morbidity and mortality for heart failure with reduced ejection fraction
Recall barriers to enrolling patients in pharmacist-driven heart failure management services in the primary care setting

Self Assessment Questions:

Which of the following medications shown to reduce morbidity and mortality for heart failure with reduced ejection fraction is at target dose?

- A Lisinopril 20 mg daily
- B: Spironolactone 12.5 mg daily
- C: Metoprolol succinate 150 mg daily
- D: Losartan 100 mg daily

Which of the following was a barrier for enrollment of patients for heart failure management services in the primary care setting?

- A Cardiology was not supportive of heart failure management in primary care
- B Many patients were at their maximally tolerated dose but not target dose
- C There was no way to generate a list of all patients with a diagnosis of heart failure
- D Primary care physicians preferred to manage the disease state with cardiology

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-518-L01-P

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

IMPACT OF STANDARD VERSUS PROLONGED COURSES OF ANTIBIOTICS FOR THE TREATMENT OF UNCOMPLICATED STAPHYLOCOCCUS AUREUS BLOODSTREAM INFECTIONS IN PATIENTS WITH HEMATOLOGIC MALIGNANCIES: UK EXPERIENCE

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Purpose: Staphylococcus aureus infections, particularly bacteremia, account for high morbidity and mortality. The Infectious Diseases Society of America (IDSA) guidelines recommend 2 weeks of directed antibiotic treatment for patients with uncomplicated bacteremia irrespective of patient population. In contrast to IDSA, the National Comprehensive Cancer Network (NCCN) guidelines for cancer-related infections recommend 4 weeks post-negative blood culture for all Staphylococcus aureus bacteremia. There is a clear lack of studies assessing appropriate duration of antibiotic therapy in this immunocompromised population. Thus, the primary objective of this study was to evaluate the impact of antibiotic duration on global clinical cure, defined as the absence of relapse infection, disease progression, and mortality within 60 days following the completion of antibiotic therapy for the index infection in patients with an active hematologic malignancy and Staphylococcus aureus bacteremia. **Methods:** This multi-center, retrospective, propensity-matched cohort study includes patients from the University of Kentucky Chandler Medical Center and Michigan Medicine who had an active hematologic malignancy and a positive Staphylococcus aureus blood culture within 90 days of chemotherapy. Patients were stratified by whether they were treated for their infection for less than four weeks or at least four weeks. The primary composite outcome was global clinical cure as defined above. Our secondary outcomes include the individual components of the primary outcome, unplanned readmission, hospital length of stay, and vancomycin-induced nephrotoxicity. Appropriate descriptive statistics were used for analysis. Additionally, multivariate logistic regression analyses were used to explore independent predictors for global clinical cure. **Results:** Site-specific data from University of Kentucky HealthCare will be presented at the Great Lakes Pharmacy Residency Conference. **Conclusions:** Site-specific conclusions from University of Kentucky HealthCare will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe epidemiology associated with Staphylococcus aureus bacteremia in immunocompromised patients with active hematologic malignancies
Discuss Staphylococcus aureus bacteremia durations as described by IDSA and NCCN guidelines and supporting literature

Self Assessment Questions:

Which of the following is a known factor associated with a complicated bacteremia?

- A Endocarditis
- B: Implanted prostheses
- C: Metastatic sites of infection
- D: All of the above

Which of the following is true regarding IDSA and NCCN guideline recommendations for the treatment of S. aureus bacteremia? IDSA guidelines recommend ___ weeks of therapy for uncomplicated bacteremia

- A 2, 2
- B 2, 4
- C 4, 4
- D 4, 2

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-519-L01-P

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

EVALUATION OF HYPOGLYCEMIC EVENTS FOLLOWING HYPERKALEMIA TREATMENT WITH INSULIN AND DEXTROSE

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Purpose: Hypoglycemia is a serious adverse event that may occur following treatment of hyperkalemia with insulin. Patients at greatest risk of hyperkalemia include those with impaired renal function. Dextrose is commonly administered with insulin to lower the risk of hypoglycemia during treatment of hyperkalemia. However, the optimal dose of dextrose has not been well established. The objective of this study is to determine if there is a difference in hypoglycemic event rates when using different doses of dextrose following the administration of insulin for the treatment of hyperkalemia. **Methods:** A single-center, retrospective chart review will be conducted at Mercy Hospital and Medical Center (MHMC) in Chicago, Illinois. A literature search of publications from MEDLINE and PubMed was done to determine the current standards of pharmacy practice, as well as published rates of hypoglycemia following treatment of hyperkalemia with insulin. A medical chart report will be used to identify patients who were hyperkalemic and received insulin and dextrose between July 2017 and October 2017. Patients will be included if they are 18 years or older and have a serum potassium level greater than 5.1 mEq/L. Patients will be excluded if they did not receive both insulin and dextrose, did not have a pre-treatment blood glucose level recorded, or were pregnant. Hypoglycemia rates following administration of insulin and dextrose will be compared to published rates of hypoglycemia in similar studies conducted using 10 units of insulin and 50 grams of dextrose. The primary outcome will be the rate of hypoglycemia (blood glucose less than 70 mg/dL) following treatment with insulin and dextrose. Secondary outcomes will include the rate of severe hypoglycemia (blood glucose less than or equal to 40 mg/dL), percentage change of serum potassium, and time-to-hypoglycemic event. **Results/Conclusions:** Final results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define the 2018 American Diabetes Association classification of hypoglycemia.

Identify risk factors for hypoglycemia following hyperkalemia treatment with insulin.

Self Assessment Questions:

The American Diabetes Association, defines the glucose alert value for hypoglycemia as:

- A ≤ 50 mg/dL
- B: ≤ 60 mg/dL
- C: ≤ 70 mg/dL
- D: ≤ 80 mg/dL

Which factor has been associated with an increased risk of hypoglycemia following hyperkalemia treatment with insulin?

- A Hepatic impairment
- B Renal impairment
- C Low body weight
- D Diabetes diagnosis

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-520-L01-P

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

EVALUATION OF A NOVEL FIXED DOSING REGIMEN OF 4-FACTOR PROTHROMBIN COMPLEX CONCENTRATE (PCC) FOR WARFARIN REVERSAL

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Purpose: Recent literature shows that fixed, and often lower, doses of PCC for warfarin reversal may be equally effective as traditional weight-based dosing. Despite available literature, the optimal dose of PCC has not been established. The purpose of this project is to evaluate the efficacy, efficiency, and cost of a novel fixed-dose PCC regimen for warfarin reversal as compared to a historical weight-based dosing cohort. Additionally, opportunities for overall improvement of PCC utilization and guideline adherence will be evaluated. **Methods:** Retrospective chart review was performed to compare historical weight-based dosing to the novel fixed-dosing in a pre-post design. Patients > 18 years old administered 4-factor PCC for warfarin reversal from January 2015 to December 2016 were included in the pre-intervention weight-based dosing cohort and patients meeting the same criteria from November 2017 to March 2018 were included in the fixed-dosing post-intervention cohort. The primary outcome is the proportion of patients who achieve target INR after PCC administration. Target INR is defined as ≤ 1.3 in individuals with a CNS bleeds, emergent surgery, or requiring a lumbar puncture. A target ≤ 2.0 was set for all other indications, unless specified in the medical record. Secondary outcomes evaluated include guideline adherence, incidence of additional PCC doses, and cost per dose, time to PCC administration and time to post-reversal INR. Predetermined 3 and 6 month guideline compliance and efficacy evaluations will be completed. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the literature supporting the use of fixed dose PCC in warfarin reversal.

Discuss the potential barriers to implementing fixed dosing of PCC

Self Assessment Questions:

What is a key advantage to utilizing fixed doses of PCC?

- A Less volume
- B: Decreased adverse effects
- C: More rapid reversal of warfarin
- D: Reduced cost

Which of the following is an appropriate fixed dose recommendation of PCC for warfarin reversal in intracranial hemorrhage?

- A 500 units
- B 1000 units
- C 2000 units
- D Would recommend FFP

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-521-L01-P

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

EVALUATION OF INTRAVENOUS ACETAMINOPHEN FOR FEVER REDUCTION IN PEDIATRIC PATIENTS

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Purpose: Fever is one of the leading reasons children present for medical evaluation. Common causes for fever include: infection, thrombosis, and medications. The treatment of fever is a controversial topic in the pediatric population. Some practitioners believe treatment will delay identification of the underlying etiology and expose children to unnecessary toxicity. However, many pediatricians continue to encourage the use of antipyretics, such as NSAIDs or acetaminophen (APAP), with the intent of improved comfort for the child. Intravenous (IV) APAP is safe and effective for managing pain, but limited data exists evaluating the efficacy of IV APAP in children for fever treatment. This study aims to measure and evaluate fever reduction in patients who have received IV and enteral APAP. **Methods:** A retrospective, chart review was conducted for patients under 18 years admitted to hematology/oncology or PICU at Riley Hospital for Children. This study utilized a case-crossover design, analyzing patients receiving IV APAP and enteral APAP for a documented fever between January 1, 2014 and July 31, 2017. Enteral APAP was defined as by mouth, feeding tube, or per rectum. Fever was defined as at or above 38°C oral or 37.9°C axillary. Patients were excluded if they received NSAIDs or APAP-containing products within 8 hours of documented APAP administration, target temperature management, or if the post-APAP temperature site differed from the pre-APAP temperature site. The primary objective assessed change in temperature before and after administration of IV and enteral APAP, with success defined as a decrease in 1°C two hours after administration. Data collected included patient demographics, APAP dose and route, and temperature site and reading (°C) at 0-6 hour intervals. The secondary objective assessed vital sign changes (heart rate, blood pressure, and respiratory rate) before, and after fever.

Results and Conclusions: To be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review common causes and medications associated with fever
Discuss the current literature regarding the role of intravenous acetaminophen in fever reduction

Self Assessment Questions:

Which medication is most likely to cause a fever?

- A: Cytarabine
- B: Naproxen
- C: Prednisone
- D: Vancomycin

Based on current literature, which of the following is true in regards to the significance of IV acetaminophen administration for fever reduction?

- A: Intravenous acetaminophen has no effect on mean temperature reduction
- B: Intravenous acetaminophen decreases mean temperature by less than 1°C
- C: The largest difference for reduction occurs four hours after administration
- D: Intravenous acetaminophen decreases mean temperature by more than 1°C

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-522-L01-P

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

STANDARDIZED DOCUMENTATION WORKFLOW WITHIN AN ELECTRONIC HEALTH RECORD TO TRACK PHARMACIST'S INTERVENTIONS IN PEDIATRIC AMBULATORY CARE CLINICS

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Purpose: Interventions are made daily in ambulatory care clinics by pharmacists to optimize therapeutic outcomes for patients. Yet, a standard method of documentation is not in place to track these interventions. The primary objective of this study is to describe the implementation of a standardized documentation workflow within an electronic health record (EHR) and to track pharmacist's interventions in pediatric ambulatory care clinics. The secondary objective is to assess the financial impact of documented interventions on billable medication therapy management (MTM) services. **Methods:** This prospective study takes place in eight ambulatory care clinics and a transition of care service within a pediatric healthcare system. In each setting, a clinical pharmacist is embedded into the healthcare team. A tool was integrated into the EHR to assist with standardizing documentation of the interventions being made by the pharmacists. Ambulatory clinical pharmacists and a pharmacy technician received thorough training on the new standardized documentation workflow. This workflow includes pharmacists documenting interventions using the EHR tool and a pharmacy technician running daily intervention reports and billing eligible MTM claims. The documentation workflow will be evaluated by analyzing clinical interventions and MTM claims from September 2017 through January 2018. **Results/Conclusions:** Data collection and analysis are ongoing. Results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the standardized documentation workflow established in an electronic health record

Identify the interventions made by pharmacists in pediatric ambulatory care clinics

Self Assessment Questions:

1. Which of the following was a successful way to implement a standardized documentation workflow for pharmacists?

- A: Send an email to the pharmacists explaining the new process
- B: Gather the pharmacists together, demonstrate the new system, discuss concerns
- C: Require each pharmacist to identify their own billable claims
- D: Punish the pharmacists documenting less than 30 interventions per month

What is a common barrier when trying to establish a pharmacist's presence in a clinic setting?

- A: There are too many patients on the clinic schedule
- B: There is not enough time for the pharmacist to do in order to justify being on the clinic
- C: There is no consistent and standardized way to objectively prove the value of the pharmacist
- D: Physicians do not desire to have a pharmacist on the clinical team

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-772-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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PERCEIVED INFORMATION NEEDS OF COMMUNITY PHARMACIST AND SUPPORT STAFF WHILE COMPLETING MEDICATION THERAPY MANAGEMENT (MTM)

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Purpose: Pharmacists' and support staff's perceived information needs during MTM provision has not been determined. This study seeks to elicit community pharmacists' and support staffs' perceived information needs while completing comprehensive medication reviews (CMR) as part of medication therapy management (MTM) services. **Methods:** Semi-structured interviews ranging 30-60 minutes will be conducted with pharmacists and support staff. Subjects will be identified from community pharmacies through practice-based research networks and/or investigators' professional networks. Interviews will be conducted either in person or over the phone. Eligible participants must have completed, and/or assisted with the completion of, at least two CMRs in the last thirty days and be either a pharmacist, pharmacy resident, pharmacy student/intern, or pharmacy technician. The interview guide will be based on a previously published clinical decision-making model. The model describes the process as follows: case familiarization, generating initial hypotheses, case assessment, final hypotheses, and decision-making. Interviews will take place until data saturation is reached. Interviews will be audio-recorded and transcribed by a healthcare transcriptionist, after which, transcriptions will be coded independently by two researchers to determine recurrent and unifying themes. Discrepancies will be resolved through consensus with a third investigator consulted as needed. Interrater reliability will be measured using Cohen's kappa and adjustments made to promote consistency in coding and reviewer definitions. **Results:** As of January, this study has been approved for IRB exemption. Recruitment and data collection is forthcoming. **Conclusion:** In progress.

Learning Objectives:

List the steps in the clinical decision-making process of pharmacists as described in this study.

Describe the approach used in eliciting the perceived information needs of pharmacists and support staff when completing a CMR as part of MTM services.

Self Assessment Questions:

Based on the clinical decision-making model utilized within the study, what is the first step in this process?

- A Case Familiarization
- B: Generating Initial Hypotheses
- C: Case Assessment
- D: Final Hypotheses

Which step in the decision-making model described in this study involves speaking to the patient?

- A Case Familiarization
- B Generating Initial Hypotheses
- C Case Assessment
- D Final Hypotheses

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-773-L04-P

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(if ACPE number listed above)

EVALUATING THE PRESCRIBING INFLUENCE OF AN ACUTE RESPIRATORY INFECTION (ARI) TREATMENT ORDER SET AT A VETERANS AFFAIRS HOSPITAL

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Purpose: The magnitude of inappropriate antibiotic prescribing has become an alarming issue in the United States, particularly in the outpatient setting. A recent medication use evaluation conducted between the 1st and 2nd quarter of fiscal year 2016 suggests that 80% of outpatient antibiotics prescribed locally at Edward Hines, Jr. VA Hospital and associated outpatient clinics for the treatment of ARIs were suboptimal. In an attempt to improve the antibiotic prescribing patterns for ARIs, a new ARI treatment algorithm order set based on CDC and IDSA guideline recommendations was created and implemented in November 2017. The purpose of this study is to evaluate the influence of this ARI treatment order set at the point of prescribing in preventing inappropriate antibiotic usage. **Methods:** This is a retrospective quality improvement research project conducted at Edward Hines, Jr. VA Hospital. The primary endpoint will be the change in inappropriate antibiotic prescribing practices for ARIs by providers before and after the implementation of a treatment order set. Patients will be included in this study if they present from the community to a participating VA emergency department, primary care, urgent care, community based outreach clinic, home-based primary care, or other outpatient clinic and have an outpatient diagnosis of acute pharyngitis, acute rhinosinusitis, acute bronchitis, or upper respiratory infections-not otherwise specified. Descriptive statistics will be used to describe the proportion of visits in which an antibiotic was prescribed. An independent t-test and Chi-square analysis will be used to describe differences pre- and post-intervention from baseline. **Results/Conclusion:** Results and conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the prevalence of inappropriate use of antibiotics in the outpatient setting

Review the indications for antibiotics in acute pharyngitis, acute rhinosinusitis, acute bronchitis, and upper respiratory infections-not otherwise specified

Self Assessment Questions:

Which of the following are consequences of inappropriate antibiotic use?

- A Decreased antibiotic resistance
- B: Adverse drug events such as Clostridium difficile infection
- C: Unnecessary healthcare expenditures
- D: Both B and C are correct

What is the estimated percentage of acute rhinosinusitis caused by a bacterial source?

- A 2-10%
- B 35-50%
- C 60-80%
- D 90-98%

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-523-L01-P

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

IMPACT OF A CLINICAL DECISION SUPPORT SYSTEM (CDSS) ON PHARMACIST POST-PRESCRIPTION ANTIMICROBIAL REVIEW AT 48 HOURS IN A COMMUNITY-TEACHING HOSPITAL

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Purpose: As of January 1, 2017, The Joint Commission and the Centers for Medicare and Medicaid Services (CMS) mandated new standards addressing Antimicrobial Stewardship Programs (ASPs) in the acute care setting. The goal of ASPs is to optimize antibiotic therapy and to minimize adverse events related to antibiotic use. Core components include: leadership commitment, accountability, drug expertise, action, tracking, reporting, and education. CMS further requires re-evaluation of antimicrobial therapy at 48-hours to assess appropriateness. The purpose of this study is to determine the utilization of a Clinical Decision Support System (CDSS) alert in assisting pharmacist post-prescription review of antimicrobial use at 48-hours. **Methods:** This study will retrospectively evaluate the number of pharmacist antimicrobial stewardship interventions pre- and post-implementation of an antimicrobial 48-hour time-out alert utilizing a CDSS. Two patient groups will be retrospectively reviewed. The first group will be analyzed prior to implementation of the 48-hour time-out alert (December 2015) and the second group will be analyzed post-implementation (December 2017-January 2018). Patients who are 18 years of age and older and who have received empiric antibiotic therapy for a minimum of 48 hours will be included. Previously enrolled patients and patients with an Infectious Diseases consult ordered will be excluded. Data collection will include: initial antibiotic indication, number of pharmacist interventions, intervention type, intervention acceptance rate, time to first possible intervention, investigator time spent per intervention, total inpatient antibiotic days, length of stay, and Clostridium difficile and/or extended-spectrum beta-lactamase culture data up to 30 days post-discharge. **Results/Conclusion:** Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference pending completion of data collection and analysis.

Learning Objectives:

Review the Joint Commission and Centers for Medicare and Medicaid Services standards for Antimicrobial Stewardship Programs (ASPs). Identify the utility of clinical decision support system (CDSS) software in aiding pharmacist post-prescription review of antimicrobials.

Self Assessment Questions:

The Centers for Medicare and Medicaid Services require post-prescription review of all antimicrobials after:

- A: 12 hours
- B: 24 hours
- C: 48 hours
- D: 72 hours

Which of the following are possible interventions to be made when determining antimicrobial appropriateness?

- A: De-escalation
- B: Discontinuation
- C: Escalation
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-775-L04-P

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(if ACPE number listed above)

IMPACT OF A FIRST REFILL TEXT OR E-MAIL REMINDER ON ADHERENCE ACROSS SPECIALTY DISEASE STATES AMONG A MEDICAID POPULATION

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Purpose: The purpose of this study is to determine the impact of a first refill reminder through mobile messaging on medication adherence 3 months after switching to a new specialty pharmacy among Medicaid patients. **Methods:** Medication adherence was obtained from Medicaid claims data for two successive 3-month time periods, May 1, 2017 to July 31, 2017 (pre-transition) and August 1, 2017 to October 31, 2017 (post-transition). Individual patient medication adherence was measured as the proportion of days covered (PDC), medication possession ratio (MPR) and gap in therapy (GIT) with PDC being the primary endpoint. The sample was divided into 3 groups who were prescribed 1 of 3 disease categories of specialty medications: Rheumatoid Arthritis (RA), Multiple Sclerosis (MS), and cinacalcet.

Results: 450 members (mean age of 46) were identified as having at least 2 fills in both the pre- and post-transition periods. Repeated measures ANOVA indicated that the group who received the notification significantly improved their PDC (0.896 to 0.930, $P < 0.0001$) while the group not receiving the reminder did not significantly change their PDC between pre- and post-transition. Within individual disease categories, the MS patients enrolled in notifications and the cinacalcet patients not enrolled significantly increased their PDC in the post-transition period ($P = 0.012$). The medication adherence measures of RA patients did not appear affected by the mobile message reminder. **Conclusions:** Although the adherence of the patients enrolled in notifications improved, it is uncertain how much of the effect was due to the notification as all patients received a phone call before medication shipment. It is also unclear to what extent the drug categories had on adherence, as only the patients prescribed MS medications and cinacalcet saw improved adherence. Future studies need to see if the

Learning Objectives:

Describe specialty adherence patterns to medications categorized as RA, MS, or cinacalcet, in Medicaid patients when switching specialty pharmacies

Identify the impact of a first refill reminder through mobile messaging on specialty medication adherence in Medicaid patients switching specialty pharmacies

Self Assessment Questions:

Which of the following medications is typically considered a specialty medication?

- A: tofacitinib
- B: lisinopril
- C: prednisone
- D: cinacalcet

What is a standard threshold proportion of days covered (PDC) value?

- A: 0.50
- B: 0.75
- C: 0.80
- D: 0.90

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-774-L04-P

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IMPLEMENTATION OF A PROSPECTIVE ELECTRONIC PRIOR AUTHORIZATION PROCESS AT A VA MEDICAL CENTER

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Purpose: A software platform and training resources aimed at reject resolution for prescription claims was made available to VAMCs nationwide in 2015; third party billing activities were incorporated into outpatient pharmacy workflow, and directly resulted in a revenue increase for the medical center. Until 2016, prior authorizations were handled retrospectively by non-pharmacy staff in the patient account center. The purpose of this project was to develop and implement an outpatient pharmacy workflow process to prospectively obtain electronic prior authorizations, avoid forfeiture of reimbursement opportunities, and further increase pharmacy collections. **Methods:** This is a quality improvement project to increase pharmacy collections. VistA third party worklist will be utilized for daily reject resolution workflow. CoverMyMeds will be used to transmit electronic prior authorization requests. Prior authorizations receiving an unfavorable outcome will be examined to identify themes which can feed back into continuous process improvement. A standard work document will be developed for staff training and competency assessment. Based on the workflow process implemented and refined at the Indianapolis VAMC, a training will be developed for implementation of a pilot program at remaining VISN10 medical centers using the Indianapolis method as a model. The impact on pharmacy revenue will be observed via MCCF Fund 528711 reported in the RAMP database. **Preliminary Results:** Results will be presented at Great Lakes Pharmacy Residency Conference. **Conclusions Reached:** Conclusions to be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify advantages to implementing a prospective electronic prior authorization process

Describe the impact to hospital revenue when converting to a prospective electronic prior authorization process

Self Assessment Questions:

1. Which of the following are advantages to implementing a prospective electronic prior authorization process?

- A: Quicker time to prior authorization decision
- B: Avoid delays in care
- C: More efficient workflow process
- D: All of the above

Which of the following were noted as revenue related outcomes to the implementation of a prospective electronic prior authorization process?

- A: Positive return on investment for the project
- B: Increase in pharmacy collections returned directly to local medical
- C: Potential opportunity for nationwide contribution to revenue cycle
- D: All of the above

Q1 Answer: D Q2 Answer: D

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A COMPARISON OF COMBINATION VASOPRESSOR THERAPIES IN THE MANAGEMENT OF SEPTIC SHOCK

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Purpose: Sepsis, a dysregulated, systemic host response to the invasion of pathogenic microorganisms that leads to end organ failure, may progress to septic shock if the patient cannot regain adequate systemic blood pressure and perfusion after appropriate fluid resuscitation. The keystones of septic shock management include intravenous fluids, antibiotics, and vasopressors. The clinical evidence suggests most patients should initially receive norepinephrine; however, the optimal secondary vasopressor, epinephrine or vasopressin, remains controversial because head-to-head data are lacking. **Methods:** A single-center, retrospective, observational cohort study of critically ill adult patients with septic shock admitted to one of the four adult ICUs at Rush University Medical Center between January 2013 and September 2017 was conducted. Patients identified using septic shock diagnosis codes were screened against inclusion/exclusion criteria and divided into treatment groups: concomitant norepinephrine and epinephrine and concomitant norepinephrine and vasopressin. This study's primary objective was to determine the difference between treatment groups in time to achievement of MAP 65 mm Hg for at least 2 hours. Secondary outcomes were duration of vasopressor agents; sequential organ failure assessment (SOFA) scores at 48 and 72 hours; days free from advanced respiratory, renal, and cardiovascular support up to 28 days; development of new-onset arrhythmias; ICU and hospital lengths of stay; and all-cause in-hospital and 28-day mortality. **Results:** Pending **Conclusions:** Pending

Learning Objectives:

Discuss the current literature examining the use of first line and adjunct vasopressor combinations in septic shock.

Identify potential differences in outcomes between patients receiving norepinephrine and epinephrine compared with patients receiving norepinephrine and vasopressin.

Self Assessment Questions:

In the Surviving Sepsis Campaign Guidelines 2016, which vasopressor(s) is/are recommended to be added to norepinephrine to raise the MAP to target?

- A: Epinephrine
- B: Vasopressin
- C: Both epinephrine and vasopressin
- D: Neither epinephrine nor vasopressin

Which adult patient(s) in septic shock would be the most appropriate candidate(s) for epinephrine?

- A: Normal or low heart rate (50-70 beats per minute) on norepinephrine
- B: Inappropriately low lactate when comparing the lab with how the patient is
- C: MAP of 70 mm Hg on low doses of norepinephrine alone
- D: Both A. and B.

Q1 Answer: C Q2 Answer: D

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(if ACPE number listed above)

IMPACT OF PSYCHOLOGICAL DEBRIEFING ON THE MENTAL HEALTH OF PHARMACY RESIDENTS PARTICIPATING IN A 24-HOUR, IN-HOUSE CLINICAL PHARMACY ON-CALL PROGRAM

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Purpose: The clinical pharmacy on-call program (CPOP) is a 24-hour, in house service provided by pharmacy residents. During shifts, pharmacy residents respond to emergent clinical scenarios that may lead to increased levels of depression, anxiety, and/or stress. While higher rates of depression in medical trainees are well established, there are few studies describing mental health patterns in pharmacy residents. This study aims to describe levels of depression, anxiety, and stress among PGY1 pharmacy residents participating in a CPOP and evaluate the effects of implementing a psychological debriefing program on pharmacy resident mental health. **Methods:** For 12 months, ten PGY1 pharmacy residents will be evaluated via completion of the modified Depression Anxiety Stress Scale (mDASS-21) during their first five independent shifts, midpoint shift, and final five shifts. Additionally, participants will undergo psychological debriefing to discuss difficult situations and unprocessed emotions from shifts. Stress perception scores (SPS) are generated during psychological debriefs to reflect stress levels from the past 24 hours. The primary endpoints of this study are mDASS-21 and SPS scores. **Results:** Median scores of depression, anxiety, and stress from the first CPOP shift were 2 (IQR 2, 7), 7 (IQR 4, 8), and 10 (IQR 7, 12), respectively. Median scores of depression, anxiety, and stress from the fifth CPOP shift were 1 (IQR 0, 1), 2 (IQR 1, 4), 4 (IQR 2, 4), respectively. Median SPS from the first and fifth CPOP shift were 2 (IQR 2, 2) and 1 (IQR 1, 1), respectively. **Conclusion:** Preliminary results show decreases in mDASS-21 and SPS from the first CPOP shift to the fifth CPOP shift. Future directions include the completion of a Wilcoxon signed rank test to compare mDASS-21 and SPS scores in PGY1 pharmacy residents before and after the opening of an adult level 1 trauma center.

Learning Objectives:

Describe levels of depression, anxiety, and stress among pharmacy residents participating in a 24-hour, in house clinical pharmacy on-call program (CPOP).

Discuss the effects of implementing a psychological debriefing program after CPOP shifts on pharmacy resident mental health.

Self Assessment Questions:

A scale used to describe mental health patterns among pharmacy residents at the University of Chicago Medicine include which of the following?

- A: Maslach Burnout Inventory
- B: Modified Depression, Anxiety, & Stress Scale
- C: Sleep Pattern Score
- D: Hamilton Anxiety Ranking Scale

Which of the following relationships describing pharmacy resident mental health in a CPOP at the University of Chicago Medicine is the goal of the psychological debriefing program?

- A: mDASS-21 composite scores increased; SPS increased
- B: mDASS-21 composite scores increased; SPS decreased
- C: mDASS-21 composite scores decreased; SPS increased
- D: mDASS-21 composite scores decreased; SPS decreased

Q1 Answer: B Q2 Answer: D

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IMPACT OF MULTI-MODAL INTERVENTION ON THE TREATMENT OF ASYMPTOMATIC BACTERIURIA IN AN EMERGENCY DEPARTMENT

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Purpose: In 2016 the Center for Medicare & Medicaid Services (CMS) issued a standard that promotes antimicrobial stewardship in hospitals, including improving the use of antimicrobials and identifying opportunities to reduce antimicrobial resistance. At the study institution, treatment of asymptomatic bacteriuria was identified as an area of opportunity for improved antimicrobial stewardship. The primary objective of this study is to assess the impact of multi-modal intervention. **Methods:** This was a retrospective chart review of patients ≥ 18 years old discharged from the emergency department (ED) who were prescribed an antibiotic for urinary tract infection (UTI). Prisoners, pregnant patients, and patients treated for > 1 infectious diagnosis were excluded. The inappropriate treatment of asymptomatic bacteriuria was defined as patients treated with an antibiotic in the absence of urinary symptoms, including dysuria, increased urinary frequency or urgency, suprapubic pain, and flank pain. Pre-intervention data was evaluated for patients who were discharged from June 1, 2017 to July 31, 2017. The multi-modal intervention included provider education and nursing protocol updates. A one-month washout period was included with post-intervention data including patients discharged from November 1, 2017 to December 31, 2017. Demographic data was collected including age, gender, height, weight, ED chief complaint, and discharge diagnoses. Urinalysis data was collected, including ordering user (nurse, provider) and presence of nitrites or bacteria. Antibiotic exposure was also analyzed including medication name, dose, and duration. Temperature, serum white blood cell count, absolute neutrophil count, presence of urinary catheter, and Clostridium difficile infection within 30 days of ED visit was also evaluated. Nominal data was analyzed using X² test, and continuous data was analyzed with t-test. **Results/Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define asymptomatic bacteriuria in the adult population

Identify patient populations requiring treatment for asymptomatic bacteriuria based on current guideline recommendations

Self Assessment Questions:

Which of the following is in compliance with the diagnostic criteria for asymptomatic bacteriuria?

- A: A single midstream clean-catch urine sample from a 65 year old female
- B: Two clean-catch urine samples from a 26 year old female with isol
- C: A single, catheterized urine sample from a 32 year old pregnant female
- D: Two urine samples collected from a bedpan from an 18 year old male

In which case would treatment for asymptomatic bacteriuria be indicated?

- A: A 52 year old male presenting with bilateral lower extremity edema
- B: A 29 year old pregnant female presenting for a wellness checkup
- C: An 86 year old female with chest pain and a urine culture growing
- D: A 46 year old male with constipation and a urine culture growing

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-526-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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EVALUATING THE IMPACT OF A PROCALCITONIN-BASED INITIATIVE ON ANTIBIOTIC PRESCRIBING HABITS FOR LOWER RESPIRATORY TRACT INFECTIONS

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Purpose: The Centers for Disease Control and Prevention reports that roughly 50% of all antibiotic prescriptions for acute respiratory conditions in hospitals are prescribed unnecessarily. Inappropriate antimicrobial usage is associated with increased antimicrobial resistance. Clostridium difficile infection, and increased costs due to medications and increased length of stay. In 2016, the Food and Drug Administration approved procalcitonin (PCT) as a biomarker to aid in decision making on the need for antibiotic therapy for patients with lower respiratory tract infections (LRTIs). The goal of this research is to review the use of PCT and its impact on clinical outcomes and antibiotic utilization for LRTIs. **Methods:** This is a single-center, retrospective analysis conducted at Genesys Regional Medical Center between August 1, 2016 and February 18, 2018. Antibiotic prescribing behaviors for LRTIs before and after a quality assurance initiative involving PCT education were compared. Pharmacists notified prescribers on low procalcitonin levels to discourage antibiotics. Patients were included if they were 18 years or older and had a diagnosis of community-acquired pneumonia (CAP), acute exacerbation of chronic obstructive pulmonary disease (AECOPD), or acute bronchitis (AB). Exclusion criteria included pregnancy, incarceration, intravenous drug use, hospital-acquired pneumonia, life-threatening comorbidities, chronic infection necessitating antibiotic treatment, and severe immunosuppression other than corticosteroid use. The following data were collected through the review of the electronic medical record: demographics, comorbidities, length of stay, initial PCT level, vital signs, radiographic imaging, pneumonia severity index, CURB-65 score, antibiotic duration of therapy, and discharge/preadmission antibiotic prescriptions. The primary endpoint was antibiotic utilization defined by the percentage of antibiotic initiation and the duration of antibiotic therapy in days of therapy. Secondary endpoints included treatment failure defined as in-hospital mortality, 30-day mortality, or readmission within 30 days after discharge due to recurrence or relapse. **Results:** Data collection currently in progress. **Conclusion:** To be presented.

Learning Objectives:

Recall the effects of using procalcitonin guidance for lower respiratory tract infections on antibiotic exposure, treatment failure, and mortality based on literature

Indicate the best action to guide antibiotic therapy based on a procalcitonin level for a patient with a lower respiratory tract infection when given a patient case

Self Assessment Questions:

A Cochrane review by Scheutz et al. published in October 2017 found that using procalcitonin guidance for lower respiratory tract infections:

- A: Did not affect mortality
- B: Reduced length of stay
- C: Increased treatment failure
- D: Reduced antibiotic exposure

A procalcitonin level resulted at 0.08 µg/L for an otherwise healthy 35-year-old patient with community-acquired pneumonia in the emergency department. What is the best approach to manage this patient

- A: This patient should receive 3 days of antibiotics
- B: This patient should be admitted to the ICU for at least 7 days of antibiotics
- C: Antibiotics should be strongly discouraged for this patient
- D: Start antibiotics and draw a repeat procalcitonin level 24 hours after

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-527-L01-P

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

IMPLEMENTATION OF A PROSPECTIVE, PHARMACIST-LED METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS NASAL PCR SCREENING PROTOCOL TO REDUCE OVERUTILIZATION OF VANCOMYCIN

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Purpose: Vancomycin is the treatment of choice for methicillin-resistant Staphylococcus aureus (MRSA) infections however, overutilization has resulted in the development of resistance. This has been associated with poor clinical outcomes and treatment failures. Appropriate vancomycin de-escalation improves patient outcomes, reduces adverse effects, and decreases resistance. The MRSA nasal polymerase chain reaction (PCR) is a rapid molecular test used to detect MRSA nasal colonization. Current literature suggests that a MRSA respiratory tract infection is unlikely in the absence of MRSA nasal colonization due to the high negative predictive value. Therefore, negative MRSA nasal PCR results can be used to de-escalate vancomycin therapy. The purpose of this study was to assess the impact of a pharmacist-led MRSA nasal PCR screening protocol on vancomycin days of therapy (DOT) for respiratory tract infections before and after protocol implementation and to analyze clinical outcomes through the reduction of vancomycin utilization. **Methods:** This single-center, pre-post quasi experimental study evaluated the impact of a pharmacist-led MRSA nasal PCR screening protocol on the duration of vancomycin therapy in patients with respiratory tract infections. Upon receipt of IV vancomycin orders for a respiratory tract infection, pharmacists ordered a MRSA nasal PCR per protocol. Negative results were then used to recommend the de-escalation of vancomycin therapy when appropriate. Prospective data were compared to a retrospective cohort during a similar time frame: December 2016 and June 2017. The primary outcome was vancomycin DOT before and after protocol implementation. Secondary outcomes included length of stay, quantity of vancomycin levels obtained, in-hospital mortality, incidence of acute kidney injury, adherence to the protocol, and need for antimicrobial escalation. **Results/Conclusion:** Data collection and analysis are pending and will be presented at the Great Lakes Pharmacy Resident Conference in April.

Learning Objectives:

Review the available evidence to support utilization of the MRSA nasal PCR as a predictor of MRSA respiratory tract infections.

Identify potential antimicrobial stewardship-related interventions that can be implemented when MRSA nasal PCR results are obtained.

Self Assessment Questions:

Based on the literature, which of the following statements is true regarding the utilization of the MRSA nasal PCR as a predictor of MRSA respiratory tract infections:

- A: A positive result indicates the patient has a MRSA respiratory infection
- B: The MRSA nasal PCR cannot be used to predict MRSA respiratory tract infections
- C: A negative result indicates a MRSA respiratory infection is unlikely
- D: The MRSA nasal PCR can only be used as a predictor of MRSA respiratory tract infections

A patient is currently receiving vancomycin and piperacillin/tazobactam for the indication of hospital-acquired pneumonia. Upon review, the MRSA nasal PCR has resulted as negative. What potential antimicrobial therapy change is most appropriate?

- A: Discontinue piperacillin/tazobactam
- B: Change piperacillin/tazobactam to cefepime
- C: Discontinue vancomycin
- D: No change in antimicrobial therapy necessary

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-528-L01-P

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

ASSOCIATION BETWEEN ANTICHOLINERGIC BURDEN AND FALL RISK IN AN INPATIENT SETTING

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Drugs with anticholinergic burden (ACB) are commonly used for a wide variety of therapeutic purposes. These agents often have side effects that can increase a patient's fall risk. Such side effects include acute agitation, confusion, and blurred vision. This research attempts to determine if a higher calculated ACB correlates to an increased fall rate in hospitalized patients. In this retrospective, two-center, case-control study, the electronic medical records (EMR) of patients with falls, as documented through the institution's safety event reporting system, will be evaluated. Average daily ACB scores will be calculated for these patients spanning a twenty-one month period. Cases and controls (patients without falls) from the same admission period will be matched based on age, sex, and hospital location. Inferential statistical analyses will be conducted to explore the utility of the ACB scale on a categorical, ordinal, and interval level. If a positive association exists, findings will be reported to the institution's falls committee. Depending on the results of this study, EMR tools, alert systems, or treatment protocol changes may be recommended. Preliminary data suggest that a large proportion of patients with reported falls have clinically significant ACBs. These data support the tentative conclusion that ACB positively correlates with fall risk.

Learning Objectives:

Recognize a regimen with significant anticholinergic burden.

Select an appropriate therapeutic alternative to decrease a patient's anticholinergic burden.

Self Assessment Questions:

Anticholinergic burden is considered significant if the calculated value is at least:

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

A patient has experienced multiple falls while taking amitriptyline 200 mg QHS for depression. Which of the following antidepressant alternatives effectively eliminates anticholinergic burden?

- A: Bupropion 300 mg XL QAM
- B: Fluoxetine 40 mg QAM
- C: Paroxetine 20 mg QPM
- D: Venlafaxine 150 mg XR QAM

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-881-L05-P

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

COMPARISON OF SMOKING CESSATION OUTCOMES BETWEEN THE COOPER-CLAYTON METHOD TO STOP SMOKING AND FREEDOM FROM SMOKING IN A COMMUNITY CLINIC SETTING: TWO YEAR RESULTS

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Purpose: Tobacco use is a leading cause of many serious health issues including cardiovascular disease, respiratory disease, and cancer. This study compares the cessation rates between The Cooper-Clayton Method to Stop Smoking and the Freedom from Smoking programs in a pharmacist-run community clinic. While there is literature available on the programs individually, a study directly comparing the two has not previously been conducted to our knowledge. **Methods:** This Sullivan University IRB approved study was conducted at The Center for Health and Wellness, a pharmacist-run community clinic. The programs were compared based on cessation rates at 12 weeks from the quit date. Cessation rates were stratified according to Fagerstrom Nicotine Dependence Test, a validated method for assessing nicotine dependence. Non-pregnant participants 18 years of age or older who enrolled in the clinic's cessation program and signed informed consent were included. Data from The Cooper-Clayton Method was obtained retrospectively from September 2012 to April 2016 and Freedom from Smoking data from September 2016 to December 2017. The data collected included demographic information, score on Fagerstrom Nicotine Dependence Test, and self-reporting of cessation status. This information was obtained via paper and phone surveys. Statistical analysis included the use of Chi-square or Fisher's exact, student t-test, and descriptive statistics. **Results:** For the primary endpoint of cessation at 12 weeks, the 34 participants in The Cooper-Clayton program had a rate of 52.9% compared to the 17 participants in the Freedom from Smoking program at 47.1%. Secondary endpoint of cessation at end of program showed rates of 52.9% and 58.8% for The Cooper-Clayton Method and Freedom from Smoking respectively.

Conclusions: No statistical differences were found between programs. Nevertheless, this study demonstrates that these smoking cessation programs positively impact success rates based on the difference from the national cessation report rate of 7.4% in 2015.

Learning Objectives:

Explain the differences between The Cooper-Clayton Method to Stop Smoking and Freedom from Smoking programs

Describe the Fagerstrom Nicotine Dependence Test and the importance of this particular test

Self Assessment Questions:

Which of the following is a correct description of both The Cooper-Clayton Method to Stop Smoking and Freedom from Smoking (FFS) program?

- A: FFS has 8 sessions for 2 hours each, Cooper-Clayton has 13 sessions
- B: FFS has 13 sessions for 1 hour each, Cooper-Clayton has 9 sessions
- C: FFS has 8 sessions for 1 hour each, Cooper-Clayton has 13 sessions
- D: FFS has 13 sessions for 2 hours each, Cooper-Clayton has 8 sessions

Mary smokes $\frac{3}{4}$ a pack of cigarettes a day, where her first smoke of the day is her favorite and is within thirty minutes of waking. She tells you she smokes mostly in the morning when she is at home

- A: Low (1-2)
- B: Low to Moderate (3-4)
- C: Moderate (5-7)
- D: High (8+)

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-778-L04-P

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

STANDARDIZING APPROACHES TO MEDICATION USE IN PATIENTS RECEIVING CONTINUOUS RENAL REPLACEMENT THERAPY

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Purpose: The purpose of this project is to standardize continuous renal replacement therapy (CRRT) dosing for non-antibiotic medications and to improve institution specific challenges related to CRRT. **Methods:** To develop a dosing table for non-antibiotic medications for CRRT, frequently used non-antibiotic medications were identified, and pharmacokinetic values of those medications were found through a medication database and primary literature search. To standardize prescribing for effluent flow rates, primary literature review was performed to identify best practice recommendations and an analysis of current CRRT effluent flow rates at UW Health was performed. Electronic ordering of CRRT effluent rate was evaluated and a cost saving analysis was done. To improve communication, nursing workflows and CRRT order sets were evaluated and discussions with nursing staff were performed to identify areas of breakdown. For transition periods around starting and stopping CRRT, discussions with pharmacy staff were done to identify best practice for dosing strategies.

Preliminary Results: Seventy-two medications were identified from institution renal-dose adjustment guidelines, and a spreadsheet with dosing strategies was created. Of these medications, 40% met qualifications to adjust for CRRT. Electronic ordering of CRRT effluent rate was updated, which could translate up to a 40% cost savings (\$50,000 yearly) in replacement fluid in the ICU based on patient body weight. Improvements in nurse charting and best practice alerts were implemented to improve communication. UW Health guidelines were updated with dosing recommendations for non-antibiotic medications and dosing strategies during transitions on and off CRRT. **Conclusions:** Conclusions will be presented at the Great Lakes Residency Conference

Learning Objectives:

Describe an appropriate range for effluent flow rate for a patient on continuous renal replacement therapy.

List the pharmacokinetic variables required for estimating doses of medications removed by continuous renal replacement therapy.

Self Assessment Questions:

Which range of effluent flow rate has been shown to be non-inferior regarding mortality at 90 days when compared to higher flow rates?

- A: 10-15 ml/kg/hr
- B: 20-25 ml/kg/hr
- C: 35-40 ml/kg/hr
- D: 50-55 ml/kg/hr

Which combination of pharmacokinetic variables is required to estimate doses of medications that are removed by continuous renal replacement therapy?

- A: Unbound drug, volume of distribution, and elimination rate constant
- B: Unbound drug, volume of distribution only
- C: Volume of distribution, and elimination rate constant only
- D: Unbound drug and elimination rate constant only

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-529-L01-P

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

ASSESSMENT OF HIV-POSITIVE PATIENTS' PERCEPTION AND REFERRAL SOURCES FOR IMMUNIZATIONS COMPARED TO THE HIV-NEGATIVE POPULATION

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Purpose: This research study aims to (1) quantitatively identify and compare Persons Living With HIV (PLWH) perception of immunizations to the HIV-negative population, and (2) determine pertinent contact-points for PLWH regarding immunization recommendations/information. **Methods:** A 19-item survey adapted from the Health Belief Model was developed to assess PLWH and HIV-negative patients' perceptions, barriers, benefits and self-efficacy and referral sources for immunizations (Tdap, pneumococcal, and hepatitis B). A five-point Likert scale was utilized for questions assessing participants' perceptions. Multiple choice questions were designed to identify source(s) of immunization information and demographics. Recruitment occurred at an HIV specialty pharmacy predominantly serving PLWH and a non-specialty pharmacy serving a diverse population (PLWH and HIV-negative). Participants completed the survey independently via a tablet or over the phone with trained research personnel transcribing responses to the tablet. HIV status was self-reported with no personally-identifiable information recorded. All consenting adults are included in analysis, while those who identified themselves as caregivers were excluded. Purdue University's IRB granted exemption approval. The primary outcomes include patient-reported predictors for immunization acceptance, Likert-scale questions, patient-reported immunization rates, and sources of immunization recommendations. Multivariate ordinal regression will be performed to assess if HIV status significantly predicts barriers to immunization acceptance. Covariates include number of comorbidities, immunization referral sources, and hepatitis B vaccine series completion. **Results:** As of January 2018, 142 participants completed the survey, with 68 participants self-reporting living with HIV. Outcomes analyses will be presented at the Great Lakes Pharmacy Resident Conference (GLPRC). **Implications/conclusions:** The investigators aim to identify immunization barriers PLWH possess and develop solutions addressing these barriers. Additionally, this research may support the expansion of pharmacist-provided immunization services in the community to positively impact immunization rates of PLWH. Results will be presented at GLPRC.

Learning Objectives:

Identify which vaccines are recommended and contraindicated in Persons Living With HIV (PLWH)

Discuss how the Health Belief Model can be utilized to identify potential barriers to immunization acceptance

Self Assessment Questions:

Which of the following vaccines are contraindicated in patients with HIV/AIDS (i.e. CD4 count < 200)?

- A: Meningococcal
- B: Pneumococcal Conjugate Vaccine (PCV13)
- C: Yellow Fever
- D: Influenza, inactivated

Which theoretical construct of the Health Belief Model refers to subjective assessment of risk to developing a health problem?

- A: Self-efficacy
- B: Perceived Susceptibility
- C: Perceived Severity
- D: Perceived Barriers

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-912-L06-P

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

IMPACT OF AN OUTPATIENT INTRAVENOUS DIURETIC PROGRAM ON PATIENTS WITH ACUTE EXACERBATIONS OF HEART FAILURE

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Background: Intravenous (IV) diuretics are commonly used to treat patients with fluid overload in the setting of heart failure exacerbation. Due to the need to establish an IV line, many patients are admitted to the hospital even if there is no need for additional medical intervention. Ryder et al. found that for patients receiving IV Furosemide 40 to 80mg over 5 minutes, 72% of patients stabilized and did not require hospitalization. Buckley et al. observed considerable weight loss and urine output with acceptable safety outcomes with similar programs and a cost analysis found that patients receiving IV diuretics as outpatients used about half as many dollars as patients who were admitted. **Purpose:** The primary endpoint is a comparison patient weight before and after the administration of IV diuretics in the outpatient setting. **Methods:** This is a multi-center, non-interventional, crossover, retrospective chart review of patients who are admitted to the ED for heart failure exacerbation and were seen in a Northwestern cardiology clinic within the 72 hours prior to admission. The study includes both the downtown Northwestern Medical Center and Northwestern Lake Forest practice sites. Data was collected on ED visit from August 1st 2016 to January 1st 2017 for the baseline data group and August 1st 2017 to January 1st 2018 for the study group. Patients served as their own controls. The primary endpoint is change in patient weight post IV diuretic administration. Secondary endpoints include potassium level, serum creatinine level, length of stay, allergies, length of time to admission after the clinic visit, and number of ED visits per patient before and after implementation of the IV diuretic program. Demographic information including age, ejection fraction, and sex was recorded as well. **Conclusions:** Results and conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define the need for IV diuresis in the treatment of acute exacerbations of heart failure.

Recognize the value of implementing an outpatient IV diuresis in treatment of heart failure exacerbations.

Self Assessment Questions:

What is the purpose of IV diuresis in treatment of heart failure exacerbations?

- A Repair damaged heart muscle
- B: Symptomatic relief
- C: Improve renal function
- D: Increase preload

Which of the following health care practitioners may be valuable to collaborate with in the implementation of an outpatient IV diuresis program?

- A Physicians
- B Pharmacists
- C Nurses
- D All of the above

Q1 Answer: B Q2 Answer: D

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Activity Type: Knowledge-based Contact Hours: 0.5
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KETAMINE SAFETY IN THE EMERGENCY DEPARTMENT FOR ANALGESIA AND SEVERE AGITATION/EXCITED DELIRIUM: A HEALTH SYSTEM EXPERIENCE

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Purpose: Multiple single-center studies have reported that ketamine is an effective treatment for pain in the emergency department (ED) and severe agitation/excited delirium in the pre-hospital setting. However, the optimal dissociative dose ketamine (SDDK) dosing range and administration method with the least adverse events is unclear. Additionally, limited studies have assessed the safety of intramuscular (IM) ketamine for severe agitation/excited delirium in an ED setting. Ketamine administration may lead to respiratory, cardiovascular, and neuropsychiatric adverse events. Cleveland Clinic Emergency Services Institute (ESI) ketamine protocols were developed to assist prescribers in appropriately utilizing ketamine for these two off-label indications. The purpose of this study is to evaluate the safety of SDDK for analgesia and dissociative sedation ketamine for severe agitation/excited delirium in patients at Cleveland Clinic Health System (CCHS) EDs. The primary objective of this project is to describe the incidence of respiratory and cardiovascular adverse events requiring intervention after ketamine administration. Secondary objectives include determining the percentage of ketamine orders in the ED for analgesia or severe agitation/excited delirium that were adherent to the approved ESI protocols and describing the incidence of neuropsychiatric adverse effects after SDDK administration. **Methods:** Retrospective chart reviews will be conducted to identify and evaluate all adult patients 18 years and older who received SDDK for analgesia and dissociative sedation ketamine for severe agitation/excited delirium in 13 CCHS EDs from May 9, 2017 to November 9, 2017. Data will be analyzed and reported using descriptive statistics. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident

Learning Objectives:

Discuss the pharmacologic properties of ketamine

Identify the adverse events that that may occur from the administration of dissociative dose and dissociative sedation ketamine

Self Assessment Questions:

Which of the following statements regarding ketamine is correct?

- A Ketamine is a noncompetitive N-methyl-D-aspartate (NMDA) receptor
- B: Ketamine use leads to dissociative anesthesia at lower doses
- C: Ketamine's sedative effects have a slow onset of action
- D: Ketamine does not lead to life-threatening adverse events

What adverse events may occur from the use of dissociative sedation ketamine?

- A Hyperglycemia
- B Respiratory depression
- C Neuropathic pain
- D Nephrotoxicity

Q1 Answer: A Q2 Answer: B

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Activity Type: Knowledge-based Contact Hours: 0.5
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EFFECT OF DILUTING VANCOMYCIN IN NORMAL SALINE VERSUS DEXTROSE 5% IN WATER ON BLOOD GLUCOSE IN POST-CABG PATIENTS

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Purpose: To determine whether diluting vancomycin in normal saline versus dextrose 5% in water has an effect on the average 24-hour post-operative blood glucose levels in CABG patients. **Methods:** A retrospective cohort study of patients who received vancomycin as surgical antimicrobial prophylaxis for CABG procedures at OSF Saint Anthony Medical Center in Rockford, IL between March 1, 2016 and December 31, 2017. The institution standardized dilution of vancomycin in normal saline in June 2017. Patients will be identified using the electronic medical record. Chart reviews will be conducted to identify patients who underwent CABG and for data collection. Average 24-hour post-surgery blood glucose levels will be compared in patients who received vancomycin diluted in normal saline to patients who received vancomycin diluted in dextrose 5% in water. The following data of the two cohorts will be collected for data analysis: age, weight, past medical history, baseline hemoglobin A1c, baseline serum creatinine, receipt of intra-operative insulin, 24 hour pre- and post-CABG surgery blood glucose levels, and amount of insulin administered 24 hours post-surgery. Average 24 hours post-surgery blood glucose levels will be calculated. Patient confidentiality will be maintained. **Results:** Not applicable **Conclusions:** Not applicable

Learning Objectives:

Identify an appropriate goal for blood glucose in cardiac surgery patients
Recognize the duration of treatment for post-CABG antimicrobial surgical prophylaxis per SCIP guidelines

Self Assessment Questions:

Which of the following would be an appropriate blood glucose target for cardiac surgery patients?

- A >200
- B: 180-200
- C: 140-180
- D: 100-140

What is the optimal duration of antimicrobial prophylaxis in cardiac procedures?

- A 12 hours
- B 24 hours
- C 36 hours
- D Antimicrobial prophylaxis is not needed

Q1 Answer: C Q2 Answer: B

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

IMPLEMENTATION OF A PHARMACIST-LED NALTREXONE EXTENDED RELEASE INJECTION CLINIC

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Purpose: The Psychotropic Drug Safety Initiative (PDSI) is a quality improvement initiative utilized within the Veteran's Health Administration (VHA) that allows facilities to compare their respective performance across different measures. The most recent update (Phase III) was launched in March 2017 and focuses on treatment of veterans with Substance Use Disorder (SUD). Each facility is required to focus on at least one of the two measures in Phase III, alcohol use disorder (AUD) or opioid use disorder (OUD). The aim of this clinic is to improve access to extended release naltrexone injections for veterans with SUD by utilizing mental health pharmacists. **Methods:** Veterans are referred to clinic via a consult placed by either their primary care or mental health provider following diagnosis of SUD. Following referral veterans are seen in clinic by the pharmacist for an intake interview, which is completed using a templated note to ensure consistency between patients. The initial workup includes a history of substance use, current medications, baseline laboratory values, urine drug screen, suicide risk assessment, and counseling on naltrexone ER injections. At the initial visit a 7-day prescription for oral naltrexone will be issued to assess tolerability of the medication. The veteran will then return one week later to receive their first injection if appropriate, and will return every four weeks thereafter. At each follow-up visit an interview will be conducted to assess efficacy/safety of the medication. Veterans will be included in the clinic if they are 18 or older, abstinent from opioids for at least 7 days, and have successfully completed the oral naltrexone challenge. Veterans will be excluded from the clinic if they have any contraindications to naltrexone ER injections as outlined in the medication guide. **Results/Conclusions:** Results/conclusions are in progress and will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the role of extended release naltrexone injection in the treatment of opioid use disorder and alcohol use disorder and be able to identify appropriate patients for clinic enrollment.

Define the role of the pharmacist in an extended release naltrexone injection clinic at a Veteran's Affairs Medical Center.

Self Assessment Questions:

1. Which of the following are potential severe adverse reactions that can occur with extended release naltrexone injection and are addressed with each patient in the REMS program?

- A Hepatotoxicity, severe injection site reactions, precipitation of opioid
- B: Severe injection site reactions, precipitation of opioid withdrawal, r
- C: Hepatotoxicity, renal failure, severe injection site reactions
- D: Precipitation of opioid withdrawal, hepatotoxicity, renal failure

How long should a patient be opioid free prior to naltrexone initiation?

- A 3 days
- B 5 day
- C 7 days
- D 10 days

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-779-L01-P

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

CLINICAL OUTCOMES IN HIGH DOSE PIPERACILLIN-TAXOBACTAM THERAPY IN OBESE PATIENTS VERSUS STANDARD DOSES IN NON-OBESE PATIENTS: A RETROSPECTIVE COHORT STUDY

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Purpose: Previous pharmacokinetic studies at Franciscan Health Indianapolis have shown standard doses of piperacillin-tazobactam that achieve adequate time above minimum inhibitory concentration ($T > MIC$); do not achieve similar concentrations in obese and morbidly obese patients, and higher doses are necessary in these patients to achieve adequate $T > MIC$. This research is necessary to establish if current dosing strategies in obese patients achieve similar clinical outcomes to standard doses in non-obese patients and investigate dose optimization in the setting of obesity. **Methods:** A retrospective single-center cohort study in patients ≥ 18 years old with culture-confirmed non-urinary tract *Pseudomonas aeruginosa* infections between March 1, 2015 and September 19, 2017. Patients with positive cultures were initially screened for piperacillin-tazobactam treatment ≥ 24 hours and classified as obese (≥ 120 kg) or non-obese (< 120 kg). After randomization, data was collected on patient demographics, site of infection, organism MIC, renal function, piperacillin-tazobactam dosing strategies, other antibiotic therapy, length of stay, and clinical outcomes. **Results/Conclusions:** The obese cohort included 45 patients with weights ranging from 120.2 kg to 303.4 kg (mean 157 kg). The non-obese cohort included 45 patients with weights ranging from 44 kg to 113.6 kg (mean 79.7 kg). Full results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review previous research in dose-optimization of piperacillin-tazobactam including in obese and morbidly obese patients
Discuss clinical outcomes in obese cohort versus non-obese cohort in current study and how these may be translated into piperacillin-tazobactam dose optimization at other sites

Self Assessment Questions:

What time above MIC ($T > MIC$) has been established to be adequate for clinical efficacy against Gram negative organisms for piperacillin-tazobactam?

- A: 40% $t > mic$
- B: 50% $t > mic$
- C: 60% $t > mic$
- D: 70% $t > mic$

What factor is likely LEAST relevant to piperacillin-tazobactam dose optimization?

- A: Organism MIC
- B: Site of infection
- C: Patient body habitus
- D: Patient age

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-532-L01-P

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

SURVEY OF VETERANS AFFAIRS HEALTH-SYSTEM PHARMACY ADMINISTRATION RESIDENT GRADUATES: STATUS, SUCCESS, AND RETENTION

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Purpose: In 2005, an American Society of Health-System Pharmacists (ASHP) report detailed an impending problem in pharmacy practice: a shortage of future pharmacy leaders. In response, pharmacy programs across the country expanded mentorship and initiated new Health-System Pharmacy Administration (HSPA) residency programs to ensure a pipeline of passionate, qualified new leadership. Since 2008, the Veterans Affairs (VA) has expanded its HSPA residency programs from three programs to fourteen in the hopes of training future pharmacy leaders and filling pharmacy administration vacancies within the VA. The purpose of this study is to survey VA HSPA residency program graduates to determine the success of graduates in assuming supervisory positions, evaluate the benefit to the VA system in terms of VA retention, and discuss areas for improvement. **Methods:** This study involves a voluntary, anonymous electronic survey of VA HSPA residency program graduates. The survey was distributed to VA HSPA residency program directors (RPDs) to forward to all their residency graduates between June 1, 2008 and July 31, 2016. RPDs were identified from the ASHP Residency Directory and contacted via e-mail. RPDs were asked to provide the number of HSPA graduates from their program to calculate a response rate. The primary endpoint is the percent of VA HSPA residency program graduates who are currently employed as a supervisor or program manager at a VA. Secondary endpoints include percent of VA retention, percent of current employment in a supervisor role at a VA, percent of current employment as a program manager at a VA, and percent of graduates currently employed as a supervisor or program manager overall (VA and non-VA). Nominal data will be analyzed using the Fisher's exact test, and continuous data will be analyzed using the unpaired t-test. **Results/Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the pharmacy leadership shortage and the potential impact on healthcare systems.
Explain the goals of Health-System Pharmacy Administration residency programs.

Self Assessment Questions:

Which of the following are potential causes of a pharmacy leadership shortage?

- A: Decrease in number of patients
- B: Decrease in number of pharmacists
- C: Increase in leadership retirement
- D: Increase in career longevity

Which of the following is a goal of Health-System Pharmacy Administration residency programs?

- A: Develop pharmacists with leadership and management skills
- B: Discourage change in pharmacy practice
- C: Focus solely on the financial impact of medication use
- D: Increase salaries for pharmacy managers

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-780-L04-P

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CHARACTERIZATION OF EMPIRIC ANTIBIOTIC TREATMENT STARTED IN PATIENTS WITH SEPSIS AT A RURAL TEACHING HOSPITAL

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Purpose: At St. Claire HealthCare, pharmacists are consulted to dose and monitor a select number of antibiotics, such as vancomycin and aminoglycosides. Pharmacist involvement in the initial treatment of patients with sepsis could help ensure that the most appropriate antibiotics are selected and administered in a timely manner. Early pharmacist driven antibiotic optimization in sepsis may result in increased coverage of suspected microbes, reduced use of protected antibiotics, and improved outcomes. **Methods:** This is a single center retrospective study evaluating the initial selection, dosing, and time to administration of empiric antibiotics for patients who presented to St. Claire HealthCare's Emergency Department with sepsis, severe sepsis, or septic shock between November 8, 2015 and November 7, 2016. Data collection included baseline demographics (e.g., sex, race, history of multidrug-resistant organisms, etc.), lab values (e.g., white blood cell count, lactic acid), vital signs, antibiotic allergies, description of allergy (if available), kidney function measures (creatinine clearance, serum creatinine at baseline and on day of order), antibiotic indication and vasopressor selection (if applicable). Results to be reported include appropriateness and timeliness of antibiotics. **Results and Conclusions:** This study is still in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize sepsis criteria as defined by the Surviving Sepsis Campaign
Recall the change in survival rate as it relates to timeliness of antibiotic administration in this patient population

Self Assessment Questions:

Which of the following are considered Systemic Inflammatory Response Syndrome criteria?

- A: Temperature $>38^{\circ}\text{C}$ or $<36^{\circ}\text{C}$
- B: Blood Pressure
- C: Mean arterial pressure $<65\text{ mmHg}$
- D: Lactate $>4\text{ mmol/L}$

What is the average decrease in survival for every hour antibiotic therapy is delayed?

- A: 20%
- B: 10%
- C: 7.5%
- D: 5%

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-533-L01-P

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

COMPARE THE PREVALENCE OF REDMAN'S SYNDROME WITH VANCOMYCIN IN PEDIATRIC CYSTIC FIBROSIS PATIENTS VS. NON CYSTIC FIBROSIS PATIENTS

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Purpose: Cystic fibrosis (CF) is a progressive, genetic lung disease that is characterized by persistent infections and mucus buildup that results in worsening lung function. Due to the risk for MRSA, vancomycin is a common treatment in patients with CF. A common, but difficult to predict reaction that can occur with vancomycin treatment is known as redman's syndrome (RMS). The primary objective of this study was to compare the prevalence of RMS in pediatric CF patients versus non-CF patients. The secondary objectives were to evaluate the use of pre-treatment diphenhydramine and risk factors for RMS, specifically examining vancomycin infusion rate (mg/kg/minute), vancomycin infusion duration (1 hour vs. 2+ hours), and vancomycin dose (mg/kg). **Methods:** In this IRB-approved retrospective cohort study, data was collected for pediatric patients with and without CF, aged 30 days to 18 years, during the period of January 1, 2015 to July 31, 2017. CF patients identified to be included in the study were age- and gender-matched with a pediatric patient without CF that also received vancomycin therapy. **Results:** Data analysis revealed that the prevalence of RMS was 69.9% in patients with CF vs. 20.3% in patients without CF ($P < 0.001$), with 73% and 27% receiving pre-treatment diphenhydramine, respectively ($P < 0.001$). Patients with CF received higher vancomycin doses (CF: median 18.3 mg/kg IQR 4.1 vs Non-CF: median 15 mg/kg IQR 1.9) and slower vancomycin infusion rates (CF: median 0.16 mg/kg/min IQR 0.11 vs Non-CF: median 0.25 mg/kg/min IQR 0.05) when compared to patients without CF ($P < 0.0001$, $P = 0.0001$, respectively). **Conclusions:** In conclusion, the prevalence of redman's syndrome was approximately 3.5 times higher in the pediatric cystic fibrosis population compared to the general pediatric population, which required slower vancomycin infusion rates and pre-treatment with diphenhydramine to control RMS

Learning Objectives:

Describe the prevalence of redman's syndrome with vancomycin therapy in pediatric cystic fibrosis patients versus non-cystic fibrosis patients
Identify potential risk factors for redman's syndrome and possible therapeutic interventions to lessen the severity of symptoms

Self Assessment Questions:

Based on data from this study, which of the following is true regarding the prevalence of redman's syndrome (RMS) in the pediatric patient population?

- A: Equal in cystic fibrosis patients vs. non-cystic fibrosis patients
- B: More common in cystic fibrosis patients vs. non-cystic fibrosis patients
- C: More common in non-cystic fibrosis patients vs. cystic fibrosis patients
- D: RMS does not occur in the pediatric patient population

Which of the following would most likely make the symptoms of redman's syndrome (RMS) worse?

- A: Higher vancomycin doses (mg/kg)
- B: Pre-treatment with diphenhydramine
- C: Slower vancomycin infusion rates (mg/kg/min)
- D: Longer vancomycin infusion durations (1 hour vs. 2+ hours)

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-534-L01-P

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

IMPLEMENTATION AND ASSESSMENT OF A PHARMACIST DRIVEN INTERVENTION OF BETA-BLOCKER USE IN HEART FAILURE PATIENTS

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Purpose: Heart failure (HF) is a leading cause of hospital readmissions in the United States. Multiple studies have assessed this issue and have focused on optimizing patient's regimens to evidenced based drug therapy. Failure to meet the treatment guidelines serves as an appropriate target for pharmacists to intervene in order to improve patient outcomes. The purpose of this study is to serve as a baseline assessment of the pharmacist driven intervention to switch select beta-blockers to evidence based beta-blockers in patients with heart failure with a reduced ejection fraction (EF). **Methods:** A pharmacist driven protocol for HF patients has been developed and approved for implementation in September 2017. This protocol targets patients with an EF < 40% and are on either atenolol, metoprolol tartrate, or nebivolol. The protocol allows the pharmacist to switch these beta-blockers to an evidence based beta-blocker. Evidence based beta-blockers are proven to reduce morbidity and mortality in heart failure and include bisoprolol, carvedilol, and metoprolol succinate. If a patient meets these criteria, the pharmacist will change the targeted beta-blocker to carvedilol or metoprolol succinate. Carvedilol and metoprolol succinate are on the formulary at Community Hospital. Metoprolol succinate will only be used in HF patients with a concomitant history of asthma/COPD due to its beta-1 receptor selectivity of this drug and subsequently higher tolerability. Data of patients who are impacted by this protocol will be collected and analyzed retrospectively. **Preliminary Results:** Data collection and analysis are currently in progress. **Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the pathophysiology of heart failure with reduced ejection fraction

Identify an area where inpatient pharmacists can intervene to optimize heart failure medication regimens based on treatment guideline recommendations

Self Assessment Questions:

Which of the following is not an evidence-based beta blocker according to the ACC/AHA Guidelines for the Management of Heart Failure?

- A: bisoprolol
- B: carvedilol
- C: metoprolol tartrate
- D: metoprolol succinate

Which of following is true regarding heart failure with reduced ejection fraction?

- A: Defined as an ejection fraction of less than 50%
- B: Natural compensatory mechanisms result in increased blood volume
- C: Heart failure with reduced ejection fraction is a problem with filling
- D: Cardiac remodeling is a desired effect in the physiology of heart failure

Q1 Answer: C Q2 Answer: B

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

PHARMACIST ROLE IN PATIENT DISCHARGE FROM AN EMERGENCY DEPARTMENT (ED) AFTER NEW DIAGNOSIS OF VENOUS THROMBOEMBOLISM (VTE)

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Purpose: Over 200,000 diagnoses of acute venous thromboembolism (VTE) are made in emergency departments (ED) across the United States annually, with 52% of deep venous thrombosis and 90% of pulmonary embolism patients being admitted for inpatient management. Many of these admissions could be avoided if anticoagulant therapy and appropriate education could be provided in the ED. By facilitating safe discharge from the ED, the cost of care and demand for inpatient beds can be reduced. Given additional oral anticoagulant options and specialized dosing strategies for VTE treatment, pharmacists can provide assistance in anticoagulant selection and patient education to ensure successful outpatient therapy. Currently at Froedtert & the Medical College of Wisconsin, pharmacists in the ED are consulted for anticoagulation recommendations and patient teaching on an as needed basis, and a consistent workflow or documentation method does not exist. The primary objective of this study is to develop the pharmacist role in patients who are discharged from the ED after diagnosis of new VTE, with secondary objectives evaluating thirty-day readmission rates and cost avoidance. **Methods:** This two-phase, quality improvement study will first utilize a new emergency department VTE clinical pathway to retrospectively evaluate appropriateness of patient admission or discharge. Appropriateness will be determined by whether or not the patient fell within the clinical pathway recommendations for admission or discharge – patients falling outside of recommendations will be considered inappropriate. The focus of the second phase will be to identify opportunities for pharmacist involvement, and then standardize the pharmacist role in assisting in ED discharge for patients newly diagnosed with VTE. A team comprised of ED physicians, hospitalists, and pharmacists will collaborate to develop and define this role. **Results:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the advantages and rationale for discharging patients with VTE from the ED.

Identify opportunities for pharmacist involvement in facilitating safe discharge of patients diagnosed with new VTE from the emergency department (ED).

Self Assessment Questions:

LC is a 44 year old male returning from a European getaway and is presenting to the ED with shortness of breath. Upon exam he is found to have a PE. Which of the following supports discharging LC from

- A: Decreased patient satisfaction/quality of life
- B: Increased risk for readmission
- C: Timely initiation of appropriate anticoagulant therapy
- D: Increased resource utilization and cost of stay

What services could a pharmacist provide to facilitate discharge from the emergency department after new VTE?

- A: Patient education
- B: Facilitate first dose prior to discharge
- C: Anticoagulant recommendation
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-781-L04-P

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

PERCEPTIONS OF THE IMPACT OF CAREGIVER'S ATTENDANCE OF DIABETES EDUCATION CLASSES ON ACHIEVEMENT OF DIABETES-RELATED GOALS

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Purpose The purpose of this study is to assess the perceptions of the impact of caregiver's attendance of diabetes education classes on achievement of diabetes-related goals. **Methods** The setting of this study is an AACE-accredited diabetes education program within an independently-owned community pharmacy in southern Indiana. The education program consists of four group classes followed by six individual follow-up appointments. Following IRB approval, semi-structured interviews were conducted in person or over the phone with patients who completed the program between July 2014 and December 2017 and reported bringing a caregiver to at least 2 of the 4 classes. The interview guide was based on the Health Belief Model of health behaviors and aimed at exploring the major concepts of perceived benefits, perceived barriers, and self-efficacy. Pilot interviews were conducted to assess the face validity of interview questions and logistics. Interviews were audio-recorded and transcribed by a medical transcription service for analysis by qualitative data software. Interviews continued until thematic saturation was reached. Coding was completed independently after data collection by the two investigators, then discrepancies were resolved. Results and pending. Conclusions are pending.

Learning Objectives:

Describe the relationship between having a caregiver attend diabetes education classes and the patient's success in implementing necessary lifestyle changes to control the disease.

Relate the perceptions of medications, meal planning, monitoring, and movement based on the Health Belief Model and the importance of having support from caregivers to help them achieve their goals.

Self Assessment Questions:

Which of the following interventions is recommended for type 2 diabetes management for every patient?

- A: Basal-bolus insulin
- B: Weight management and exercise
- C: Cutting out carbohydrates from the diet entirely
- D: Pancreatic surgery

The Health Belief Model is used to-

- A: define patients' support of the medical insurance system
- B: promote nutritional supplement recommendations
- C: identify patient active in regard to preventative measures
- D: describe the collective opinions of health care professionals regarding

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-536-L01-P

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

ASSESSMENT OF FACTOR PRODUCT UTILIZATION WITHIN A COMMUNITY TEACHING HOSPITAL - A RETROSPECTIVE CHART REVIEW

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Purpose: Factor products are used in the setting of various bleeding disorders and when rapid reversal of anticoagulation is required. At Genesys Regional Medical Center, the products utilized include four-factor prothrombin complex concentrate, coagulation factor VII, and activated prothrombin complex concentrate/anti-inhibitor coagulant complex. While these medications can ultimately be life saving, they do not come without consequences. Risks associated with use include predisposing patients to thrombotic events and high purchase prices per dose. Anecdotal evidence at Genesys Regional Medical Center suggests that there are opportunities for improvement in factor product utilization. The purpose of this project is to assess the utilization of the three most commonly prescribed factor products on formulary within a one-year time frame and compare it to FDA-labeled indications and Ascension criteria for use. **Methods:** This is a single-center, retrospective review of patients who received ≥ 1 dose of four-factor prothrombin complex concentrate, coagulation factor VII, and activated prothrombin complex concentrate/anti-inhibitor coagulant complex between July 1, 2016 through June 30, 2017. A utilization report was generated to identify patients for inclusion in this study. Information that was collected includes indication for factor product, dosing strategy, anticoagulation prior to factor product administration, and outcomes after administration. Reasons for factor product use were then compared to FDA-labeled indications and Ascension criteria for use. **Results and conclusions:** Data collection is complete. Final results will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the implications associated with factor products in terms of suboptimal utilization and dosing strategy selection.

Discuss first-line options for anticoagulation reversal in the setting of life-threatening bleeding or reversal for urgent procedures.

Self Assessment Questions:

Factor product use may be associated with all of the following except:

- A: Thromboembolic complications
- B: Dosing errors due to unfamiliarity and rapid turn around time
- C: Increased bleeding
- D: Cardiovascular events

A 45-year old Jehovah's Witness presents to the emergency department at 3 p.m. after experiencing a fall. He is prescribed apixaban for atrial fibrillation, claiming that he took his last dose of apixaban

- A: Four-factor prothrombin complex concentrate
- B: Coagulation factor VII
- C: Activated prothrombin complex concentrate/anti-inhibitor coagulant
- D: None

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-782-L01-P

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

USE OF A FLUOROQUINOLONE VERSUS A NON-FLUOROQUINOLONE VERSUS A NON-ANTIBIOTIC BASED REGIMEN IN THE TREATMENT OF ACUTE, UNCOMPLICATED DIVERTICULITIS

Use of a Fluoroquinolone versus a Non-Fluoroquinolone versus a Non-antibiotic Based Regimen in the Treatment of Acute, Uncomplicated Diverticulitis.

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Purpose: Diverticulitis is estimated to account for ~300,000 hospitalizations/year and is estimated to cost ~\$11,000 per hospitalization. The management of acute, uncomplicated diverticulitis remains based on expert consensus rather than on evidence from randomized clinical trials. The most common antibiotic regimen used in this patient population is metronidazole plus a fluoroquinolone (FQ). Non-FQ options include metronidazole plus trimethoprim-sulfamethoxazole or a third generation cephalosporin, amoxicillin-clavulanate, and beta-lactam/beta-lactamase inhibitor combinations. Since there is a lack of clinical data comparing outcomes between these regimens, it remains uncertain whether patients presenting with acute, uncomplicated diverticulitis require a fluoroquinolone-based regimen. Increasing rates of FQ resistance and awareness of collateral damage have raised concern about whether this class should remain a first-line option. Additionally, recent trials have demonstrated that antibiotics may not be necessary for acute, uncomplicated diverticulitis. Currently at Northwestern Memorial Hospital, treatment is left up to physician discretion. In this study, patients receiving FQ versus non-FQ based regimens will be compared, and patients receiving any antibiotic regimen versus no antibiotics will be compared to implement an evidence based approach to treatment. The primary objective is to evaluate whether there's a difference in outcomes, defined by length of stay and 30 day readmission due to recurrent diverticulitis, in patients receiving a fluoroquinolone versus non-fluoroquinolone regimen for the treatment of acute, uncomplicated diverticulitis. The secondary objective is to evaluate these outcomes in patients who received any appropriate antibiotic regimen versus no antibiotics. **Methods:** This retrospective cohort study will be conducted utilizing electronic health records to identify patients 18 years of age or older with acute, uncomplicated diverticulitis, defined by ICD 10 codes. Data points to be collected include length of stay, 30 day readmission due to diverticulitis, time to conversion from IV to PO antibiotics, progression to surgery, and duration of therapy.

Learning Objectives:

Recall appropriate guideline based recommendations for the treatment of acute, uncomplicated diverticulitis

Discuss the category of diverticulitis where there exists evidence that antibiotic treatment does not always improve outcomes

Self Assessment Questions:

Which of the following are appropriate guideline based recommendations for the treatment of acute, uncomplicated diverticulitis?

- A: Metronidazole + ciprofloxacin
- B: Metronidazole + trimethoprim-sulfamethoxazole
- C: Metronidazole + ceftriaxone
- D: all of the above

Which category of diverticulitis is there evidence that antibiotic treatment does not improve outcomes?

- A: Diverticulitis with bleeding
- B: Acute, uncomplicated diverticulitis
- C: Complicated diverticulitis
- D: Diverticulitis with perforation

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-537-L01-P

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

IMPACT OF AMBULATORY CARE PHARMACISTS ON DIABETES-RELATED HOSPITALIZATIONS AND EMERGENCY DEPARTMENT VISITS

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Purpose: Diabetes mellitus is a significant cause of morbidity and mortality. It has been projected that as many as one in three Americans will have diabetes by 2050 if these trends continue. Health care costs are 2.3 times greater for these patients, and with the increased costs associated with managing these patients, the number of hospitalizations and emergency department (ED) visits related to diabetes will likely increase. Literature currently published on the pharmacist's role has shown positive results. Specifically, patients who were managed by a clinical pharmacist had higher decreases in hemoglobin A1c as compared to usual care. Additionally, changes in diabetes-related hospitalizations and ED visits were lower among patients managed by clinical pharmacists. Our objective is to assess the impact of ambulatory care pharmacy services on the number of diabetes-related inpatient hospitalizations and diabetes related ED visits prior to and after working with a pharmacist. The secondary objective is to assess the changes in hemoglobin A1c, appropriateness of statin therapy, and appropriateness of angiotensin converting enzyme inhibitors (ACEI) or angiotensin II receptor blocker (ARB) from baseline to 6 months after working with a pharmacist. **Methods:** This study is a retrospective chart review analyzing the impact of meeting with pharmacists on diabetes related hospitalization and ED visits in the one year period before and six months after patients are seen by a pharmacist. A cohort of approximately 200 patients with type 2 diabetes, ≥ 18 and < 90 years of age, with an A1c $\geq 9.0\%$, having met with a pharmacist for ≥ 2 face-to-face appointments, and who are managed under the collaborative drug therapy management (CDTM) protocol will be analyzed. Patient must have completed their initial face-to-face visit with a pharmacist between January 1, 2017 to June 30, 2017. **Results/Conclusion:** Results and conclusion will be presented at the 2018 Great Lakes Conference

Learning Objectives:

Discuss the impact ambulatory care pharmacists can have on reducing diabetes related ED visits and hospitalizations

Identify interventions pharmacists can make during diabetes related patient appointments

Self Assessment Questions:

In 2013, it was estimated there were approximately _____ visits to emergency departments (ED) with diabetes as the primary diagnosis?

- A: 2 million
- B: 8 million
- C: 20 million
- D: 12 million

Approximately what percent of the American population is living with diabetes?

- A: 15%
- B: 10%
- C: 5%
- D: 20%

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-538-L01-P

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

COMPARING TRADITIONAL 30 MINUTE CEFEPIME INFUSION VS. CONTINUOUS AND EXTENDED INFUSIONS: ADJUSTING TO THE TAILWINDS OF HURRICANE IRMA

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Background: Cefepime, like other beta-lactams, exhibits time dependent killing meaning that the amount of bactericidal activity is related to the percentage of the dosing interval that remains above the minimum inhibitory concentration (MIC) for a particular pathogen. Studies utilizing Monte-Carlo simulations have shown extended interval and continuous infusion dosing to be ideal dosing strategies for maximize time above the MIC however, actual patient outcomes data when compared with standard 30 minute infusion is limited. Purpose: Evaluate the outcomes of treatment with cefepime as an extended infusion over 4 hours or a continuous infusion as an alternative to standard 30 minute infusions of cefepime. Methods: This is a retrospective chart review to assess the safety and efficacy outcomes of adult patients who received continuous infusion cefepime versus extended infusion cefepime versus traditional 30 minute infusion during hospitalization. Main outcome measure will be mortality rate of cefepime continuous infusion and extended-infusion strategy versus traditional infusion. The secondary outcome measures are time to defervescence, rates of reinfection, time to normal WBC (<11,000), days of therapy, length of hospital stay. Results/Conclusion: Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference

Learning Objectives:

Recognize the barriers and safety issues associated with use of continuous infusions.
Explain the potential advantages of using continuous infusion cefepime as it pertains to pharmacokinetics and patient outcomes

Self Assessment Questions:

Less than what percentage of time above the minimum inhibitory concentration (T>MIC) has been shown to have high rates of cefepime therapy failure?

- A 40%
- B: 50%
- C: 60%
- D: 70%

A potential barrier to using cefepime continuous infusion therapy may be

- A Continuous renal replacement therapy
- B Y-site interactions with other medications
- C Increased MIC
- D Staffing shortages

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-539-L01-P

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

POST-OPERATIVE VENOUS THROMBOEMBOLISM RATES FOLLOWING IMPLEMENTATION OF DEEP VEIN THROMBOSIS PROPHYLAXIS ORDER SET IN PATIENTS AFTER TOTAL JOINT ARTHROPLASTY AT UI HEALTH

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Purpose: Patients are at an increased risk for venous thromboembolism (VTE) after total joint arthroplasty or revisions. Symptomatic VTE is highest within the first 7 to 14 days post-operatively. In March 2016, a deep vein thrombosis (DVT) prophylaxis order set for orthopedic surgeries was implemented at UI Health. This project will evaluate and compare rates of deep vein thrombosis (DVT), pulmonary embolism (PE) and bleeding before and after order set implementation in patients who have undergone total knee arthroplasty (TKA), total hip arthroplasty (THA) or revisions.Methods: This is a retrospective chart review examining patients from time of surgery to 3 months post-surgery within May 2016 to July 2017 compared to data collected prior to order set implementation (May 2014 to July 2015). A patient list will be compiled using ICD-10 codes diagnosing orthopedic procedures THA, TKA or revision. Patients 18 years old or younger and prisoners will be excluded. The following baseline patient characteristics (demographics, weight, co-morbidities, basic metabolic panel, creatinine clearance, complete blood count, and international normalized ratio) will be collected. The study will collect information on concomitant blood thinners, pre and post-surgical care (type of surgery, name of surgeon, type of anesthesia, how often order set was used) and length of stay. Type of VTE prophylaxis used including chemoprophylaxis (medication name, dose, time to initiation, intended duration), mechanical prophylaxis, time to mobilization, discharge prophylaxis regimen, and time to therapeutic international normalized ratio (INR) on warfarin treated patients will be assessed. The primary outcome is evaluating the incidence of VTE before and after order set implementation at UI Health.Results: Data collection is still in progressConclusion: To be presented at the Great Lakes Pharmacy Residency Conference

Learning Objectives:

Review therapeutic agents recommended for chemoprophylaxis in patients after total joint arthroplasty
Identify appropriate duration of venous thromboembolism prophylaxis in patients after total joint arthroplasty

Self Assessment Questions:

According to the 2012 ACCP guidelines, patients post total joint arthroplasty should receive extended venous thromboembolism prophylaxis for up to ____ days.

- A 7 days
- B: 14 days
- C: 30 days
- D: 35 days

Which one of the following chemoprophylaxis agents is recommended by the SCIP for VTE prophylaxis in patients after total joint arthroplasty who has high risk of bleeding?

- A Aspirin
- B Fondaparinux
- C Rivaroxaban
- D Warfarin

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-540-L01-P

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

ASSESSING THE NEED FOR AN OUTPATIENT COPD TRANSITIONS OF CARE SERVICE

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Chronic obstructive pulmonary disease (COPD) is currently the third leading cause of death in the United States. Exacerbations of COPD account for the majority of the morbidity, mortality, and cost associated with this disease state. Furthermore, acute exacerbations of COPD and the associated hospital readmissions are a metric the Center for Medicare and Medicaid Services uses to guide reimbursement for healthcare institutions. Because of this, numerous studies have been published describing the patient population and risk factors associated with 30-day readmissions of patients hospitalized for COPD exacerbations. This study, however, focuses on patients who first present to an outpatient setting for a COPD exacerbation and identifies those that re-enter the healthcare system for subsequent COPD exacerbations within the same year. The primary objective is to identify the clinical characteristics of patients treated for a COPD exacerbation in the outpatient setting. Secondly, this study aims to identify the prevalence of patients accessing the healthcare setting again for COPD either outpatient or through hospital admission, within one year of the initial exacerbation. All adult patients discharged between September 1, 2014 and November 1, 2017 from UI Health's emergency department (ED), family medicine, internal medicine or pulmonary clinic with an ICD 10 coded discharge diagnosis for COPD were included. Along with detailed demographic information, other measures collected include adherence to clinic visits, immunization acceptance, comorbidities, and COPD exacerbation treatment course. The results of this study will be used to assess the need for a pharmacist-based COPD transition of care clinic. By determining the clinical characteristics of the patients seen in the outpatient setting who subsequently require further healthcare encounters, the pharmacist can provide focused and additional care to the highest risk patients. Results will be presented at 2018 Great Lakes Residency Conference.

Learning Objectives:

Identify factors associated with the need for COPD exacerbation treatment in the outpatient setting
Recognize an appropriate COPD exacerbation treatment recommendation

Self Assessment Questions:

1. Which of the following characteristics best describes patients treated for a COPD exacerbation in the outpatient setting?

- A COPD Class 2, Group A
- B: Continued tobacco use
- C: Followed in family medicine clinic
- D: Received influenza vaccine in the past year

Which of the following is an appropriate treatment regimen for an outpatient COPD exacerbation?

- A Prednisone 40 mg x 5 days
- B Ciprofloxacin 750 mg bid for 7 days
- C Increase ICS from medium to high dose
- D Increase LABA from daily to twice daily

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-541-L01-P

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

CANDIDEMIA OUTCOMES ACCORDING TO BODY WEIGHT

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Purpose: Obese patients may have altered pharmacokinetic parameters when compared to normal weight patients due to their body habitus. Case reports suggest higher echinocandin dosing may be needed to reach adequate serum concentrations in obese patients. The purpose of this project is to compare patient outcomes between normal weight and overweight patients that receive an echinocandin for candidemia.

Methods: This was an IRB approved, retrospective cohort study conducted at a five hospital health system. Patients admitted January 1, 2014 through January 1, 2018 were included if at least eighteen years old, had a Candida species positive blood culture or T2MR, and received an echinocandin for at least 72 hours. Exclusion: neutropenia, endocarditis, osteomyelitis, meningitis, post-transplant on immunosuppression, or made comfort care with discontinuation of antifungal therapy. Primary outcome: 30 day all-cause mortality. Subset populations: time to echinocandin less than 24h, suboptimal azole dosing, Candida species, blood culture confirmed candidemia. Secondary outcomes: intensive care unit length of stay after candidemia onset, 14 day global clinical cure, 14 day change in SIRS and SOFA score, time to blood culture clearance, Candida retinitis, candidemia recurrence within 6 weeks, re-initiation of antifungal therapy within 6 weeks. 340 patients will be collected to provide 80% power to detect a 15% difference in the primary endpoint. Appropriate statistical analyses will be used to evaluate outcomes, and a bivariate and multivariate logistic regression analysis will be performed to determine variables that may be associated with the primary endpoint, as well as global clinical cure. Results and Conclusions: Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe current literature evaluating the relationship between Candida spp. MIC and probability of target attainment with current echinocandin dosing recommendations.

Describe current literature findings on adequateness of current echinocandin dosing recommendations.

Self Assessment Questions:

Echinocandin dosing may need to be increased from package insert recommendations if the Candida spp. MIC is which of the following:

- A 0.015
- B: 0.03
- C: 0.06
- D: 0.24

While echinocandin package insert dosing may be adequate for most patients, current literature supports the following findings in echinocandin dosing in obese patients.

- A Anidulafungin dosing is able to achieve sufficient concentrations.
- B Caspofungin dosing is able to achieve sufficient concentrations.
- C Micafungin dosing is able to achieve sufficient concentrations.
- D Anidulafungin dosing may not be sufficient to achieve adequate cc

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-543-L01-P

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

THE EFFECT OF CONCOMITANT ACID SUPPRESSION THERAPY WITH ERLOTINIB IN NON-SMALL CELL LUNG CANCER

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Drug-drug interactions have the potential to negatively impact clinical outcomes. The dramatic increase in oral oncolytic therapy, including tyrosine kinase inhibitors (TKIs), has led to the observation of drug interactions with other commonly utilized medications such as proton pump inhibitors and histamine-2 receptor antagonists. These acid reducing agents are known to decrease TKI absorption with limited data on clinical outcomes. The pharmacokinetic interaction is documented in the prescribing information that accompanies tyrosine kinase inhibitors, but is largely disregarded by medical oncologists. This study is focused on the interaction between a specific TKI, erlotinib, and concomitant acid suppression therapy in patients with non-small cell lung cancer. The aim is to determine if concomitant use negatively impacts clinical outcomes. From 2004 to 2016, patients in the state of Indiana receiving erlotinib therapy for non-small cell lung cancer were retrospectively reviewed. Demographic information was collected as well as duration of therapy, number of prior treatments, performance status, date of diagnosis, smoking status, stage, histology, genomic testing, response to therapy, overall survival, and date of death. Survival outcomes were compared between groups of patients who received concomitant acid suppression therapy and those who did not.

Learning Objectives:

Recognize the interaction between acid suppressing agents and tyrosine kinase inhibitors.

Review existing pharmacokinetic data regarding acid suppression and tyrosine kinase inhibitors.

Self Assessment Questions:

At what pH is erlotinib maximally absorbed?

- A: 2
- B: 4
- C: 6
- D: 8

Which of the following is the most appropriate concern of concomitant acid suppression therapy with oral tyrosine kinase inhibitors?

- A: increased absorption, decreased efficacy
- B: decreased absorption, increased efficacy
- C: increased absorption, increased efficacy
- D: decreased absorption, decreased efficacy

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-544-L01-P

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

SAFETY, EFFICACY, AND ACTIVITY LEVELS IN ACUTE LYMPHOBLASTIC LEUKEMIA (ALL) PATIENTS RECEIVING ATTENUATED DOSING OF PEG-ASPARAGINASE.

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Purpose: Asparaginase is a vital component of acute lymphoblastic leukemia (ALL) treatment regimens and is a key contributing factor to improved outcomes in adolescent and young adult patients (AYA) treated on pediatric-based protocols. Traditional adult ALL regimens have minimized use of asparaginase due to concern for severe toxicities, such as hepatotoxicity, pancreatitis, thrombosis or hemorrhage, in older patients receiving this agent. Patients developing hepatotoxicity with asparaginase therapy have shown an increased 30 day mortality rate. To minimize toxicities associated with PEG-asparaginase, Michigan Medicine implemented a PEG-asparaginase dosing algorithm that utilizes lower doses of 1000 IU/m² in adult patients who may be unable to tolerate traditional dosing of 2000 IU/m² with subsequent asparaginase activity level monitoring. The objective of this study is to determine if a reduced dose of PEG-asparaginase of 1000 IU/m² avoids significant toxicities and shows similar efficacy as compared to standard dose of 2000-2500 IU/m² in an adult population. Methods: Patients with ALL who are 50 years of age or older and who have received PEG-asparaginase at Michigan Medicine from January 2007 until August 2017 will be screened for inclusion in this study using the electronic medical record. Patients will be divided into two cohorts based on if they received a standard dose of PEG-asparaginase (> 2000 IU/m²) or a reduced dose (1000 IU/m²). The efficacy and safety of this dosing strategy will be assessed by examining baseline characteristics, liver and pancreatic function tests, coagulopathies, and CR/CRi rates. PEG-asparaginase activity levels will be characterized. All data will be recorded without patient identifiers and maintained confidentially. Results/Conclusions: Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the importance of asparaginase-based regimens in the treatment of acute lymphoblastic leukemia.

Discuss the adverse effects associated with asparaginase in adult patients.

Self Assessment Questions:

Retrospective analysis has shown that adolescent and young adult patients treated on asparaginase-based treatment protocols has:

- A: Decreased survival
- B: Shown a survival benefit
- C: Increased relapse rates
- D: None of the above

Which of the following is an adverse effect of asparaginase?

- A: Hepatotoxicity
- B: Pancreatitis
- C: Thrombosis
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-545-L01-P

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

COMPARATIVE INCIDENCE OF ACUTE KIDNEY INJURY IN CRITICALLY ILL SURGICAL PATIENTS RECEIVING VANCOMYCIN WITH PIPERACILLIN-TAZOBACTAM VERSUS VANCOMYCIN AND CEFEPIME OR MEROPENEM

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Purpose: Acute kidney injury (AKI) in critically ill patients has been associated with development of end stage renal disease as well as increased incidence of renal replacement therapy, duration of mechanical ventilation, hospital length of stay, and mortality. Recent literature has revealed a possible association between combination therapy of vancomycin and piperacillin-tazobactam versus vancomycin and cefepime or meropenem in causing AKI. However, the data for this incidence remain inconclusive in critically ill surgical patients. The primary objective of this study was to compare the incidence of AKI between patients receiving vancomycin and piperacillin-tazobactam (VPT) and vancomycin and cefepime or meropenem (VC/VM) in critically ill surgical patients. Secondary objectives included comparison of time to AKI and morbidity and mortality between groups, as well as to determine independent risk factors for developing AKI. **Methods:** This retrospective, single center study included adult, critically ill patients admitted to the surgical intensive care unit who received concomitant VPT or VC/VM. Exclusion criteria included pre-existing renal dysfunction, receipt of both piperacillin-tazobactam and cefepime or meropenem within the same admission, receipt of antibiotics at an outside hospital prior to transfer, incarceration, and pregnancy. One-hundred and six patients will be included in the final analysis. Variables will be analyzed by chi square or Fisher's exact tests, as appropriate. Selected variables assessed a priori via multivariate logistic regression for creation of a dose-predicting equation included combination antibiotic regimen, severity of illness assessed by SOFA (Sequential Organ Failure Assessment) score, and concomitant use of nephrotoxic agents, vasopressors, or intravenous radiocontrast agents. Univariate analyses will be performed and factors that result in a p-value of less than 0.2 will be included as additional covariates in a multivariate logistic regression to assess for independent risk relationships. **Results:** Data collection and analysis are ongoing.

Learning Objectives:

Discuss the current literature regarding acute kidney injury related to vancomycin, beta-lactams and the combination therapy
Review incidence of acute kidney injury in critically ill surgical patients receiving vancomycin and anti-pseudomonal beta-lactams

Self Assessment Questions:

What is the mechanism of injury for vancomycin-induced nephrotoxicity?

- A Vasoconstriction of the afferent arterioles of the nephron
- B: Vasodilation of the efferent arterioles of the nephron
- C: Cellular apoptosis secondary to production of free oxygen radicals
- D: Immunologically mediated damage to the proximal convoluted tub

What is the proposed mechanism of injury for vancomycin and piperacillin-tazobactam induced nephrotoxicity?

- A Vasoconstriction of the afferent arterioles of the nephron
- B Vasodilation of the efferent arterioles of the nephron
- C Cellular apoptosis secondary to production of free oxygen radicals
- D Immunologically mediated damage to the proximal convoluted tub

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-546-L01-P

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

EFFECTS FROM CONTINUOUS INFUSIONS OF DEXMEDETOMIDINE, MIDAZOLAM, AND PROPOFOL ON HEMODYNAMIC STABILITY IN PATIENTS WITH SEPTIC SHOCK.

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Purpose: Septic shock is defined as life-threatening organ dysfunction and failure in which patients become refractory to fluid resuscitation and require vasopressors. Once organ dysfunction is identified, mortality rates substantially increase. These patients are at high risk for respiratory failure necessitating mechanical ventilatory support. Standards of care for mechanically ventilated patients with septic shock include fluid resuscitation, vasoactive agents, and pain and agitation management. Continuous infusion sedatives commonly used in ventilated patients include benzodiazepines (e.g., midazolam) and non-benzodiazepines (e.g., propofol and dexmedetomidine). The most common adverse effects observed from sedatives are fluctuations in hemodynamics, including occurrences of bradycardia and hypotension, and respiratory depression. Patients with septic shock are predisposed to poor outcomes from these effects because of their preexisting hemodynamically compromised state. This study's purpose is to evaluate differences in development of clinically significant hemodynamic instability caused by continuous infusions of dexmedetomidine, midazolam, and propofol in mechanically ventilated, septic shock patients. **Methods:** This is a retrospective, observational, cohort study of mechanically ventilated adult patients treated for septic shock in our medical intensive care unit between July 1, 2013 to July 31, 2017. Treatment groups were determined based on receipt of a single continuous infusion sedative: dexmedetomidine, propofol, or midazolam. The primary outcome was development of hemodynamic instability, defined as increase in vasoactive requirements (defined as an increase in the dosage of a titratable vasopressor by at least 20% or the addition of another vasopressor) in septic shock patients receiving continuous infusions of dexmedetomidine, midazolam or propofol. Multivariate regression analysis will be conducted to identify factors associated with development of hemodynamic instability. Results and conclusions will be presented at Great Lakes Pharmacy Resident's Conference.

Learning Objectives:

Describe mechanisms of action of commonly used intravenous sedative
Identify factors associated with development of hemodynamic instability in mechanically ventilated adult patients with septic shock

Self Assessment Questions:

Which sedative undergoes metabolism to active metabolites that can cause prolonged sedation in patients with renal dysfunction?

- A Dexmedetomidine
- B: Fentanyl
- C: Midazolam
- D: Propofol

An 82-year-old patient presents to the medical intensive care unit with septic shock (with mean arterial pressure (MAP) 50 mm Hg) on vasopressor support. Shortly after ICU admission, the patient's res

- A Dexmedetomidine
- B Fentanyl
- C Midazolam
- D Propofol

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-547-L01-P

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

AUDIT COMPLIANCE POST-IMPLEMENTATION OF A REVENUE INTEGRITY SYSTEM

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Purpose: The pharmacy department at Nationwide Children's Hospital receives limited information about the Charge Description Master (CDM) build accuracy. Inadequate audit tracking and visibility could increase the risk of noncompliance based on payor claims submission requirements. Such noncompliance can lead to decreased reimbursement and loss of drug discount programs. A structured auditing process is important to ensure compliance during drug claim submissions. This is best accomplished by strong collaboration between the pharmacy and finance departments. A comprehensive literature review found a lack of published information on the impact of pharmacy audits on billing compliance in pediatric hospitals. However, research in adult hospitals shows streamlining an audit process minimizes compliance risk. The objective of this study is to evaluate compliance from self-audits post-implementation of a revenue integrity system. **Methods:** This study is a pre-post implementation analysis. The population of interest is patients receiving medication therapy at Nationwide Children's Hospital. Software was implemented in October 2017. The study investigators submitted purchase history, current formulary, and revenue records to the software vendor from July – August 2017. Results from the audited record extracts serve as pre-implementation data. Pre-implementation data will guide updates to the pharmacy department's CDM including but not limited to, drug pricing, billing codes, and multipliers. Data from November – December 2017 will serve as post-implementation results. Records collected after CDM updates will be submitted to the software vendor and results will be analyzed to assess improvement. Four areas of interest are 1) HCPCS coding, 2) multiplier accuracy, 3) 340B volume reconciliation, and 4) formulary cost updates in the electronic health record (EHR). McNemar's test will be used to assess pre and post audit compliance.

Results: This will be presented at Great Lakes Conference. **Conclusion:** This will be presented at Great Lakes Conference.

Learning Objectives:

Define chargemaster and the importance of coding compliance
Identify the impact of revenue integrity software on ensuring coding compliance

Self Assessment Questions:

Which of the following statements is correct?

- A: Chargemaster integrity has minimal impact on billing compliance.
- B: A billing audit process is not warranted in health system pharmacy
- C: Conducting monthly or quarterly billing audits help ensure compliance
- D: Billing audits should happen once a year.

What is the largest concern with billing noncompliance in health-system pharmacy?

- A: Results in claim rejections and reimbursement
- B: Hinders pharmacy services implementation
- C: Decreases relations with Finance Department
- D: Reduces the impact on patient care

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-783-L04-P

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

IMPACT OF ADVANCED AGE ON SURVIVAL AND OUTCOMES IN ADULT LUNG TRANSPLANTATION

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Purpose: Lung transplantation in elderly patients is controversial given the potential for increased risk of complications due to immunosenescence and comorbid conditions which can impact survival. Despite this, older patients are increasingly being referred and transplanted. The purpose of this study was to retrospectively evaluate the impact of age on overall survival and safety outcomes after lung transplantation. **Methods:** This was a retrospective cohort study conducted at Spectrum Health Medical Center including 85 adult patients that underwent lung transplantation from February 2013 to August 2017. Exclusion criteria included dual heart and lung transplants and vulnerable populations. Patients were stratified based on age: those less than 65 years (Group 1, n=49) and those greater than or equal to 65 years (Group 2, n=36). The primary objective was to compare overall survival between groups utilizing Kaplan Meier analysis. Secondary objectives were to evaluate maintenance immunosuppression dosing and tolerability; post-transplant outcomes including length of stay, 30 day readmission rates, acute cellular rejection, and malignancy; and to assess for recipient risk factors for mortality in Group 1 versus Group 2. Patients that died during initial hospital stay were excluded from secondary objective analyses. **Results:** There was no statistically significant difference in overall survival between groups (Group 1: 89.8% vs Group 2: 86.1%, p=0.1867) with a median [IQR] follow-up time of 699 [626] days. **Conclusion:** Lung transplantation was performed in patients 65 years or greater with comparable survival to those less than 65. Additional results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss age related considerations that can impact transplant outcomes and survival

Review benefits of tailored immunosuppression in transplant patients

Self Assessment Questions:

The International Society for Heart and Lung Transplantation consensus document on selection of lung transplant candidates recommends age greater than how many years as a relative contraindication to

- A: 60
- B: 65
- C: 70
- D: 72

Over-immunosuppression in transplant patients can be associated with increased risk of

- A: Infections
- B: Malignancy
- C: Rejection
- D: A&B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-549-L01-P

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

PHARMACIST'S ROLE IN ASSESSING SOCIAL DETERMINANTS OF HEALTH AT THE VETERANS AFFAIRS MEDICAL CENTER

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Purpose: The importance of addressing social determinants of health (SDoH), including social and physical environments that promote overall good health, is one of the overarching goals of Health People 2020. Of that, addressing food insecurity is one example of SDoH. The U.S. Department of Veterans Affairs estimated that over 22 million Veterans are currently living in the United States. Food insecurity is a serious problem among Veterans, especially those returning home from combat. A crucial factor of SDoH is assessing food insecurity among high-risk Veterans. As one of the most accessible health care professionals, pharmacists can help address SDoH in the Veteran population through integrated patient-centered care clinics. The primary intent of this project is to evaluate food insecurity and to assess results of the referrals for patients identified to be food insecure. **Method:** This is a retrospective chart review of patients that were flagged positive for food insecurity during patient visits. During each visit (heart failure clinic, anticoagulation clinic, or emergency department), patients were screened using a single-question screening tool "In the past 12 months, has there been any time when the food for you did not last and there was no money to buy more." If patients were screened positive for food insecurities, several follow-up questions were asked, including 1) where patients buy their food, 2) number of meals patients eat per day, 3) if they receive public assistance for their food, 4) do they have diabetes, and 5) if they experience signs or symptoms of hypoglycemia. Patients will be referred to social worker service for further assessment and plan for food insecurity. A 3-month follow-up phone call survey will be made by pharmacy staff to assess if patient outcomes regarding food insecurity has changed. Results and conclusions will be presented at Great Lakes Pharmacy Resident's Conference.

Learning Objectives:

Identify health risks associated with patients that are food insecure.
Discuss considerations for implementation integrating food insecurity assessment during patient visits.

Self Assessment Questions:

Approximately how many Americans living in the US reside in food-insecure homes?

- A: 2 million
- B: 10 million
- C: 20 million
- D: 40 million

Which of the following is a key area of social determinants?

- A: Economic instability
- B: Social and community context
- C: Spiritual support
- D: Increase government regulations

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-784-L04-P

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

SUCCINYLCHOLINE VERSUS ROCURONIUM FOR RAPID SEQUENCE INTUBATION IN TRAUMATIC BRAIN INJURY PATIENTS

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Purpose: Due to inability to protect their airway, moderate to severe traumatic brain injury (TBI) patients often require rapid sequence intubation (RSI) using a sedative and neuromuscular blocking agent (NMBA) to facilitate placement of an endotracheal tube. Succinylcholine is an ideal NMBA given its rapid onset and short duration of action; however, it can cause hyperkalemia. Rocuronium is not associated with major adverse effects but has a longer duration of action. Clinical evidence guiding selection of the appropriate NMBA for RSI in TBI patients is lacking. A recent retrospective study evaluating RSI in TBI patients found that succinylcholine is associated with increased in-hospital mortality in more severely injured TBI patients. No study to date has assessed 28-day mortality between succinylcholine and rocuronium for RSI in TBI patients or evaluated other adverse outcomes such as increased intracranial pressure or discharge disposition. The purpose of this study is to identify whether there is a difference in clinical outcomes with the use of succinylcholine versus rocuronium for RSI in TBI patients. **Methods:** This was a retrospective cohort of patients ≥ 18 years old admitted to Loyola University Medical Center after trauma with TBI from January 2014 to December 2017 who received succinylcholine or rocuronium for RSI within 24 hours of admission. Patients < 18 years old, intubated using no NMBA or NMBA other than succinylcholine or rocuronium, or intubated prior to arrival were excluded. Data collected included patient demographics, Glasgow coma scale scores, and injury severity scores. The primary endpoint was 28-day mortality and secondary endpoints included ICU length of stay, hospital length of stay, and discharge disposition. Descriptive statistics were used for baseline demographics and a multivariate regression analysis was used to determine predictors of mortality. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the lack of clinical evidence in existing primary literature to guide the choice of optimal paralytic for RSI in TBI patients
Review the pharmacokinetic and pharmacodynamic properties of succinylcholine and rocuronium in relation to usage in RSI for TBI patients

Self Assessment Questions:

What side effect is commonly associated with use of succinylcholine?

- A: Neutropenia
- B: Diarrhea
- C: Hyperkalemia
- D: Tinnitus

Which NMBA causes muscle fasciculations via depolarization of the neuromuscular membrane?

- A: Vecuronium
- B: Succinylcholine
- C: Rocuronium
- D: Cisatracurium

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-548-L01-P

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

ANTIBIOTIC HARM IN FEBRILE NEUTROPENIA

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Purpose: Following appropriate recommendations for use of antibiotics in patients with febrile neutropenia (FN) is imperative to avoid adverse effects and ensure optimal outcomes. One previous study described the vancomycin was prescribed inappropriately 72.7% of the time for FN, demonstrating discordance with guideline recommendations. Given the potential lack of follow-through with guideline recommendations for antibiotics, there is a need for a study addressing the harms associated with overuse and underuse of antibiotics. This research project aims to identify these harms to promote best practice in patient care. **Methods:** This was an IRB approved, retrospective cross-sectional study with a nested case-control study conducted at Henry Ford Hospital. Patients were included if they were at least 18 years of age, oncology patients actively receiving chemotherapy for cancer treatment, developed neutropenia (defined as an ANC <500 cells/mm³ or < 1,000 cells/mm³ and a predicted decline to ≤500 cells/mm³ over the next 48 hours), and presented with a fever. Bone marrow transplant patients, patients who developed neutropenia for reasons other than cancer, and patients who were not actively receiving chemotherapy were excluded. The aims of this study were to evaluate the appropriateness of antibiotics used in the treatment of febrile neutropenia, as well as characterize the adverse effects associated with antibiotics used in the treatment of FN. The primary objective of the study was to identify risk factors for AKI, with vancomycin exposure being the primary risk factor of interest. The outcomes for this study were time to resolution of fever, resolution of neutropenia, and duration of therapy. The patients in the nested case control study consisted of patients who developed acute kidney injury and those that did not. Patients were further grouped by vancomycin exposure and non-exposure. **Results and conclusions:** To be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the recommended antibiotics for febrile neutropenia.
Identify the indications for vancomycin in patients with febrile neutropenia.

Self Assessment Questions:

Which antibiotic is used as monotherapy?

- A Vancomycin
- B: Cefepime
- C: Tobramycin
- D: Ampicillin

Which of the following are indications for vancomycin?

- A Skin or soft tissue infection
- B Suspected catheter-related infection
- C Blood cultures positive for Gram positive bacteria before final iden
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-550-L01-P

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

IMPACT OF PLATELET FUNCTION TESTING AND ANTIPLATELET MODIFICATION ON THROMBOTIC AND HEMORRHAGIC COMPLICATIONS FOLLOWING ELECTIVE PIPELINE EMBOLIZATION DEVICE PLACEMENT

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Purpose: Clopidogrel and aspirin are routinely initiated as dual antiplatelet therapy (DAPT) about one week prior to elective pipeline embolization device (PED) placement. Previous studies have shown wide variability in platelet inhibition with standard DAPT that may lead to hemorrhagic and thrombotic complications. Platelet function testing has been proposed as a method to tailor antiplatelet regimens in patients classified as clopidogrel hyporesponders and hyperresponders in order to reduce complications. However, targets and clinical benefits of platelet function testing remain controversial and an optimal antiplatelet modification strategy has not been established. This study compares clinical outcomes and antiplatelet regimens in clopidogrel responders, hyporesponders, and hyperresponders based on pre-operative P2Y₁₂ reaction unit (PRU) values obtained from VerifyNow. **Methods:** This study was a retrospective comparative cohort study involving patients at least 18 years of age undergoing elective PED placement for unruptured aneurysm. Electronic medical records were reviewed for eligible patients who had an elective PED placement from January 1, 2014 to December 31, 2017. Patients without pre-operative VerifyNow values were excluded. Institutional Review Board approval was obtained before data collection. Study arms included clopidogrel responders (PRU 60-207), clopidogrel hyporesponders (PRU > 208), and clopidogrel hyperresponders (PRU < 60). The primary composite endpoint was intracranial hemorrhage (ICH) or thrombotic event within 24 hours of procedure. Secondary outcomes included proportion of patients with PRU-guided antiplatelet modification, ICH within 30 days, thrombotic event within 30 days, and bleeding or thrombotic-related 30-day readmission. A contingency table and analysis of covariance (ANOVA) were 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 the most common first-line antiplatelet regimen utilized for elective pipeline embolization device placement.

Relate VerifyNow results to antiplatelet responsiveness in patients undergoing pipeline embolization device placement.

Self Assessment Questions:

Which of the following is the most studied first-line antiplatelet regimen for patients undergoing elective pipeline embolization device placement?

- A Aspirin 325 mg daily + clopidogrel 150 mg daily
- B: Aspirin 81 mg daily + ticagrelor 90 mg twice daily
- C: Aspirin 325 mg daily + prasugrel 10 mg daily
- D: Aspirin 81 mg daily + clopidogrel 75 mg daily

A patient is scheduled to get an elective pipeline embolization device placement today after taking aspirin and clopidogrel daily for 7 days. The pre-operative VerifyNow PRU value is 296. Which of the

- A Arachidonic acid inhibition indicates aspirin hyporesponse
- B P2Y₁₂ inhibition indicates clopidogrel hyporesponse
- C Arachidonic acid inhibition indicates aspirin hyperresponse
- D P2Y₁₂ inhibition indicates clopidogrel hyperresponse

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-551-L01-P

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

OUTCOMES OF (R) BEAM VERSUS BEEAM FOR AUTOLOGOUS STEM CELL TRANSPLANT AND IMPLEMENTATION OF OUTPATIENT CONDITIONING

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Purpose: To assess the clinical and health-system effects of the transition from (R) BEAM (rituximab), carmustine, etoposide, cytarabine, melphalan) to BeEAM (bendamustine, etoposide, cytarabine melphalan) high dose chemotherapy conditioning for autologous stem cell transplant (ASCT), and to provide pharmacist support for outpatient BeEAM administration. **Methods:** This was a retrospective review of 40 consecutive BeEAM ASCT recipients compared to a consecutive cohort of (R)-BEAM patients from 2015 to 2017. The primary outcome was time to neutrophil engraftment, with secondary outcomes of efficacy and toxicity. Time to engraftment was compared using the log-rank test. Pharmacists revised the BeEAM treatment plan and designed workflows to minimize treatment-related morbidity during outpatient conditioning. A cost comparison between (R)-BEAM and BeEAM was compared the effects of length of stay, drug acquisition cost, and complications of outpatient administration. **Results:** The study population consisted of 80 patients. There was no significant difference in time to neutrophil or platelet engraftment between regimens. Median time to neutrophil engraftment was 11 days for BeEAM (Interquartile range [IQR]: 11-13) and (R) BEAM (IQR: 10-12; $p=0.68$) ($p=0.2$). Days to platelet engraftment were 22 (IQR: 18-28) for BeEAM compared to 21 (IQR: 19-22) for (R) BEAM ($p=0.68$). Median time to hospital discharge was 19 days (IQR: 17-22) for BeEAM compared to 18.5 days (IQR: 17-21) for (R) BEAM. Details of toxicity and preliminary outcomes will be presented at the meeting. The BeEAM regimen saved \$280,317 in drug costs compared to (R) BEAM. Pharmacists' workflows were developed to support patient education and supportive care. Outpatient treatment outcomes will be presented at the meeting. **Conclusions:** No difference was found between BeEAM and BEAM in time to engraftment, and similar toxicities were seen between treatments. Pharmacists can support outpatient BeEAM treatment through treatment plan adjustments and pharmacist encounters designed to support outpatient administration.

Learning Objectives:

Describe treatment differences and similarities between BeEAM and (R) BEAM for autologous stem cell transplant

Identify opportunities for pharmacists' support of outpatient high dose chemotherapy prior to autologous stem cell transplantation

Self Assessment Questions:

1. Which of the following is NOT an advantage of BeEAM (Bendamustine, etoposide, cytarabine, and melphalan) high-dose chemotherapy prior to autologous stem cell transplant compared to (R) BEAM (rituxi

- A Reduced kidney dysfunction with bendamustine
- B: Reduced pneumonitis with bendamustine
- C: Decreased drug cost with BeEAM
- D: Once daily administration of BeEAM

Which drug is responsible for the largest cost savings in the (R) BEAM to BeEAM conversion?

- A Rituximab
- B Carmustine
- C Etoposide
- D Cytarabine

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-552-L01-P

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

EVALUATION OF DEXTROMETHORPHAN WITH SELECT ANTIDEPRESSANT THERAPY FOR THE TREATMENT OF DEPRESSION IN THE ACUTE-CARE PSYCHIATRIC SETTING

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Purpose: Despite effective treatment for major depressive disorder, a large number of patients are treatment resistant. Thus, there is a need to explore medications with different mechanisms of action that might effectively alleviate depression. Dextromethorphan, an N-methyl-D-aspartate receptor antagonist, may have ketamine-like rapid acting antidepressant effects. Dextromethorphan is extensively metabolized via cytochrome P450 (CYP) 2D6, and its half-life in extensive metabolizers is two to four hours. Therefore, it is paired with a strong CYP2D6 inhibitor, quinidine, in a commercially available product approved for pseudobulbar affect in order to prolong its duration of action. Dextromethorphan could offer significant benefits to those suffering from depression if shown to be effective due to its low cost, ease of administration, and proposed rapid-acting effects as compared to current treatment options. The purpose of this study is to evaluate the effects of dextromethorphan on depression in an acute-care psychiatric setting. **Methods:** This is a retrospective chart review evaluating the difference in the average time to clinical improvement for depressive symptoms in patients who received dextromethorphan with select antidepressant therapy as compared to patients who did not receive dextromethorphan. Patients will be identified by discharge depressive disorder diagnosis code and whether or not they received scheduled dextromethorphan. The select antidepressant therapy includes fluoxetine, bupropion, or paroxetine. The objective is to determine the impact of dextromethorphan on depressive symptoms when combined with select antidepressants that are moderate to strong CYP2D6 inhibitors. The primary endpoint is the difference in time to clinical improvement defined as an average of: time to first documented improvement by the psychiatrist, time to first 24 hours without as needed anxiolytic or antipsychotic medication, and time to first recorded improvement by nursing. Results and conclusions are pending completion of data analysis.

Learning Objectives:

Identify the need for antidepressant therapy with novel mechanisms of action.

Describe the reason dextromethorphan is paired with other medications for the treatment of some disease states.

Self Assessment Questions:

Which of the following possess a unique mechanism of action for the treatment of depression?

- A Monoamine oxidase inhibitors
- B: N-methyl-D-aspartate receptor antagonists
- C: Selective serotonin reuptake inhibitors
- D: Serotonin norepinephrine reuptake inhibitors

Which of the following is the reason why dextromethorphan is paired with a strong CYP2D6 inhibitor?

- A Augment proposed antidepressant effects
- B Mitigate side effects
- C Reduce toxicity
- D Prolong half-life

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-553-L01-P

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

IMPACT OF SHARED MEDICAL APPOINTMENTS ON QUALITY OF LIFE IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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The shared medical appointment (SMA) model for chronic disease state management has shown to significantly improved glycemic control and cardiovascular outcomes. Although some of these studies involved a clinical pharmacist in the care team, there have not been studies that addressed the quality of life in patients with type 2 diabetes mellitus (T2DM) in this type of model. The purpose of this project is to determine if a pharmacist-led SMA can lead to improved patient-reported quality of life and in patients with T2DM. Medicare patients 18 years of age and older with T2DM were referred and voluntarily enrolled in this pilot service. Patients with gestational diabetes were excluded from this IRB approved study. Patients attended a series of four group visits that involved an interdisciplinary health care team that included a clinical pharmacist and diabetes educator, physician, dietitian, and lifestyle coach. Visits were two hours in length and spaced out by at least a month. A validated 15-question diabetes-specific quality of life questionnaire (DQOL) was filled out by patients at baseline and at the last visit. Labs and body measurements were also obtained at baseline and at the last visit. The primary outcome was the difference in the DQOL score. Secondary outcomes included average change in HbA1c and BMI. Four patients were found eligible and were enrolled in the pilot service. Average HbA1c and BMI at baseline were 6.8% and 30.1 kg/m² respectively. Average score for the DQOL was 4.2 out of 5 [3.6-4.9]. Post data is still in the process of being collected. It is hypothesized that pharmacist-led SMA visits will show positive improvement in patient reported quality of life.

Learning Objectives:

Discuss how diabetes mellitus can impact the quality of life for a patient.
Review current data on the positive impact of interdisciplinary care in the form of shared medical appointment visits in patients with chronic disease states such as type 2 diabetes mellitus.

Self Assessment Questions:

1. Which of the following statements are correct when describing how diabetes can impact quality of life?
- A: Diabetes predisposes patients to developing schizophrenia
 - B: Sleep disturbances, such as insomnia, can occur
 - C: More often than not, patients feel more in control of their diet after
 - D: Sexual dysfunction is not attributed to a diagnosis of diabetes

The use of the SMA model has been shown to provide which outcomes in management of type 2 diabetes mellitus?

- A: Reduced glycemic control despite better quality of life
- B: Improved glycemic control despite worsening quality of life
- C: Improved glycemic control and better quality of life
- D: Reduced glycemic control and worsening quality of life

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-554-L01-P

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

OUTCOMES FOR HEPATITIS C VIRUS (HCV) TREATMENT WITH DIRECT ACTING ANTIVIRALS WITHIN A SAFETY-NET HEALTH-SYSTEM

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Purpose: Direct acting antivirals have revolutionized the treatment of hepatitis C virus (HCV) with their high rates of success in sustained virological response (SVR). However, prior authorizations, complex treatment criteria, and nonadherence can decrease rates of treatment success. Recent literature has suggested that involvement of a pharmacist in a HCV treatment program can optimize patient care and improve patient outcomes. The purpose of this study is to evaluate the number of patients treated through our health system and compare SVR rates to those previously published. Methods: This study is a retrospective chart analysis of all patients referred and evaluated for HCV treatment between January 2014 and August 2017 at Cook County Health and Hospitals System. Patients will be identified through an existing pharmacy HCV tracking database from the infectious disease clinic and the medication assistance department that processes prior authorization requests for the health-system. Data to be collected and analyzed includes age, gender, race, insurance, history of cirrhosis, and presence of human immunodeficiency virus (HIV) or hepatitis B virus (HBV) coinfection. HCV demographics will also be collected including HCV genotype, HCV treatment history and HCV RNA levels at baseline and at least 12 weeks after completion of treatment. If available, total missed doses and adherence assessments at follow up visits at 4, 8, and 12 weeks will be documented. The primary outcome will be determined by the ratio of patients achieving SVR to the overall count of those who began treatment. SVR will be defined as the absence of detectable HCV RNA for at least 12 weeks after discontinuing treatment. Statistical methods to be determined. Results and Conclusions: In Progress

Learning Objectives:

Identify screening requirements when evaluating a patient for HCV treatment.

Recognize common side effects of direct acting antivirals.

Self Assessment Questions:

Which of the following drugs requires baseline resistance testing for patients with genotype 1a?

- A: glecaprevir/pibrentasvir (Mavyret™)
- B: ledipasvir/sofosbuvir (Harvoni®)
- C: sofosbuvir/velpatasvir (Epclusa®)
- D: elbasvir/grazoprevir (Zepatier®)

What are the common side effects of direct acting antivirals?

- A: Neutropenia and anemia.
- B: Headache and fatigue.
- C: Dysgeusia and skin rash.
- D: Bone density loss and renal tubular dysfunction.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-555-L01-P

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

IMPACT OF A PROCESS CHANGE ON PREVALENCE OF PRESCRIBED UNMEASURABLE LIQUID DOSES IN A NEONATAL INTENSIVE CARE UNIT

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Purpose: Many patients from the 85 bed neonatal intensive care unit (NICU) at St. Vincent Women's Hospital are discharged on at least one medication. The majority of prescribing in the electronic health record (EHR) is done using a weight-based dosing calculator, with no alert to the prescriber if the dose is unmeasurable. An initial evaluation from a previous study identified that approximately one fourth of all weight-based, oral liquid discharge prescriptions at St. Vincent Women's Hospital were unmeasurable. This puts patients at risk for dosing errors if their caregiver is unable to accurately measure the medication. The purpose of this project was to evaluate whether a process change implemented within the NICU effectively reduced the rate of unmeasurable doses prescribed at discharge. The primary objective was to compare the rate of unmeasurable oral liquid doses prescribed a discharge before and after implementation of a process change. Secondary objectives included a description of patient and discharge medication characteristics, and assessment of these characteristics in relation to the unmeasurable doses prescribed. **Methods:** This study was a retrospective analysis of patients discharged from the NICU between October 1, 2017 and March 31, 2018. Patients were included if they were discharged on at least one oral liquid medication, excluding vitamins. Patients were identified through Neodata,® and the EHR was used to collect data on the patient and their discharge medications. Patient demographic information collected included age, weight, and month of discharge. Discharge medication information such as name, dose, route, frequency, measurability, drug class, prescriber status, medication education, last EHR ordered dose and use of St. Vincent's outpatient pharmacy was also collected. All data were compared to re-implementation data from a previous study. **Results and Conclusion:** Data collection is ongoing. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize a potential error within an electronic health record that may impact the medication discharge process at a neonatal intensive care unit.

Identify challenges associated with patient safety interventions based on the Institute for Safe Medication Practices' (ISMP) hierarchy of error reduction strategies.

Self Assessment Questions:

CG is an 11 day old term baby who weighs 2.4kg. His physician prescribes acetaminophen 160mg/5mL at a dose of 15mg/kg x 1. What dose would St. Vincent's electronic health record automatically dispense?

- A: 1.1 mL
- B: 1.12 mL
- C: 1.125 mL
- D: 1.1257 mL

Which of the following error reduction strategies provides the highest leverage?

- A: Automation
- B: Education
- C: Policies
- D: Reminders

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-883-L05-P

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

DEVELOPMENT AND IMPLEMENTATION OF A RISK STRATIFICATION SCORING SYSTEM FOR IDENTIFYING MEDICATIONS FOR PROSPECTIVE PHARMACIST ORDER REVIEW IN THE EMERGENCY DEPARTMENT

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Pharmacists play a key role in ensuring appropriate and safe medication use. Prospective pharmacist order review (PPOR) can ensure appropriate selection of medication, dose, route and frequency while preventing harmful drug interactions. PPOR in the emergency department (ED) has significant variability among hospitals. ED pharmacists within the Froedtert Health-System perform targeted order review for some high-risk medications, weight based orders, and centrally distributed medications. The primary objective of this project is to increase medications undergoing PPOR in the EDs within the four emergency departments at Froedtert and the Medical College Health-System using a risk stratification scoring system. Secondary objectives of this project are to evaluate the impact PPOR has on the number of pharmacist interventions, medication administration timeliness, and pharmacist job satisfaction. This is a pre and post implementation study for the development and implementation of a risk stratification scoring system. A scoring system was created to identify medications that may benefit from pharmacist review. A total of 286 medications were identified to undergo evaluation. Using the scoring system and expert opinion, a recommended list of medications for removal from auto-verification will be presented for approval to the respective site based Medication Safety Committees and Health-System Pharmacy and Therapeutics (P&T) Committee. The primary outcome will be measured by evaluating the percentage of ED medications undergoing PPOR pre and post intervention. The secondary outcome of pharmacist interventions will be assessed through the combination of in order edits and order rejections for medications removed from auto-verification. Pre and post order processing times will be assessed to measure the impact of removing medications from auto-verification. Pharmacist satisfaction will be assessed via a pre and post satisfaction survey utilizing a 5 point Likert scale. Expected results include increased PPOR and improved medication use within the ED population.

Learning Objectives:

Describe current U.S. emergency department practices for prospective pharmacist order review and professional organization requirements/recommendations

Identify methods of measuring prospective pharmacist order review impacts on emergency department workflow

Self Assessment Questions:

For the following statements regarding U.S. practice for prospective pharmacist order review in the ED, which is true?

- A: The Joint Commission recommends pharmacist order review for a
- B: The American Society of Health-system pharmacist's best practice
- C: The Centers for Medicare & Medicaid Services is very specific when
- D: Prospective pharmacist order review in the ED varies across the country

As it relates to measuring prospective pharmacist order review in ED automated dispensing cabinets, which of the following would be a poor measure for impact on ED workflow?

- A: Medication timeliness for order entry to the following: pharmacist v
- B: ED pharmacist satisfaction surveys
- C: Percentage of medications receiving prospective pharmacist order
- D: Frequency of medications coming from central pharmacy and auto

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-785-L04-P

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

USP <800>: EDUCATION RELATED TO PPE USE FOR NURSING AND CREATION OF THE SOPs

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Purpose: USP General Chapter <800> is expected to be implemented in all institutions by December 1, 2019 and requires the collective effort of healthcare providers. The Bureau of Labor Statistics estimates that approximately 2 million nurses are exposed to hazardous drugs at some point during patient care. Due to risks of exposure and upcoming changes in practice, education on personal protective equipment (PPE) is of utmost importance. The focus of this quality improvement project is to provide resources to implement education to nursing leadership on potential risk, the updated hazardous drug list, and updated PPE precautions. Standard operating procedures and policies will be updated internally within the health system. Methods used: This is a quality improvement project and is therefore exempt from review by the Institutional Review Board. Departments of pharmacy, nursing, and environmental health and safety were assembled to contribute to implementation. USP <800>, the NIOSH hazardous drug list, and internal gap-analyses were reviewed. A survey was created to analyze current nursing practices and knowledge, and will be re-evaluated post-implementation. A power-point presentation was used for education on potential risk, current updates in PPE precautions and hazardous drug list. Assessments were developed to evaluate competency. Financial considerations and impact will be discussed in regards to new PPE standards. Results/ Conclusions: The results and conclusions will be presented at the 2017 Great Lakes Pharmacy Residency Conference

Learning Objectives:

Define hazardous drugs and to be able to identify drugs that are considered hazardous under National Institute for Occupational Safety and Health (NIOSH) and USP <800> standards

Describe current PPE recommendations in relation to administration of antineoplastic and non-antineoplastic hazardous agents

Self Assessment Questions:

An example of manipulation is _____

- A Crushing/ splitting tablets
- B: Administering an IV piggyback
- C: Drawing up a medication from a vial
- D: Both A and C

Which of the following are characteristics of hazardous drugs that would require PPE precautions?

- A Carcinogenicity
- B Teratogenicity
- C Genotoxicity
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-914-L07-P

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

EFFECT OF EARLY SCHEDULED OXYCODONE ADMINISTRATION ON TIME TO EXTUBATION IN TRAUMA INTENSIVE CARE UNIT PATIENTS

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Purpose: Extended periods of time spent intubated has negative effects on morbidity and mortality. Continuous infusion opioids are prescribed to intubated patients to help with sedation and pain control, but must be weaned off prior to extubation. One method of weaning involves administration of enteral opioids, such as oxycodone. There is no research evaluating the use of oxycodone on weaning and ability to extubate. The purpose of this research study is to evaluate the effect of early versus late scheduled oxycodone administration on time to extubation in critical care patients. Methods: This retrospective, single-center, chart review study will include patients managed by the trauma intensivist service in a critical care unit at Grant Medical Center. Patients included were administered scheduled oxycodone while intubated and receiving a continuous fentanyl infusion between July 1, 2015 and June 30, 2017. Two groups will be compared: those administered scheduled oxycodone within 72 hours of intubation (early group) and those administered scheduled oxycodone greater than 72 hours after intubation (late group). Key exclusion criteria are patients with Richmond Agitation Sedation Scores (RASS) goal of -2 or less, continuous infusions of neuromuscular blockers, patients who received a tracheostomy, and patients intubated for less than 24 hours or greater than 14 days. Demographic and clinical data will be recorded for patients, including Acute Physiologic Assessment and Chronic Health Evaluation (APACHE) II scores to assess for disease severity. The primary objective will compare time to extubation in patients on continuous fentanyl infusions using early versus late administration oxycodone. Secondary objectives will compare intensive care unit length of stay and incidence of delirium between the two groups. Results / Conclusions: During the study time period, 275 patients were screened and 139 patients were included. Final results and conclusions to be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the differences between using enteral oxycodone and enteral methadone as an adjunct to weaning continuous opioid infusions.

Describe the risks for patients who spend extended periods of time on mechanical ventilation.

Self Assessment Questions:

When comparing oxycodone to methadone as an enteral option for intubated patients, why is methadone a less preferred option?

- A It is easily titratable
- B: It has a long, variable half-life
- C: It cannot be crushed
- D: It must be given six times per day

Patients who spend extended periods of time on mechanical ventilation are at risk for which of the following?

- A Infections
- B Surgeries
- C Increased rates of delirium
- D A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-786-L04-P

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

ALERT, OVERRIDE, REPEAT: BEATING ALERT FATIGUE

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Purpose: Computerized Clinical Decision Support Systems (CDSS) were designed to improve patient care and safety by providing alerts to providers during the medication prescribing process based on patient characteristics. However, excessive drug alerts lacking clinical value increases alert fatigue. The result is an increase in alert override rates regardless of severity. The primary objective of this study is to increase the number of meaningful alerts presented to outpatient providers at Bronson Healthcare Group. **Methods:** We will identify Bronson Healthcare Groups' top 200 prescribed drugs in 2017. We will then systematically customize duplicate allowances in the First Databank AlertSpace application for these medications. Currently, up to 4 medications within the same therapeutic class can be ordered by providers in the outpatient setting before a duplicate alert fires. However, all duplicate alerts are filtered from providers' view at this time. Therefore, providers are not receiving any warnings regarding duplicate therapy. Baseline data will be gathered from the filtered alerts. Afterward, duplicate therapy allowance changes will be implemented and alerts will be turned on to providers. Data including number of alerts fired, number of alerts overridden, and reason for override will be analyzed from December 2017 to March 2018. Results of this study could optimize duplicate therapy alert management and increase the overall acceptance rates of alerts in Bronson's ambulatory care setting. **Results/Conclusions:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the impact of alert fatigue on patient safety
Identify different strategies of combatting alert fatigue

Self Assessment Questions:

Which of the following is true regarding alert fatigue?

- A Increased number of alerts improves patient safety outcomes
- B: Exposure to the same alerts improves clinician response
- C: Excessive number of irrelevant alerts decreases clinician response
- D: Increased number of alerts improves provider education

Which of the following is a strategy to combat alert fatigue?

- A Eliminating alerts altogether
- B Tracking alerts and action taken by providers in order to streamline
- C Filtering alerts from ordering providers and only firing alerts to pharmacist
- D Customizing alerts to be more generic rather than patient specific

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-884-L05-P

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

RISK ANALYSIS OF CLOSED SYSTEM TRANSFER DEVICES AT AN ACADEMIC MEDICAL CENTER

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Purpose: The UW Health Department of Pharmacy has strong interest in implementing technology to become fully compliant with recommendations from the proposed USP <800> chapter. The department has installed and operationalized a hazardous drug compounding robot to reduce employee exposure to hazardous drugs, however, the robot is limited in the number of preparations it can compound and does not address decreasing hazardous drug exposure to nursing staff. The purpose of this project is to evaluate, select, and assess closed system transfer device (CSTD) systems in pilot areas to measure the impact on nursing exposure, drug stability, costs, productivity, and end user satisfaction. **Methods:** A steering committee comprised of nursing and pharmacy stakeholders was formed to guide the project team. A baseline assessment of available CSTDs and wipe sample kits was conducted and presented to the steering committee. Four CSTD vendors were invited onsite for presentations with two selected for pilot studies in our oncology pharmacy and three nursing units (one adult and two pediatric). The following variables were collected during each week-long pilot study: pre and post wipe samples, measurement of the impact on nursing and pharmacy workload, and end-user and patient satisfaction. Results from the pilot studies, supply costs, and considerations for drug vial optimization, were all incorporated into the final selection decision by the steering committee. A formal risk analysis that includes variables from the pilots in addition to contracting considerations will be completed and presented to senior leadership prior to finalizing plans for house-wide implementation for hazardous drug preparation and administration.

Results: This study will provide insight into implementing a highly expensive technology that has substantial potential to enhance employee safety, patient safety, and possibly provide a return on investment without significant negative impact to the organization's bottom line.

Learning Objectives:

Recognize the differences between the Closed System Transfer Device requirements for hazardous drug preparation and administration as specified within USP <800>
Describe common barriers to implementation of Closed System Transfer Devices

Self Assessment Questions:

Which of the following practices require the use of Closed System Transfer Devices (CSTDs) per the proposed USP <800> guidelines?

- A Hazardous drug administration
- B: Hazardous drug preparation
- C: Both A and B
- D: None of the above

Which of the following are barriers to implementing Closed System Transfer Devices (CSTDs)?

- A Cost of the device
- B Limited selection of vendors
- C Lack of evidence-based data supporting efficacy for decreasing hazardous drug exposure
- D All of the above

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-787-L07-P

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

EVALUATION OF BLOOD GLUCOSE MANAGEMENT IN NON-CRITICAL CARE, NON-DIABETIC PATIENTS EXPERIENCING STEROID-INDUCED HYPERGLYCEMIA

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BACKGROUND: Uncontrolled blood glucose has been shown to increase risk of infection and length of stay in the hospital. One class of medications that is well known to cause hyperglycemia is glucocorticoids. Glucocorticoids cause glucose production via gluconeogenesis and lipolysis. Further, glucocorticoids may reduce insulin sensitivity and decrease insulin secretion via pancreatic cell destruction and β -cell dysfunction. The onset of glucocorticoid induced hyperglycemia is seen in most patients after 2 consecutive days of ≥ 40 mg/day of prednisone or an equivalent steroid. The primary objective is to evaluate whether non-diabetic, non-critical care patients experiencing steroid induced hyperglycemia are adequately managed within 72 hours of steroid administration. **METHODS:** Information was extracted from The Ohio State University Wexner Medical Center's electronic medical record. Data was collected and analyzed in retrospective fashion, using patient records from January 1, 2017 to June 30, 2017. Exclusion criteria were: steroid doses ≤ 40 mg of oral prednisone, past medical history of type 1 or 2 diabetes mellitus, HbA1c of $\geq 6.5\%$ during the encounter, taking antidiabetic medication without clear indication at the time of admission, admission to an intensive care unit, past medical history of solid organ transplant, steroids for hematology or oncology indications, and no recorded blood glucose ≥ 180 mg/dL within the first 72-hours of taking a high-dose steroid. Information gathered included: blood glucose values for 72-hours after initiation of high-dose steroid, presence of point of care testing (POCT) order, presence of insulin order, type of insulin, and dose of insulin. Data points were collected in intervals of 0-24, 24-48, and 48-72 hours from the initiation of high dose steroid. Data was collected and analyzed using descriptive statistics in Microsoft Excel®. **RESULTS/CONCLUSION:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the risk of hyperglycemia in non-diabetic patients while on high-dose steroids and recommended management strategies.
Review the results from the medication use evaluation examining steroid induced hyperglycemia management in non-diabetic, non-critical care patients at a large academic hospital.

Self Assessment Questions:

Based on pharmacokinetic profile, what is the preferred insulin for steroid induced hyperglycemia?

- A Insulin NPH given at the time of steroid administration
- B: Insulin glargine given at the time of steroid administration
- C: Insulin aspart recombinant 70/30 at the time of steroid administration
- D: Insulin human regular at the time of steroid administration

A 65 year old male patient, with a BMI of 28 kg/m², presented with chronic obstructive pulmonary disease (COPD) and was started on prednisone 40mg by mouth daily for 5 doses. Which of these characterizes the patient?

- A Age
- B Steroid dose
- C Gender
- D Steroid duration

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-788-L01-P

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(if ACPE number listed above)

IMPACT OF SERUM ZINC NORMALIZATION ON CLINICAL OUTCOMES IN SEVERE BURN PATIENTS

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Purpose: Burn injury is associated with profound inflammation, metabolic disturbances, infection, protein wasting, and trace element depletion. Patients with burns become zinc deficient due to exudative losses, increased urinary excretion, and reduction of carrier proteins which results in impaired immunity, wound healing and glucose control. Standard practice at our burn center is to initiate daily zinc supplementation at 220mg (50mg elemental zinc) daily upon admission and adjust based on weekly zinc levels with the goal to normalize serum levels. Dose escalation and/or intravenous zinc are considered for those with persistently low serum zinc concentrations. Previous trials have demonstrated improved wound healing utilizing various doses of zinc supplementation, but none have assessed the potential clinical benefits associated with normalizing serum zinc concentrations. The primary objective of this study was to compare the impact of zinc normalization on outcomes in patients with severe burn injury. **Methods:** This was a retrospective, single-center study comparing clinical outcomes between patients with normal and low serum zinc concentrations post-burn injury. Patients with burns covering a total body surface area greater than 10% and at least three serum zinc concentrations were eligible for inclusion. According to the third measurement, patients with a normal zinc concentration (≥ 60 mcg/mL) were compared to those with a low zinc concentration (< 60 mcg/mL) with a primary endpoint of hospital length of stay. Infection risk was assessed based on positive culture data, glucose control on the percentage of glucose values greater than 180 mg/dL within during hospitalization, and wound healing on the time to discontinuation of wound dressings and initiation of skin moisturizer. The association between zinc deficiency and length of stay will be evaluated using multivariable quantile (median) regression adjusting for potential confounding covariates. Results and conclusions will be presented at the Great Lakes Pharmacy Conference.

Learning Objectives:

Discuss the utility of zinc supplementation in severe burn patients
Identify the zinc supplementation dose at which serum zinc normalization is likely to occur in severe burn patients

Self Assessment Questions:

What is/are the previously substantiated benefit(s) of zinc supplementation in severe burn patients?

- A Improved wound healing
- B: Reduced hospital length of stay
- C: Improved glucose control
- D: None of the above

What serum zinc measurement is considered the lowest threshold of normal?

- A 120 mcg/mL
- B 100 mcg/mL
- C 80 mcg/mL
- D 60 mcg/mL

Q1 Answer: A Q2 Answer: D

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

A RETROSPECTIVE LOOK AT THE EFFECT OF TRANSITIONS OF CARE ON INPATIENT GLYCEMIC CONTROL.

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Purpose: The American Diabetes Association recommends pre-prandial blood glucose (BG) readings less than 140mg/dL and random BG readings less than 180mg/dL for inpatient management. Despite these guidelines, inpatient hyperglycemia is often inadequately addressed in general medicine and surgical patients. The purpose of this project is to compare the effects of holding patients' home basal insulin regimen on inpatient glycemic control. **Methods:** This is an IRB approved retrospective cohort study of adult patients admitted to a general practice unit between January and December 2016. Patients with a diagnosis of type 2 diabetes (DM2) for at least 3 months, on a home basal insulin regimen, and an initial point of care BG reading between 70- 400 mg/dL will be included in the study. Exclusion criteria include patients admitted to an intensive care unit any time during admission, an inpatient endocrine consult for DM2 management (including those on U500 insulin or an insulin pump), diagnosis of a hyperglycemic emergency, taking specific types of nutrition supplementation, having renal and/or hepatic impairment, or are transferred from another institution. Patients will be grouped based on whether or not their home basal insulin regimen was restarted within 24 hours of admission. The primary outcome is the percentage of BG readings within range. Secondary outcomes include the percentage of BG above and below range, the incidence of severe hyperglycemia (BG>400 mg/dL) and severe hypoglycemia (BG <40 mg/dL), the number of patients discharged with hyperglycemia, time to euglycemia, length of stay, 30-day readmission rate, the number of changes to insulin orders, and the appropriateness of initial correctional insulin order. Data will be analyzed using appropriate statistical tests. A multivariate regression and an a priori subgroup analysis will be conducted to adjust for confounding variables. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the inpatient glycemic management goals per the American Diabetes Association's treatment guideline.

Identify the characteristics affecting optimal inpatient glycemic control.

Self Assessment Questions:

Which of the following describes the American Diabetes Association's (ADA) recommendations for inpatient blood glucose management?

- A Pre-meal 80-130 mg/dL, post-meal <180 mg/dL, using a correction
- B: Pre-meal <140 mg/dL, post-meal <180 mg/dL using a basal and b
- C: Pre-meal professional judgement, post-meal <180 mg/dL using a
- D: ADA recommends professional judgement when managing blood

Which of the following best describes the characteristics affecting optimal inpatient glycemic control?

- A Provider, patient, and system related issues.
- B Provider, insurance, and lifestyle related issues
- C Patient, system, and regulatory issues
- D Patient, regulatory, and financial related issues

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-557-L01-P

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

MORE THAN BIG DATA: DEVELOPMENT AND IMPLEMENTATION OF A PHARMACY ENTERPRISE STRATEGIC DASHBOARD

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Dashboards and scorecards are effective avenues to present data available to health systems in a way that directs the end-user's attention to key metrics. The development and implementation of a strategic dashboard will allow the department to provide staff, leaders, and other key pharmacy stakeholders with the information needed to reach our goals by creating a sense of shared employee responsibility and highlighting the direction for departmental growth. A plan, do, check, act methodology has been followed to develop and implement the strategic dashboard. In the planning phase, the project team was tasked with defining the layout of the strategic dashboard and developing a relationship with the business intelligence team. Then, the project team brainstormed critical metrics to include on the dashboard, surveyed the leadership team and pharmacy staff members to finalize dashboard metrics, and worked with the business intelligence team to publish the dashboard. Once published, pharmacy staff will be surveyed to understand the perceived benefits of the dashboard and the impact on shared employee responsibility for reaching departmental goals. Performance indicators will be measured to identify the impact of publishing the dashboard on these metrics. Preliminary results indicate that 50% of pharmacy staff is unaware of the department's strategic initiatives. By developing and implementing a strategic dashboard, pharmacy departments can see an improvement in key performance indicators and an increase in shared employee responsibility. We anticipate that pharmacy staff will feel a sense of accountability for improving the metrics in their area of work and have a greater understanding of their role in moving the department and organization forward to reach long-term goals.

Learning Objectives:

Identify the differences between a scorecard, dashboard, and strategic dashboard.

Describe barriers that may arise when developing and implementing a strategic dashboard.

Self Assessment Questions:

Which of the following best describes a strategic dashboard?

- A A strategic dashboard lists the department's strategic initiatives
- B: A strategic dashboard measures performance, operates in real-time
- C: A strategic dashboard measures progress towards strategic goals
- D: A strategic dashboard is a combination of a scorecard and dashb

Which of the following is a best practice that should be followed when creating a dashboard?

- A Starting off with too much complexity
- B Using metrics that no one understands
- C Keeping it visual, interactive, and current
- D Cluttering the dashboard with unimportant graphics

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-789-L04-P

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

IMPACT OF PHARMACIST INTERVENTION ON GLUCAGON PRESCRIBING PATTERNS IN AN OUTPATIENT INTERNAL MEDICINE TEACHING CLINIC

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Purpose: Current literature indicates that glucagon is under-prescribed to patients with both type 1 and type 2 diabetes mellitus managed with insulin. The objective of this study is to examine the changes in glucagon prescribing patterns within an academic outpatient internal medicine clinic after pharmacist interventions. **Methods:** This study was deemed not human subjects research by the University of Louisville Institutional Review Board (IRB) and was approved by the Sullivan University IRB. This was an uncontrolled before and after quality improvement project analyzing patient charts from an outpatient Adult Internal Medicine (AIM) clinic from September 2016 to January 2018. The primary endpoint was the change in rate of glucagon prescribing from pre-intervention to post-intervention. Pharmacist interventions included glucagon education to medical residents and attending physicians, utilization of verbal and standardized written communication to recommend glucagon for eligible patients, and demonstration of glucagon injection technique. A computer-generated report identified patients at least 18 years old with a diagnosis of type 1 or type 2 diabetes mellitus managed with basal insulin and at least one dose of bolus insulin, or mixed-insulin. Patients were excluded if they had: (1) not been seen by the AIM team since 9/18/16 (one year before pharmacist intervention); (2) since deceased; (3) a hypersensitivity to glucagon; (4) a diagnosis of pheochromocytoma or insulinoma. Two chart reviews were conducted, one pre-intervention and the other four months post-intervention. The following data were collected: age, prescriber (resident/attending/endocrinologist), type of visit (new/established), trigger when prescribed (hospitalization for hypoglycemia/new start insulin/other), number of glucagon refills authorized, insulin regimen (intensive/conventional), total daily dose of insulin, A1C at time of glucagon prescribing, diagnosis of severe hypoglycemia, pharmacy consult and endocrinology consult. **Results and Conclusions:** The results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define severe hypoglycemia
Identify patients indicated for an outpatient glucagon injection kit

Self Assessment Questions:

The American Diabetes Association defines severe hypoglycemia based on which of the following blood glucose threshold?

- A: $\leq 70\text{mg/dL}$
- B: $<54\text{mg/dL}$
- C: $<44\text{mg/dL}$
- D: No specific threshold

A recommendation for a glucagon injection kit is most appropriate for which patient with type 2 diabetes based on their antidiabetic regimen?

- A Patient JJ: metformin 1000mg by mouth twice daily and liraglutide
- B Patient MY: empagliflozin 25mg by mouth once daily and insulin g
- C Patient DL: insulin degludec 24 units subcutaneously once daily a
- D Patient SN: metformin 500mg ER by mouth twice daily and sitagli

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-558-L01-P

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

DEVELOPMENT OF A PHARMACIST CREDENTIALING PROCESS IN A SMALL, COMMUNITY HOSPITAL SETTING

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Purpose: Initial and annual competency checks for pharmacists are currently performed. To ensure optimal therapeutic outcomes, it is becoming more important to require pharmacists to become credentialed in therapeutic management. A credentialing process will further increase multidisciplinary confidence in pharmacist-led services. In order to expand the role of pharmacists in the future, a credentialing process will allow for streamlined documentation and accountability of pharmacy services. As demand for primary care providers continues to increase, the role of the pharmacist becomes more crucial in order to aid the primary care providers in the provision of optimal patient-centered care. Creating a credentialing process will position pharmacists to fill gaps in patient care. **Methods:** A standardized credentialing process for pharmacists was developed to provide more streamlined documentation of pharmacist led consults for use in improvement of a multidisciplinary approach to patient care. A credentialing application was utilized as a piece of the credentialing process. A privileges request form was also developed to include privileges requested for consults that may be provided by pharmacists. Available privileges include management and dosing for heparin, warfarin, vancomycin, aminoglycosides, total parenteral nutrition, venous thromboembolism prophylaxis, antithrombotic therapy, adverse drug reaction reviews, renal adjustment review and management, fall risk assessments, and intravenous to oral medication conversions. A form was also developed for peer review of pharmacist-led interventions. This allows for pharmacists to evaluate each other's interventions and ultimately demonstrate that consults and interventions are being managed appropriately. This peer review piece is non-punitive and used as a tool to improve overall patient care. After the development of the overall credentialing process, including the necessary forms for documentation, the finalized process and forms will be presented to the credentials committee for approval. Results and conclusions to be presented at the Great Lakes Pharmacy Resident's Conference.

Learning Objectives:

Explain the difference between credentials and privileges
Describe the role of peer reviews within the credentialing and privileging process

Self Assessment Questions:

Which of the following best describes a peer review process?

- A Review and evaluation of clinical interventions completed by a pharmacist
- B: Review of a pharmacist's clinical interventions by a member of another profession
- C: Review of a pharmacist's clinical interventions by the credentials committee
- D: Review of a pharmacist's clinical interventions by non-biased pharmacist peers

What are the next steps if a peer review discovers poor patient care trends?

- A Immediate loss of the offending pharmacist's privileges
- B Another peer will pull interventions from the offending pharmacist
- C Non-punitive discussion and case review with pharmacy manager
- D The pharmacist with poor patient care trends will appear before the credentials committee

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-790-L04-P

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

IMPACT OF THE PHARMACIST ON ANTIDEPRESSANT MEDICATION INITIATION AND ADJUSTMENT IN PATIENTS WITH CHRONIC DISEASE STATES

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Purpose: Mental health conditions such as major depressive disorder remain significant health care issues. Many patients with mental illnesses also suffer from chronic diseases, such as diabetes or hypertension. Research shows that having a chronic disease can be a risk factor for developing depression. Often times, management of mental illnesses is limited given lack of appropriate resources. The pharmacist could address part of this gap in care by screening patients with chronic disease and initiating and monitoring medication therapy when appropriate. Literature supports pharmacist involvement with management of patients with depression. No studies to date have directly measured the impact of the pharmacist on symptom improvement. **Methods:** In this single-center retrospective analysis, patients with chronic disease states such as diabetes, hypertension, and hyperlipidemia seen by a clinical pharmacist were screened for depression using the Patient Health Questionnaire (PHQ-9) tool. Patients were included in the analysis if they were greater than 18 years old and seen for a chronic disease state. Patients were excluded if they did not meet inclusion criteria, had an underlying psychiatric disorder, were not under the care of a psychiatrist or if they were pregnant or trying to conceive. Data collected included age, gender, race, body mass index (BMI), primary/secondary/tertiary disease states, number of chronic disease states, initial PHQ-9 score and disease-specific endpoints and follow up labs. Information on pharmacotherapy initiated or adjusted by the pharmacist was also collected. The primary outcome of this study was percent change in PHQ-9 score from initiation or adjustment of antidepressant medication by the pharmacist to three months follow-up. Secondary endpoints include association between PHQ-9 score and number of medications, PHQ-9 score and disease-specific endpoints, and PHQ-9 score and demographics. **Results:** Results are pending. **Conclusion:** Conclusions are pending statistical analysis

Learning Objectives:

Describe the key factors to consider when implementing a new service that tailors to treating mental health patients.

Discuss the PHQ-9 assessment as a screening tool for pharmacists in an outpatient setting to identify patients with moderate to severe depression.

Self Assessment Questions:

What of the following is an advantage to a pharmacist-led depression new service?

- A: More cost to the patient
- B: More medications for the patient
- C: More frequent follow-up with the patient
- D: The patient no longer needs to see their primary care provider

Which of the following is assessed by the PHQ-9 score?

- A: Appropriateness of medications
- B: Severity of depression
- C: Risk of attempting suicide
- D: Potential for developing narcotic dependence

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-559-L01-P

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

IMPACT OF TRANSITIONING TO ORAL ANTIHYPERTENSIVE THERAPY ON INTENSIVE CARE UNIT LENGTH OF STAY IN AORTIC DISSECTION PATIENTS

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Purpose: Strict blood pressure control is critical in the management of aortic dissection. Often, patients are admitted to the intensive care unit (ICU) and require intravenous antihypertensives to achieve adequate blood pressure control. Once blood pressure is stable, however, there is little literature to guide the transition from intravenous to oral antihypertensives. Without definitive recommendations, the rapidity at which oral antihypertensives are initiated and titrated can vary potentially resulting in a prolonged transition process. The purpose of this study is to evaluate the timing of complete transition to oral antihypertensive therapy after acute aortic dissection and how this transition impacts length of stay in the ICU. **Methods:** An IRB approved single-center retrospective chart review was performed for adult patients admitted to the ICU at Spectrum Health Butterworth Hospital with an acute aortic dissection from June 2007 until June 2017. Patients needed to receive concomitant intravenous and oral antihypertensives in the ICU to be considered for this study. Included patients were placed into one of two groups: those who were fully transitioned from intravenous to oral antihypertensives in less than 72 hours, and those who required greater than 72 hours to complete the transition. The administration of the first oral antihypertensive dose signified time zero. The primary endpoint is ICU length of stay. Secondary endpoints include hospital length of stay, time to complete the transition from intravenous antihypertensive therapy to oral therapy, total volume of intravenous antihypertensives, the number of oral medication changes needed to transition from intravenous therapy, and the cost associated with the intravenous drug use and length of stay. A total of 128 subjects will be included to meet 80% power with a significance level of 0.05. **Results and Conclusions:** Data collection and statistical analysis is ongoing. Final conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patients at risk of developing an aortic dissection

Describe the potential consequences of prolonged intravenous therapy after aortic dissection

Self Assessment Questions:

Which of the following is the leading cause of aortic dissection?

- A: Traumatic accident
- B: Uncontrolled hypertension
- C: Genetics
- D: Congestive heart failure

What is a potential complication of intravenous medication administration in cardiac patients?

- A: Fluid overload
- B: Increased risk of another aortic dissection
- C: Increased risk of infection from central line insertion
- D: A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-560-L01-P

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THE IMPACT OF A VALUE BASED PHARMACY DESIGN PROGRAM ON ADHERENCE AND MEDICAL EXPENDITURES

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Purpose: To determine the effect of a value based design (VBD) including copayment reduction and disease state management on adherence to prescribed diabetes and hypertension medications and disease-specific medical expenditures. **Methods:** This retrospective analysis identified members from a commercial client who were part of the VBD and those who were not (Non-VBD) that maintained eligibility from March 1, 2016 to August 31, 2017. Members had to have two or more fills of either diabetes or hypertension medications. The primary outcome for adherence was measured as proportion of days covered (PDC) over three 6 month time intervals, with a PDC \geq 80% as the threshold for adherence. The total disease-specific medical expenditure accumulated during eligibility were also compared between the two groups. **Results:** Adherence was statistically greater for the VBD exposed group compared to Non-VBD for both members prescribed diabetes (N= 272) and hypertension (N= 750) medications. Chi-Square tests indicated that among members prescribed either diabetes or hypertensive medications, the VBD group exhibited statistically significant higher (P < 0.05) adherence than the Non-VBD group during the first, second, and third 6 month intervals studied. T-test compared the total and disease-specific medical expenditures between the two groups. The VBD group exhibited significantly higher medication costs (P < 0.05) and medical expenditure (P < 0.05) for diabetic members compared to the Non-VBD group. Similarly, the VBD group had higher hypertension medication costs (P < 0.05), however, the medical expenditure was lower for VBD hypertensive members compared to the Non-VBD group but was not statistically significant. **Conclusions:** The addition of copay assistance and disease state management for the VBD group significantly improved adherence over the 18 month study. The medical expenditure was not decreased by the VBD intervention. These findings indicate the VBD resulted in increased adherence but did not reduce medical expenditure.

Learning Objectives:

Define what value based design entails in the community pharmacy and pharmacy benefit manager setting.

Recognize the impact of value based design on adherence and medical expenditure.

Self Assessment Questions:

Which of the following are a part of value based design in the community pharmacy and pharmacy benefit manager setting?

- A Copayment reduction
- B: Disease state education
- C: Disease state monitoring
- D: Both A and B

Which of the following statements is correct?

- A Value based design has the potential to impact adherence
- B Value based design only works on rare conditions
- C Value based design has the potential to impact medical expenditure
- D Both A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-791-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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IMPACT OF DISCONTINUATION OF AMIODARONE ON WARFARIN DOSING AND INR IN PATIENTS TAKING WARFARIN MANAGED THROUGH AN ANTICOAGULATION CLINIC

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Background: Warfarin and amiodarone are commonly used together, particularly in patients with atrial fibrillation. The drug interaction between these medications is well known; amiodarone augments the anticoagulant effect of warfarin and increases the risk of serious bleeding, particularly several weeks after amiodarone is started in a patient on a stable warfarin regimen. Empiric warfarin dose reduction at the initiation of amiodarone with close international normalized ratio (INR) monitoring has been recommended. Although the impact of adding amiodarone to warfarin has been well described, little data exists to characterize the interaction or assist in managing warfarin when a patient discontinues amiodarone. Due to the extended half-life of amiodarone, the effects of amiodarone may persist for weeks following discontinuation resulting in unstable INRs for several weeks. Under this particular circumstance patients may be at a higher risk for subtherapeutic INR and thromboembolic events. **Methods:** This was a retrospective, single center cohort study. Adult patients of the Internal Medicine Center of Akron Anticoagulation Clinic between July 21, 2009 and May 31, 2018 were screened for a diagnosis of atrial fibrillation and concomitant warfarin and amiodarone therapy. The objectives of this study were to determine the effect of amiodarone discontinuation on warfarin dosing and INR in patients previously taking concurrent warfarin and amiodarone, and to describe the predictors of warfarin dose changes after discontinuation of amiodarone in the same patient population. Baseline warfarin doses and INRs following amiodarone discontinuation were collected and compared to the weekly doses and INRs at 16 weeks. **Results and conclusions:** Final results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the probable time course of the warfarin and amiodarone drug interaction

Describe the mechanism of the warfarin and amiodarone drug interaction

Self Assessment Questions:

Which of the following best describes the interaction between warfarin and amiodarone?

- A Peaks at 1 week, returns to baseline at 25 weeks
- B: Peaks at 3 weeks, returns to baseline at 25 weeks
- C: Peaks at 3 weeks, returns to baseline at 12 weeks
- D: Peaks at 5 weeks, returns to baseline at 12 weeks

Amiodarone augments the anticoagulant effects of warfarin through the inhibition of which CYP enzymes?

- A Cyp1a2 & cyp2c19
- B Cyp1a2 & cyp2c9
- C Cyp1a2 & cyp2b6
- D Cyp1a2 & cyp3a4

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-561-L01-P

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

REDOSING OF PORACTANT ALFA AND BERACTANT IN NEWBORNS WITH RESPIRATORY DISTRESS SYNDROME

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Purpose: The purpose of this study is to determine the difference in the rate of redosing occurring with poractant alfa and beractant for the treatment of neonatal respiratory distress syndrome (RDS). Memorial Hospital of South Bend transitioned from beractant to poractant alfa as the formulary lung surfactant for neonatal RDS. While poractant has a higher cost per unit, it was anticipated that fewer doses would be required, decreasing the overall hospital cost of lung surfactant. By assessing the number of doses per patient and relevant clinical data, an informed conclusion can be made justifying the decision to switch to the new formulary lung surfactant. **Methods:** Retrospective data was gathered from patients in the hospital's Neonatal Intensive Care Unit. Data for patients who have received either lung surfactant product was collected for up to 50 subjects per group. Data from December 2016 – May 2017 includes subjects who received beractant; data from July 2017 – December 2017 includes subjects who received poractant alfa. The primary endpoint is rate of redosing of poractant alfa and beractant. Secondary outcomes include length of hospital stay, number of ventilator days, and cost of medication associated with each treatment. Data was collected from the electronic medical record on the utilization of poractant alfa and beractant (e.g. time of first dose, amount received, number of doses received etc.), as well as relevant clinical data (ventilator days, reintubation, cesarean delivery etc.). Automated dispensing machine data was compiled to determine if the number of doses given to the patient matches the amount of medication pulled from the machine, ensuring proper charging and billing. Pharmacy wholesaler data was utilized to estimate hospital costs of each treatment. **Results and Conclusion:** There are no results to report at this time. Data collection and analysis will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

State the mechanism of action of lung surfactants and how it relates to neonates with respiratory distress syndrome.

Explain the rationale for determining which lung surfactant to include on a hospital formulary for neonates with respiratory distress syndrome.

Self Assessment Questions:

What is the primary mechanism of action of lung surfactants?

- A Increase surface tension at the air – liquid interface of the alveoli
- B: Decrease surface tension at the air – liquid interface of the alveoli
- C: Decrease inflammation of the alveoli
- D: Dilate the pulmonary artery

What factors should a hospital consider when determining which lung surfactant to provide as their formulary agent of choice?

- A Drug cost
- B Length of hospital stay
- C Mortality rate
- D All of the above

Q1 Answer: B Q2 Answer: D

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Activity Type: Knowledge-based Contact Hours: 0.5
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EVALUATION OF MEDICATION RELATED OUTCOMES FOR ELDERLY PATIENTS LIVING IN RURAL COMMUNITY SETTINGS

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Introduction: Elderly patients, especially those living in rural community settings, are at high risk for medication mismanagement and polypharmacy. The Flourish program through the Institute for Sustainable Health and Optimal Aging at the University of Louisville aims to improve the health and lifestyle of elderly patients in rural Kentucky. Through the program, healthcare navigators (CHNs) visit patient homes to assess specific needs related to managing lifestyle and chronic conditions. Following the visit, a multidisciplinary group, including pharmacists, reviews the patients' medical chart and CHNs assessment. The pharmacists perform comprehensive medication reviews which are then discussed with the patients' primary care physicians with the aim of optimizing medication therapy and avoiding medication errors. The purpose of this study is to assess changes and/or optimization in medication use for patients enrolled in the Flourish program. **Methods:** A retrospective chart review will be conducted on 25 elderly patients. Criteria for inclusion in the study will be enrollment in the Flourish program, two or more chronic medical conditions, and two home visits. The study will compare diagnoses, objective measures [blood pressure, hemoglobin A1c] and medications at baseline and follow up. The primary outcome will evaluate medication optimization of four conditions: hypertension, depression, diabetes and chronic obstructive pulmonary disorder. Evidence-based algorithms were peer-reviewed for each disease state to allow objective assessment of medication appropriateness. Secondary outcomes will assess polypharmacy, therapeutic duplications, medications on the Beers list and STOPP/START (Screening tool of older people's prescriptions and screen tool to alert to right treatment) criteria and identification of risk factors for polypharmacy and therapeutic duplications. **Results:** Results will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify potential risk factors for polypharmacy and suboptimal medication management for elderly patients in rural community settings.

Identify objective tools used to optimize medical management in the elderly patient population.

Self Assessment Questions:

Which of the following is NOT a common obstacle for medical management in the elderly patient population in rural settings?

- A Lack of appropriate transportation
- B: Lack of available resources
- C: Inability to find a primary care physician
- D: Inability to obtain medication

Which of the following resources provides appropriate and objective recommendations for medication prescribing and management in the elderly patient population?

- A START/STOPP criteria
- B Geriatric Medication Coalition
- C STOP/STOPP criteria
- D Beers criteria

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-885-L05-P

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

EVALUATING THE EFFECTS OF A STANDARDIZED PHARMACY RESIDENCY PRECEPTOR DEVELOPMENT PROGRAM TO ASSESS PRECEPTOR PREPAREDNESS

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Purpose: Over the past years, an increasing number of pharmacy graduates are seeking pharmacy practice residencies to supplement their knowledge gained in pharmacy school. Pharmacy residency programs rely on proficient preceptors to support this increased demand in graduates applying. Preceptors are expected to possess the skills and ASHP Starring Role principles necessary to cultivate the resident's experiential education. There has been limited research in substantiating a standardized preceptor development program. In an effort to remedy this situation, our objective is to implement a preceptor development training course to evaluate preceptor preparedness. **Methods:** Our population will consist of male and female clinical pharmacists at OSF Saint Anthony Medical Center eligible by ASHP to be residency preceptors. As a new PGY-1 program, our objective is to assess preceptor preparedness by utilizing a pre and post survey to evaluate the effectiveness of a series of learning modules. This training program would help standardize and prepare preceptors for improving their preceptorship skills that will help ensure their readiness. Pharmacists will be administered a survey before the learning modules which will be compared to the survey taken after the modules. The learning modules will consist of a span of presentations on courses related to preceptor development. The results of the post-survey will shed light onto the challenges of preceptor development, identify the critical areas pharmacists self-report, as well as formulate a baseline for a standardized preceptor development training program. **Preliminary Results:** TBA **Conclusions:** TBA

Learning Objectives:

List the Four ASHP Starring Roles.

Describe the difference between a direct vs. elaborative approach when providing a resident with feedback.

Self Assessment Questions:

Which approach is preferred when providing a resident feedback?

- A: Direct Approach
- B: Elaborative Approach
- C: Psychological Approach
- D: Quiet Approach

Of those listed below, which is an ASHP Starring Role?

- A: Modeling
- B: Talking
- C: Explaining
- D: Research

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-792-L04-P

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

EVALUATING RATES OF METABOLIC MONITORING FOR SECOND-GENERATION ANTIPSYCHOTICS AFTER IMPLEMENTATION OF A NEW POP-UP ALERT: TWO YEAR FOLLOW-UP

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Purpose: The purpose of this study is to compare three groups of veterans at the Captain James A. Lovell Federal Health Care Center: veterans newly prescribed a second-generation antipsychotic (SGA) prior to the implementation of a pop-up alert for recommended metabolic monitoring, newly prescribed veterans one year after implementation, and newly prescribed veterans two years after implementation. **Methods:** Review of the Computerized Patient Records Systems (CPRS) was conducted to identify qualified patients and to identify if laboratory monitoring was conducted as directed by the pop-up alert. Data extracted included patient demographics (age, gender), antipsychotic name, diagnosis, date of original prescription, type of provider ordering labs, baseline and 12-week fasting glucose/A1c and lipid labs, and type of intervention made to manage metabolic side effects. **Results:** The majority of SGAs had indications for bipolar/bipolar depression (25.6%) and depressive disorder (25.6%) followed by mood disorder (16.2%) and insomnia (11.6%). Baseline monitoring rates improved slightly for lipid labs, from 50% pre-alert to 68% 2-year post-alert and 60% 2-year post-alert; while glucose/A1c monitoring rates decreased from 75% pre-alert to 68.8% 1-year post-alert and 60% 2-year post-alert. Monitoring rates for glucose/A1c increased from 16.7% pre-alert to 18.8% 1-yr post-alert to 26.7% 2-yr post alert; while lipid monitoring increased from 8.3% to 18.8% to 20%. The majority of providers who ordered baseline and follow-up labs included primary care providers (60% for baseline and 77.8% for follow-up) and psychiatrists (23% for baseline and 11.1% for follow-up). A total of 7 (16.3%) interventions were made to manage metabolic side effects with the most common being switching antipsychotics (42.8%) and lifestyle counseling (28.6%). **Conclusion:** Results suggest that the new pop-up alert may improve metabolic monitoring rates for SGAs, though further chart review is needed to fully understand how to optimize the impact of the new pop-up alert.

Learning Objectives:

Recognize recommended metabolic monitoring for second-generation antipsychotics (SGA).

Identify the most common provider ordering follow-up metabolic monitoring.

Self Assessment Questions:

Please select the time that accurately reflects the recommended timeframe for follow-up fasting glucose/A1c and lipid level monitoring for second generation antipsychotics:

- A: 2 weeks
- B: 4 weeks
- C: 8 weeks
- D: 12 weeks

Please select the type of provider that is most likely to order follow-up metabolic monitoring for second-generation antipsychotics:

- A: Neurosurgeon
- B: Primary Care Provider
- C: Psychiatrist
- D: Pharmacist

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-793-L01-P

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

CLINICAL DECISION SUPPORT TOOLS FOR GENERIC PRESCRIBING

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Purpose: Medications may have multiple formulations; some formulations have a generic equivalent available and other formulations may only be available as a branded product. Navigating through the long list of generic and brand formulations can be cumbersome and may require physicians to consult resources outside the computerized provider order entry (CPOE) system. Currently, the CPOE does not display information if a medication is a brand only product or has a generic equivalent commercially available. At this community health system, there is an initiative to increase the generic prescribing rate with the help of medication-specific clinical decision support (CDS) tools and pharmacist interventions targeted at high volume brand medications with clinically similar generic alternatives. To address less common branded medications, numerous medication-specific CDS tools would need to be created which would require significant resources to build and maintain. The purpose of this project is to implement general CDS tools to increase awareness of generic status for all outpatient prescriptions.

Methods: A taskforce was formed with pharmacists, information technology specialists, and input from a physician group. Background information about possible electronic health record (EHR) functionalities was gathered. Two CDS tools were added to the EHR: a new column in order entry to display if a generic exists for the ordered medication and an alert to display commercially available generic alternatives based on the name and route of the drug ordered. The EHR build for the alert was tested and turned on passively to assess which medications were triggering the alert and if the alert needed further development. The trend for the generic prescribing rate will be monitored. Data will be gathered on the number of times the alert was triggered. Results and conclusion: Final conclusions and results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify two methods of providing generic status information of a medication to ordering providers.

Describe potential barriers and complications of the clinical decision support tool.

Self Assessment Questions:

Which one of the following is true?

- A The alert displays for outpatient prescriptions only
- B: It does not matter to patients with insurance if they receive brand or generic medication
- C: The alert prevents the user from ordering a brand medication if a generic is available
- D: The alert displays to nurses

Which of the following is a potential complication or barrier of the clinical decision support tools?

- A The column displaying if a generic exists can be overlooked
- B The column displaying if a generic exists requires adjustment when a medication is changed
- C The suggested generic alternative medication may not be appropriate
- D A and C

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-794-L04-P

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

COMPARISON OF CEFOTAXIME VERSUS CEFTAZIDIME FOR NEONATAL SEPSIS

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Purpose: Empiric management of suspected sepsis in Neonatal Intensive Care Units (NICUs) commonly includes ampicillin or vancomycin plus gentamicin. A third-generation cephalosporin may be added in patients who are critically ill, have poor renal function, or for improved meningitis coverage. The preferred agent is cefotaxime, however, due to a national drug shortage, ceftazidime has been recommended in its place for infants less than 2 months old by the American Academy of Pediatrics. The objectives of this study were to determine if the incidences of culture-positive late onset sepsis and multi-drug resistant organisms (MDROs) were increased with the use of ceftazidime compared to cefotaxime in NICU patients. **Methods:** This was a single-center, retrospective cohort study of all NICU patients who received at least 24 hours of cefotaxime or ceftazidime within pre-specified time ranges between April 1, 2015 and August 1, 2017, determined by our institutional shortage status. Each subject was included only once based on the first time they received the study antibiotic. Subjects were excluded if they received the alternate antibiotic for greater than 24 hours during the same admission. **Results:** A total of 101 subjects were included in the final analysis (cefotaxime n=43; ceftazidime n=58). The median gestational ages were significantly different between groups (32.3 [IQR 26.9, 37.4] versus 28.1 [IQR 25, 36.6] weeks, respectively, p<0.05). Results showed a non-statistically significant increased incidence of culture positive late-onset sepsis (2.3% versus 17.2%, respectively, unadjusted p=0.02, adjusted p=0.48), MDRO infections (0% versus 5.2%, respectively, p=0.26), culture-negative sepsis (20.9% versus 37.9%, respectively, p=0.07), and necrotizing enterocolitis (2.3% versus 22.4%, respectively, unadjusted p=0.003, adjusted p=0.067). MDRO infections included ESBL-producing Escherichia coli and Pseudomonas aeruginosa. No differences were noted for mortality or postmenstrual age at discharge. **Conclusion:** Further multi-center research is warranted to assess the effect of this drug shortage on the neonatal population.

Learning Objectives:

Describe empiric antibiotic management strategies for suspected neonatal sepsis in Neonatal Intensive Care Units (NICUs).

Discuss the perceived differences in neonatal outcomes when comparing cefotaxime versus ceftazidime use for neonatal sepsis.

Self Assessment Questions:

Which of the following statements is true about empiric therapy for neonatal sepsis?

- A A third-generation cephalosporin is commonly utilized as first-line empiric therapy
- B: The preferred third-generation cephalosporins in neonates are ceftazidime and cefotaxime
- C: Ampicillin or vancomycin plus gentamicin is commonly used as first-line empiric therapy
- D: Third-generation cephalosporins can be added to empiric therapy if meningitis is suspected

Which of the following is true of the results found in this study?

- A All four of the identified MDRO infections were found in the cefotaxime group
- B Cefotaxime has a broader spectrum of coverage, and therefore, resulted in fewer MDRO infections
- C The results showed significant unadjusted differences in UTIs after 24 hours
- D There were non-statistically significant increases seen in the incidence of late-onset sepsis

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-566-L01-P

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

EFFECT OF ANTIHYPERTENSIVE MEDICATIONS ON VASOPRESSOR REQUIREMENTS IN PATIENTS WITH SHOCK

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Purpose: Shock is the manifestation of circulatory failure affecting approximately one third of patients in the intensive care unit (ICU). The four variations of shock include distributive, cardiogenic, hypovolemic and obstructive, each associated with unique signs and symptoms. Hypotension, however, is ubiquitous and is typically characterized by a mean arterial pressure less than 70 mmHg, resulting in reduced tissue perfusion and organ dysfunction. Hypotension persisting beyond adequate fluid resuscitation is deemed refractory and necessitates the use of vasoactive agents. The use of antihypertensive agents prior to vasopressor initiation may worsen hypotension leading to increased vasopressor doses and prolonged duration of shock. This study aims to explore the impact of antihypertensives on vasopressor dose and duration. **Methods:** This retrospective, single-center study included patients who received at least one vasopressor for the treatment of all types of shock, from January 1, 2017 to June 30, 2017. Patients on home antihypertensive agent(s) were compared to patients without antihypertensives. Patients were excluded for the following reasons; < 18 years of age, pregnant, cardiovascular surgery, burn injury, vasopressors initiated at an outside hospital, a MAP goal > 70 mmHg, had care withdrawn or died within 72 hours of admission. Baseline demographic data were collected including shock type, comorbidities and sequential organ failure assessment (SOFA) scores. The primary endpoint was vasopressor-free hours at 72 hours. Secondary endpoints included the number of vasopressors, the maximum and cumulative vasopressor doses, hospital and ICU length of stay and 30-day mortality. Descriptive statistics were expressed as means, standard deviations and percentages. Continuous data were analyzed using the Mann-Whitney U test while categorical data were analyzed using chi-square or Fisher's exact test. **Results:** Results will be presented **Conclusion:** Results will be presented

Learning Objectives:

Explain landmark trials demonstrating the efficacy of vasoactive agents in patients with shock

Describe the potential effects of antihypertensive agent use on vasopressor requirements

Self Assessment Questions:

The SOAP II trial failed to find a significant difference in 28-day mortality between patients receiving which two vasopressors?

- A: Phenylephrine and dopamine
- B: Norepinephrine and epinephrine
- C: Dopamine and norepinephrine
- D: Phenylephrine and epinephrine

In critically ill patients, including patients with septic shock, how has antihypertensive agent use been shown to reduce mortality?

- A: Reduced myocardial oxygen consumption
- B: Relative bradycardia
- C: Increased end-organ perfusion
- D: All of the above

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-564-L01-P

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

EXAMINATION OF COMPLICATIONS OCCURRING WITHIN ONE YEAR POST RENAL TRANSPLANTATION

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Purpose: The prevalence of obese patients with end stage renal disease awaiting renal transplantation (RTx) is increasing due to the growing number of overweight patients within the United States. Obesity is considered a relative contraindication to RTx at many transplant centers due to an increased risk of complications. Furthermore, emergency department (ED) visits are a manifestation of complications. One study found that 40% of RTx recipients visited the ED within 1 year after transplantation, and 60% of those visits led to hospitalization. The purpose of this study is to compare the incidence of ED visits and hospitalizations between obese and non-obese RTx recipients. **Methods:** Single-center, retrospective, cohort study assessing RTx recipients from 09/20/2013 to 09/19/2016. Patients meeting inclusion criteria were followed for 12 months from the date of RTx. Complications requiring ED or hospital intervention, baseline demographics, transplant demographics, and laboratory values were collected. Data was assessed for normality using the Shapiro Wilks test. Categorical data was compared with the chi-square or the Fisher's exact test. Continuous data was compared with the student t-test or repeated-measure analysis of variance (ANOVA). Statistical analysis completed on IBM SPSS Statistics Version 24. **Results:** Preliminary results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

List common reasons for emergency department visits or hospitalizations in renal transplant patients.

Discuss the current literature on graft function in obese patients.

Self Assessment Questions:

The number of obese patient's on the United States Kidney Waiting List is _____, and the risk of complications after RTx in obese patients is generally _____ than non-obese patients.

- A: Decreasing, lower
- B: Increasing, higher
- C: Plateauing, higher
- D: None of the above

Which of the following is considered to be the best index of graft function?

- A: SCr
- B: CrCl
- C: eGFR
- D: Urine output

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-563-L01-P

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

EVALUATION OF ACUTE KIDNEY INJURY WITH MANNITOL VERSUS HYPERTONIC SALINE IN THE TREATMENT OF ELEVATED INTRACRANIAL PRESSURE

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Purpose: In the neurocritical care population, management of elevated intracranial pressure is crucial to reduce morbidity and mortality. A pharmacologic option is hyperosmolar therapy with mannitol or hypertonic saline, but guidelines do not have a preferred agent. Studies have shown a risk of acute kidney injury with hypertonic saline, a concern established for mannitol. History of acute kidney injury can affect prognosis and progression to chronic kidney disease. No studies have directly compared the safety of these agents, and due to their effects on the kidneys, this study aims to evaluate the incidence of acute kidney injury with hypertonic saline and mannitol. **Methods:** A retrospective chart review will identify patients with traumatic brain injury, intracerebral hemorrhage, subarachnoid hemorrhage, ischemic stroke, malignant middle cerebral artery (MCA) syndrome, or cerebral edema who have been treated with mannitol or 3% hypertonic saline for elevated intracranial pressure. Exclusion criteria include patients with end stage renal disease or acute kidney injury upon admission and patients 17 and younger. Any patient who received greater than 24 hours of mannitol prior to hypertonic saline or hypertonic saline prior to mannitol also will be excluded. Past medical history collected will include diabetes, heart failure with reduced ejection fraction, chronic kidney disease, and hypertension. Data about concurrent nephrotoxic agents, intravenous fluids, and vasopressor use will be obtained. The primary outcome is the incidence of acute kidney injury as defined by the Kidney Disease Improving Global Outcomes (KDIGO) guidelines. Secondary outcomes include stage of acute kidney injury, length of stay, return to baseline renal function, dialysis requirements, and incidence of hypotension. A separate multivariate logistic regression analysis for acute kidney injury will be performed to identify predictors. **Results/Conclusion:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the mechanism of action of hypertonic saline.
Identify adverse drug reactions of hypertonic saline and mannitol.

Self Assessment Questions:

When treating elevated intracranial pressure, which of the following best describes the mechanism of action of both mannitol and hypertonic saline?

- A: Hyperosmolar therapy
- B: Diuretic
- C: Antihypertensive
- D: Decreasing edema

Which of the following is an adverse effect of both mannitol and hypertonic saline?

- A: Hypertension
- B: Fatigue
- C: Acute kidney injury
- D: GI bleeding

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-565-L01-P

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

IMPACT OF ANTIFUNGAL AGENT USED FOR PROPHYLAXIS AGAINST INVASIVE FUNGAL INFECTIONS (IFI) DURING INDUCTION THERAPY FOR ACUTE MYELOID LEUKEMIA (AML)

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Purpose: Invasive fungal infections (IFIs), particularly mold infections, continue to remain a significant cause of morbidity and mortality in patients with acute myeloid leukemia (AML) undergoing remission-induction therapy. Despite improvements in diagnosis and prophylaxis, the incidence of proven or probable invasive fungal infection remains high in patients with AML. The objective of this research project is to examine the risk factors for invasive fungal infections (IFIs) and compare the incidence of IFI between various prophylaxis antifungal agents in patients receiving induction or reinduction therapy for AML. **Methods:** This single center, retrospective case-control study investigating the incidence of invasive fungal infections during the period of neutropenia in patients receiving remission induction therapy for AML. Adult AML patients receiving induction therapy from January 2014 to July 2017 at the University of Michigan Health Systems (UMHS) were included. Patients who received induction therapy at an outside hospital and patients who received chemotherapy that was not expected to produce prolonged neutropenia monotherapy (i.e. hypomethylating agents) were excluded. Patients with positive IFI will be matched 2:1 to patients without an IFI who are on same day post-induction chemotherapy and antifungal exposure in the past 21 days were evaluated for defined risk factors. The following data will be collected: age, gender, transplant status, duration of neutropenia, chemotherapy regimen, concomitant steroid dose, ICU admission, ICU length of stay, antifungal agent, dose if on micafungin, steady state levels, CT scans, fungal diagnostic tests, serology tests, microbiology. Per prophylaxis day IFI rate will be calculated. **Results/ Conclusions:** Will be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Describe the risk factors of IFI in AML patients receiving induction chemotherapy
Recognize prophylaxis agents used to prevent IFI in AML patients undergoing remission-induction chemotherapy

Self Assessment Questions:

Which of the following antifungal agents do not have coverage against aspergillus mold infections?

- A: Fluconazole
- B: Isavuconazole
- C: Posaconazole
- D: Voriconazole

How is a proven IFI defined by EORTC?

- A: Host factors present and clinical criteria met
- B: Host factors present, clinical criteria and mycological criteria met
- C: Histopathologic, cytopathologic or direct microscopic examination
- D: None of the above

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-568-L01-P

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

UTILIZATION OF RISK FACTOR PROTOCOL TO DIRECT EMPIRICAL ANTIBIOTIC THERAPY FOR NURSING HOME PATIENTS ADMITTED TO THE MEDICAL FLOORS WITH PNEUMONIA

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PurposeThe 2005 American Thoracic Society/Infectious Diseases Society of America guidelines recommended similar empiric antimicrobial therapy for patients with healthcare-associated pneumonia (HCAP), hospital-acquired pneumonia (HAP), and ventilator-associated pneumonia (VAP). However, the 2016 guidelines for HAP/VAP no longer include recommendations for HCAP based on findings that previous HCAP criteria was a poor predictor for multi-drug resistant (MDR) pathogens. The objective of this study is to compare the 30-day mortality rate for patients admitted with pneumonia from nursing homes utilizing a new site-specific risk factor protocol, stratifying patients to receive either narrow therapy with ceftriaxone or broad-spectrum therapy with piperacillin-tazobactam. **Methods**This study will retrospectively evaluate patients admitted from a nursing home with pneumonia to medical floors receiving either ceftriaxone or piperacillin-tazobactam for at least 24 hours. The site-specific protocol includes meeting at least 2 of the following risk factors: prior hospitalization in the last 90 days for 2 days, immunosuppression, intravenous antibiotic use in last 90 days, chronic structural lung disease, or history of MDR pathogen to qualify for piperacillin-tazobactam. The primary outcome is mortality rate between ceftriaxone group and piperacillin-tazobactam group within 30 days of hospital discharge. The secondary outcomes include: readmission in 30 days, incidence of Clostridium difficile within 30 days, length of stay (LOS), transfer to the ICU, ICU LOS, patients with etiology of MDR pathogens, patients with MRSA, rate of nephrotoxicity, and percent compliance with the institutional HCAP treatment guidelines. **Preliminary results**Seven patients have been included in the ceftriaxone group and 25 patients are included in the piperacillin-tazobactam group. The 30-day mortality rate in the ceftriaxone group is 14% compared to 4% in the piperacillin-tazobactam group. **Conclusions**Early data suggests that there is no statistical difference in all-cause mortality for HCAP patients treated with ceftriaxone versus piperacillin-tazobactam utilizing the site-specific risk factor protocol.

Learning Objectives:

Define healthcare associated pneumonia initially proposed by the 2005 American Thoracic Society/Infectious Diseases Society of America guidelines.

Review the risk factors associated with multidrug resistant pathogens causing HCAP.

Self Assessment Questions:

Which of the following is included in the definition of HCAP established in the 2005 ATS/IDSA guidelines?

- A Any patient who was hospitalized in an acute care hospital for less
- B: Any patient residing in a nursing home or long-term care facility
- C: Any patient who received oral antibiotic therapy in the past 30 day
- D: Any patient who resides at home

2. According to the 2005 ATS/IDSA HAP/VAP/HCAP guidelines, which of the following are risk factors for multidrug resistant pathogens causing HCAP?

- A Chronic dialysis within 30 days
- B Advanced age (≥ 65 years)
- C Mechanical ventilation
- D Diabetes mellitus

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-567-L01-P

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

EVALUATION OF SKIN CANCER RISK IN KIDNEY TRANSPLANT RECIPIENTS RECEIVING BELATACEPT

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Background: Skin cancers, particularly nonmelanoma, are among the most common malignancies in kidney transplant recipients (KTRs). The incidence of nonmelanoma skin cancer after solid organ transplant is 5% to 10% after 5 years, increasing to 40% to 70% after 10 to 20 years. Skin cancer risk is multifactorial, dependent in part on immunosuppressive regimen. Belatacept, a costimulation blocker, is the newest medication available for maintenance immunosuppression in KTRs. Compared to calcineurin inhibitors (CNIs), belatacept has a lower incidence of cardiovascular risk factors and causes less nephrotoxicity; however, the incidence of skin cancer in patients receiving belatacept is not well characterized. An integrated safety analysis comparing belatacept and cyclosporine suggests similar rates of nonmelanoma skin cancer (< 1% to 2%) after 2 years. As utilization of belatacept continues to grow among transplant centers, this study aims to better characterize skin cancer development in patients exposed to belatacept. **Methods:** This is a single-center, retrospective study of KTRs exposed to belatacept under the supervision of a Froedtert and Medical College of Wisconsin physician. Patients were included if they received their first dose of belatacept at the time of transplant (de novo) on or after January 1, 2005 through December 31, 2017. The primary outcome is the percent of patients that develop at least one new skin cancer after initiating belatacept. Secondary outcomes include time to first documented skin cancer, number of patients who develop more than one skin cancer, interval time between skin cancer development in patients with more than one occurrence, and percent of each type of skin cancer. **Results/Conclusion:** Data analysis is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the trend of skin cancer development over time in kidney transplant recipients.

Identify risk factors, including immunosuppressive agents, for skin cancer development in kidney transplant recipients.

Self Assessment Questions:

Which of the following statements regarding skin cancer trends in kidney transplant recipients is true?

- A Melanoma is the most common skin cancer to develop in kidney tr
- B: A patient's risk for developing skin cancer increases with time post
- C: Patients transplanted at a younger age will develop skin cancer ea
- D: Once a kidney transplant recipient develops nonmelanoma skin ca

Which of the following statements about skin cancer risk factors is true?

- A Patients with fair skin (Fitzpatrick scores I and II) and light hair hav
- B Exposure to immunosuppressive medications, such as belatacept
- C Older age at transplantation and greater degree of immunosuppre
- D Kidney transplant recipients are at lower risk of developing skin ca

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-795-L01-P

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

THE EFFECT OF INCREASED EFFORTS DURING TRANSITIONS OF CARE ON PATIENTS WITH COPD

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Purpose: The purpose of this study is to determine the impact of a newly implemented hospital program on patients recently discharged with chronic obstructive pulmonary disease, or COPD. The program involves referring all patients with COPD to a post discharge clinic where medication counseling and assessment of medication compliance will be performed by a pharmacist. Spirometry may also be performed on patients by a trained pharmacist during a follow-up visit if the patient is unable to get an appointment with a pulmonologist. **Methods:** All admissions due to COPD will be identified using ICD-9 and ICD-10 codes for patients discharged from October 1, 2016 to January 31, 2017 and October 1, 2017 to January 31, 2018; the former time period being prior to the COPD program implementation. The primary outcomes are 30-day and 60-day readmission rates during these time periods. Population characteristics of patients within each time period will be compared between patients seen and not seen at the post discharge clinic. For patients with multiple admissions during one of these time periods, only the first admission will be reviewed. Data will be collected using St. Vincent Health's electronic medical record systems, Sunrise Clinical Manager and Athena. **Results/Conclusions:** The results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patient barriers to medication compliance that a pharmacist can alleviate

Describe the role of a pharmacist in the management of COPD during transitions of care

Self Assessment Questions:

Which of the following healthcare barriers could a pharmacist most likely help solve?

- A A patient who limited transportation to get to doctor appointments
- B: A patient who is unable to afford a newly prescribed inhaler
- C: A patient who is unable to find adequate shelter
- D: A patient who mistrusts the healthcare system

Which of the following interventions for a patient with COPD could involve a pharmacist during transitions of care?

- A Medication reconciliation
- B Enrollment in patient assistance programs
- C Education on smoking cessation
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-569-L01-P

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

APPROPRIATENESS OF EMPIRIC ANTIBIOTICS FOR URINARY TRACT INFECTIONS IN OUTPATIENTS OF A RURAL HEALTHCARE SYSTEM

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Purpose: Antibiotics may be inappropriate in 20-50% of cases, according to the Centers for Disease Control and Prevention. Saint Claire HealthCare began an antimicrobial stewardship program in the summer of 2016 that monitors antibiotic use for inpatients, but there is no comparable service for the organization's affiliated outpatient clinics. Additionally, the Food and Drug Administration (FDA) added a boxed warning to fluoroquinolones in 2016 stating they should be reserved for patients with no alternative treatment options for uncomplicated urinary tract infections (UTIs). The purpose of this study is to evaluate the appropriateness of antibiotics prescribed for outpatient UTIs in accordance with current literature and warnings. **Methods:** This is a single center, retrospective chart review focusing on the appropriateness of antibiotics prescribed for UTIs in the outpatient clinics affiliated with a rural community, teaching hospital. The study period was January 1, 2016 through December 31, 2016. The primary endpoint was appropriateness of antibiotics for all UTIs, with a secondary emphasis on fluoroquinolone usage for uncomplicated UTIs before and after the FDA warning. Due to the large number of antibiotics prescribed for surgical prophylaxis, these were also assessed for appropriateness. A list of 392 patients was reviewed. Patients were included if they were prescribed antibiotics for UTI or surgical prophylaxis. Patients were excluded if they were < 18 years of age. There were 138 duplicate entries and 30 pediatric patients that were excluded, resulting in a total of 224 patients reviewed. Appropriateness was determined based on current literature, FDA warnings, indication, antibiotic prescribed, dose, frequency, duration, patient specific factors (renal function, allergies, etc.), the hospital's antibiogram, culture and sensitivity results, and previous culture results. **Results/Conclusions:** This study is still in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify appropriate empiric antibiotics for urinary tract infections

Recognize appropriate antibiotic use for surgical prophylaxis for urological procedures

Self Assessment Questions:

KM is a 30 YO F who presents to her PCP and is diagnosed with acute uncomplicated cystitis. Which of the following would be the most appropriate antibiotic choice for treatment?

- A Trimethoprim-sulfamethoxazole 160/800 mg PO BID x7 days
- B: Trimethoprim-sulfamethoxazole 160/800 mg PO BID x5 days
- C: Nitrofurantoin monohydrate/macrocrystals 100 mg PO BID x5 days
- D: Nitrofurantoin monohydrate/macrocrystals 100 mg PO BID x3 days

RS is a 50 YO F who is to undergo a cystoscopy at her local urology clinic today. A urine culture performed 3 days ago showed no growth. Which of the following would be the most appropriate choice a

- A Ciprofloxacin 500 mg PO once prior to procedure and 500 mg PO
- B Trimethoprim-sulfamethoxazole 160/800 mg PO once prior to proc
- C Cephalexin 500 mg PO once prior to procedure and 500 mg PO B
- D No antibiotic prophylaxis is necessary

Q1 Answer: C Q2 Answer: D

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Activity Type: Knowledge-based Contact Hours: 0.5
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ASSESSMENT OF NEUROMUSCULAR BLOCKER USE IN PATIENTS UNDERGOING THERAPEUTIC HYPOTHERMIA

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Purpose: Targeting a core temperature of 32 to 36 degrees Celsius may prevent negative neurological sequelae associated with anoxic brain injury in comatose patients following cardiac arrest. During therapeutic hypothermia (TH), shivering can counteract the benefits of cooling through increased inflammation, heat production, and metabolic derangements. Several modalities, including neuromuscular blocking agents (NMBAs), have been used to help prevent shivering; however, guideline recommendations are inconclusive. The purpose of this study was to evaluate the clinical effects associated with the use of NMBAs in patients who underwent TH. **Methods:** A retrospective chart review was performed at a tertiary-care medical center of cardiac arrest patients from November 2016 through December 2017. Eligible patients were 18 years and older, underwent at least 24 hours of TH to achieve a goal temperature of 33 degrees Celsius, and had a return of spontaneous circulation occurring less than eight hours following cardiac arrest. Patients who received NMBAs during TH were compared to those who did not. Data were collected via electronic medical records and analyzed using descriptive statistics. The primary outcomes of the review were time to achieve zero on the bedside shivering assessment scale and percentage of time maintained at goal. Secondary outcomes included time to extubation, all-cause mortality, percentage of train-of-four readings at goal, number of shivering episodes, and length of hospital and intensive care unit stay. **Results/Conclusion:** Full results and conclusion will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the proposed benefits of therapeutic hypothermia and the physiological impact of shivering.
Explain the effect of neuromuscular blocking agents on shivering during therapeutic hypothermia.

Self Assessment Questions:

What is a perceived benefit of therapeutic hypothermia?

- A Has shown positive neurologic outcomes and decreased mortality
- B: Increases cerebral metabolic rates and oxygen demand
- C: Causes free radical reactions and cellular apoptosis
- D: Increases the inflammatory and immune responses within the body

Which of the following is true about pharmacological therapies used for shivering?

- A Clonidine works to increase the threshold for cutaneous vasoconstriction
- B Magnesium works as an N-methyl-D-aspartate agonist and induces shivering
- C Non-depolarizing agents work to block nerve impulses by preventing acetylcholine release
- D Due to its effect on alpha-adrenergic receptors, buspirone is thought to be effective

Q1 Answer: A Q2 Answer: C

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EVALUATION OF PACT (PATIENT ALIGNED CARE TEAM) CLINICAL PHARMACY SERVICES

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Purpose: Clinical pharmacy services within the Cincinnati VA have been provided for several years without significant changes that would increase utilization of pharmacists on the PACT. Recent studies have shown various ways to redesign pharmacy services within the PACT that resulted in increased efficiency, improved access to care, and improved patient and provider satisfaction. Potential differences from this data have been identified with the Cincinnati VAs current practices that suggest possible areas for improvement. The primary objective is to develop a business proposal for the future redesign and implementation of changes to current PACT clinical pharmacy services at the Cincinnati VA. **Methods:** This quality improvement project will evaluate workload and efficiency for all clinical pharmacy specialists (CPSs) working in the PACT setting. The VHA Support Service Center (VSSC) database will be used to perform a retrospective review over the previous year to compare current efficiencies to the proposed national recommendations by the VA Clinical Pharmacy Practice Office (CPPO). The specific data utilized will include encounter and workload data, missed opportunity rates, and evaluation of clinic efficiencies. Pharmacist workload performed outside of PACT duties will be excluded. Additionally, feedback will be obtained from internal PACT providers and PACT CPSs through electronic surveys. These results will be used to help identify what services and support is needed to support the PACT providers. All electronic surveys will be voluntary and anonymous. These methods of evaluation will be collected, analyzed, and compared to the CPPO recommendations. The information and data gathered will then be used to develop the new PACT model. **Results and Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify current efficiencies within the patient aligned care team (PACT) clinical pharmacy specialist's (CPSs) clinic
Discuss ways to optimize care provided by the clinical pharmacy specialist (CPS) working in the patient aligned care team (PACT) setting

Self Assessment Questions:

Which of the following is an electronic database that provides national and local data for analyzing healthcare availability and efficiency?

- A VHA Reports and Measures Portal (RAMP)
- B: VHA Support Service Center (VSSC)
- C: PharmD Project Tool
- D: Computerized Patient Record System (CPRS)

Which of the following statements is correct?

- A PACT CPS should target 17-19 comprehensive medication management visits per month
- B A staffing ratio of at least 1 PACT CPS for every 5 PACT primary care providers
- C PACT CPS should target spending 75-80% of their time in direct patient care
- D On average, a typical VA provider with a panel of 1,200 patients, has 17-19 comprehensive medication management visits per month

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-796-L04-P

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IMPACT OF A PHARMACIST-DRIVEN ANTIMICROBIAL STEWARDSHIP PROTOCOL IN COMBINATION WITH RAPID BLOOD CULTURE IDENTIFICATION TECHNOLOGY IN A COMMUNITY HOSPITAL

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Purpose: Clinical outcomes in patients with bacteremia such as increased mortality and hospital length of stay occur when appropriate antibiotic therapy is delayed. Rapid blood culture identification has been shown to significantly reduce the time-to-appropriate antibiotic therapy and improve patient outcomes when combined with antimicrobial stewardship efforts. The objective of this study is to determine if a pharmacist-driven protocol for real-time intervention on rapid blood culture identification results can decrease time-to-effective antibiotic therapy in a community hospital setting. **Methods:** Institutional Review Board approval will be obtained prior to data collection. A single center retrospective chart review of all patients with positive blood cultures over an eighteen month time period will be analyzed to determine the time-to-effective antibiotic therapy before and after the implementation of rapid blood culture technology in combination with a pharmacy-driven antimicrobial stewardship protocol. Secondary outcomes to be measured include vancomycin use, hospital length of stay, in-hospital all-cause mortality, pharmacy costs, and Clostridium difficile rates of patients with positive blood cultures. A protocol was implemented for all clinical staff pharmacists to respond in real-time to rapid blood culture identification results from Microbiology. Rapid blood culture identification results were analyzed 24 hours a day so that all interventions were made in real-time. Pharmacists were also provided with detailed education prior to protocol implementation, and all interventions were documented whether or not they were approved or denied by the overseeing physician. **Results and Conclusions:** Data collection and analysis is ongoing and will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the bacterial pathogens identified using rapid blood culture technology.

Explain the effects on patient outcomes when pharmacist-driven antimicrobial stewardship efforts are combined with rapid blood culture identification.

Self Assessment Questions:

What is an example of a multi-drug resistant organism that can be identified using rapid blood culture identification?

- A: Extended spectrum beta-lactamase-producing Gram-negative pathogen
- B: Enterococcus spp.
- C: Staphylococcus spp.
- D: All of the above

What clinical outcomes are expected when combining rapid blood culture identification with antimicrobial stewardship?

- A: Increase in hospital length of stay
- B: Addition of unnecessary antibiotics
- C: Streamlined patient specific antibiotic therapy
- D: Increase in overall hospital costs

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-572-L01-P

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ALIGNING MEDICATION BILLING PRACTICES ACROSS A MULTI-SITE ACADEMIC HEALTH-SYSTEM

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Spending on medications in the U.S. continues to rise and is forecasted to reach \$640 billion by 2020. With continual growth in medication spending, largely driven by high cost medications, health-systems are increasingly subject to scrutiny by payers regarding medication billing practices. Additionally, health-system pharmacy leaders are challenged with enterprise growth and integration efforts that pose new pharmacy fiscal and revenue cycle challenges. UW Health recently became an integrated multi-site academic medical enterprise, combining UW Hospital and Clinics and UW Medical Foundation. This has initiated movement to align processes, including medication charge structure and billing practices across multiple sites of care. UW Health currently has multiple medication charge structure and pricing strategies based on legacy location practices and other factors. The objective of this project is to create and implement an enterprise-wide wholesale acquisition cost (WAC)-based medication billing strategy that is revenue neutral for UW Health. A steering committee of stakeholders representing pharmacy, fiscal, revenue cycle, enterprise analytics, and managed care contracting was created to design and implement a new billing strategy. A predictive revenue model was developed to quantify the gross and net revenue impacts of conversion to a WAC-based charge structure, with consideration for other factors including markup, fees, drug utilization, payer mix, and rapidly rising drug costs. This predictive model and robust monitoring and maintenance processes were utilized to design optimal billing practices and pharmacy revenue cycle integrity for the UW Health pharmacy enterprise. This contemporary approach to revenue modeling will enhance our ability to identify trends, monitor costs and revenues, and increase transparency for patients and payers.

Learning Objectives:

Identify health-system stakeholders who should be included when determining an optimal medication billing strategy

Explain strategies that maintain consistent billing practices and expected revenue when significant medication supply chain savings are implemented

Self Assessment Questions:

Which of the following is a reason to implement a wholesale acquisition cost (WAC)-based medication charge structure?

- A: Supply chain savings on medications does not negatively impact patient outcomes
- B: It is required by The Joint Commission
- C: It is a strategy to avoid medication claim denials
- D: Wholesale acquisition cost is typically lower than actual acquisition cost

Which of the following statements is true regarding the process for designing and implementing a medication billing strategy?

- A: Health-system pharmacy leaders should create a multi-disciplinary team
- B: Changes in medication billing only impact the department of pharmacy
- C: Medication billing practices should not be discussed with patients or payers
- D: Class of trade does not impact billing practices or expected revenue

Q1 Answer: A Q2 Answer: A

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VACCINATIONS IN ADULTS AWAITING LIVER TRANSPLANT

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Purpose: Despite national guidelines recommending vaccinations in adult solid-organ transplant candidates, wide variations in immunization practices occur. This results in low vaccination rates in an immunocompromised population. Strategies to improve vaccination rates include recommending and monitoring immunizations at an appropriate time and an infectious disease (ID) consult prior to liver transplant (LT). At the Cleveland Clinic, an ID consult is requirement during LT evaluation. The purpose of this study is to evaluate vaccination rates in adult LT candidates at Cleveland Clinic. **Methods:** This IRB approved, single center, retrospective chart review evaluates adults >19 years old who received a LT at Cleveland Clinic Main Campus between January 1, 2013 and December 31, 2016. Subjects were identified from a report generated from the shared electronic medical record. Pre-transplant vaccination history and serologies, baseline demographics (date of transplant, donor type, date of first ID consult, and ID recommendations), and transplant-related data were retrieved via the institutional electronic transplant database, report generation, manual collection from subjects' electronic medical records, and the Ohio Department of Health immunization database (Impact SIIIS). Primary outcomes include vaccination rates and/or positive serology for pneumococcal, influenza, hepatitis A, and hepatitis B vaccines. Secondary outcomes include vaccination rates and/or positive serology for varicella, herpes zoster, measles/mumps/rubella, tetanus/diphtheria/pertussis, human papilloma virus, meningococcal, haemophilus influenzae type B vaccines. Additional secondary outcomes include number of patients who completed vaccines recommended by ID, number of patients who did not receive vaccines recommended by ID, and number of patients who underwent simultaneous splenectomy. All outcomes will be analyzed using descriptive statistics. **Results:** Of 547 eligible subjects, 443 were included. Of those excluded, 44 (8%) received multi-organ transplants, 23 (4%) were re-transplanted, and 15 (2.7%) were transplanted due to acute liver failure. Additional results and conclusions are to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the importance of appropriate administration and timing of vaccines in an immunocompromised population, specifically liver transplant.

Recall ACIP vaccination recommendations for liver transplant candidates.

Self Assessment Questions:

Why is it important to administer vaccinations in a timely manner prior to liver transplantation?

- A Prevent infections post-transplantation
- B: To assist in tolerating liver transplant procedure
- C: Receiving vaccinations prior to transplant can increase efficacy of
- D: A and C

A 25-year old male patient is listed to receive a liver transplant with simultaneous splenectomy in the next few months. During ID evaluation all vaccines are up to date with the exception of ACIP-re

- A Meningococcal vaccines (Meningococcal quadrivalent and Mening
- B Hepatitis A and B vaccines if not seropositive
- C Haemophilus influenzae type B (Hib) vaccine
- D A and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-913-L06-P

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CLINICAL IMPACT OF ACID SUPPRESSIVE THERAPY IN SOFT TISSUE SARCOMA PATIENTS RECEIVING PAZOPANIB

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Background/Purpose: Pazopanib, an oral multikinase inhibitor, is approved for patients with advanced soft tissue sarcoma (STS) who have failed standard anthracycline-based chemotherapy. Pazopanib exhibits pH-dependent solubility, therefore a pharmacokinetic drug interaction exists between pazopanib and acid suppressive medications, which may affect the overall efficacy of the drug. STS patients may require acid suppressive medications, including proton pump inhibitors (PPIs) and histamine 2 receptor antagonists (H2RAs), while concomitantly receiving pazopanib. Prescribers are challenged with the management of acid suppressive medications with concomitant use of pazopanib. The purpose of this study is to determine whether concomitant acid suppressive medications (PPIs or H2RAs) impact efficacy or safety in STS patients receiving pazopanib. The primary objective of this study was to determine progression free survival (PFS) in STS patients taking pazopanib with concomitant acid suppressive medications versus no acid suppressive medications. Secondary objectives were to determine overall survival (OS) and occurrence and management of grade 3 or 4 toxicities between groups. Toxicities were graded utilizing the Common Terminology Criteria for Adverse Events (CTCAE) version 4.0. Statistical analysis included descriptive statistics for patient demographics, Kaplan-Meier survival curves for survival analyses, and Chi-squared test for toxicity comparisons between groups. **Methods:** This was an institutional review board-approved retrospective cohort study. Inclusion criteria included patients 18-89 years old who received at least one dose of pazopanib for STS from June 2011 until July 2017. Data collected included: patient demographics, time of initiation of pazopanib to date of progression and/or death, use and indication of acid suppressive medications, duration of overlap of acid suppressive medications and pazopanib, grade 3 or 4 drug-related toxicities, and any dose reductions or hospitalizations during pazopanib therapy. **Results/Conclusions:**

The final results and conclusions of this study are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review primary literature evaluating the clinical impact of concomitant acid suppressive medications (ASM) and tyrosine kinase inhibitors in cancer patients

List management strategies for the pharmacokinetic drug interaction between pazopanib and acid suppressive medications

Self Assessment Questions:

Which of the following statements is true?

- A Overall survival was decreased in renal cell carcinoma patients wh
- B: Median progression free survival was decreased in non-small cell l
- C: Median progression free survival was increased in soft tissue sarco
- D: Overall survival was decreased in renal cell carcinoma patients wh

Possible strategies to manage the pharmacokinetic drug interaction between pazopanib and concomitant acid suppressive medications include:

- A Increase the dose of ASM
- B No drug interaction exists
- C Separate pazopanib by 2 hours before or 10 hours after an ASM
- D Increase dose of pazopanib

Q1 Answer: B Q2 Answer: C

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OPTIMIZATION OF PHARMACIST INTERVENTIONS WITH RAPID DIAGNOSTIC TESTING FOR BLOODSTREAM ASSOCIATED INFECTIONS

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Purpose: The purpose of this project is to evaluate whether increasing pharmacist antimicrobial stewardship intervention after receiving rapid diagnostic testing blood culture results will improve time to appropriate antibiotic selection and reduce unnecessary antibiotic therapy. The rapid diagnostic test used can identify 24 gram-positive, gram-negative, and yeast pathogens with a turnaround time of approximately two hours.

Methods: Antibiotic therapy was evaluated in 29 patients who were eligible from July 1-July 31, 2017. Patients were included if they had a positive blood culture with a pathogen identified by rapid diagnostic testing. Patients were excluded if death or transfer to another hospital occurred prior to receiving culture results. Following this review, a plan to optimize pharmacist intervention in appropriate antibiotic selection was implemented. This plan included creation of a protocol with antibiotic recommendations based on the organism identified and a process for communicating de-escalation recommendations to the physician. A post-intervention review will be conducted over a similar time frame and number of patients and compared to the pre-intervention group. Primary endpoints are time to de-escalation and appropriate antibiotic therapy. Secondary endpoints include length of stay, carbapenem days, piperacillin/tazobactam days, vancomycin days, and average antimicrobial pharmacy expense. Preliminary Results: Four of the organisms in the pre-intervention group were likely contaminants and removed from the analysis. Pharmacists made an antimicrobial stewardship recommendation in 7 patients (28%). Recommendations were accepted in 4 patients (16%). Piperacillin/tazobactam was used for an average of 4.2 days, carbapenems for 5.8 days, and vancomycin for 3.9 days. The average length of stay was 10.0 days, and death occurred in two patients. Conclusion: Preliminary results from the pre-intervention group showed opportunities to increase pharmacist intervention after receiving rapid diagnostic testing blood culture results. Impact of protocol implementation will be evaluated and presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review how organisms are identified by rapid diagnostic tests
List the potential benefits of pharmacist antimicrobial stewardship interventions based on rapid diagnostic testing

Self Assessment Questions:

Which of the following is true regarding the BioFire® blood culture identification panel?

- A Organisms are identified by multiplex PCR
- B: Susceptibilities are reported
- C: It cannot identify resistance genes
- D: Turn-around time is approximately 24 hours

Which of the following is a potential benefit of combining antimicrobial stewardship initiatives with rapid diagnostic testing?

- A Increased use of broad spectrum antibiotics
- B Faster identification of organism susceptibility
- C Faster de-escalation of broad spectrum antibiotics
- D Decreased laboratory costs compared to traditional microbiology

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-574-L01-P

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EVALUATION OF EPINEPHRINE AND VASOPRESSIN AS A SECOND LINE VASOPRESSOR IN SEPTIC SHOCK PATIENTS

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Purpose: The 2016 Surviving Sepsis Campaign (SSC) guidelines suggest vasopressin or epinephrine as a second-line vasopressor in septic shock patients. A retrospective evaluation of epinephrine and vasopressin as a second-line vasopressor in septic shock patients was completed in November 2017. A comparable number of patients in each treatment group achieved goal mean arterial pressure (MAP) at hours 4, 6, and 8. The use of epinephrine resulted in an increased number of arrhythmias. The purpose of this study is to assess the effectiveness of an updated sepsis protocol: using epinephrine as a second-line vasopressor in patients without tachyarrhythmias and vasopressin as a second-line vasopressor in patients with tachyarrhythmias. Methods: This is a single-center, observational study evaluating septic shock patients admitted to the medical intensive care unit (MICU) at Mount Sinai Hospital between December 2017 to March 2018. Inclusion criteria includes septic shock patients who received adequate fluid resuscitation and norepinephrine as their initial vasopressor in combination with either epinephrine or vasopressin as their second vasopressor. The following data will be collected from the electronic health record including demographics, comorbidities, APACHE II variables, hemodynamic variables, and metabolic variables. The primary outcome is the time to achieve goal MAP at hours 4, 6, and 8 after the addition of epinephrine in patients without tachyarrhythmias and vasopressin in patients with tachyarrhythmias. The secondary outcomes include incidence of arrhythmias, hydrocortisone use, duration of norepinephrine, mechanical ventilation requirement, length of ICU stay, mortality, and cost per patient admission. Final results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Select an optimal second-line vasopressor in septic shock patients with and without tachyarrhythmias
Identify the duration of norepinephrine prior to the addition of a second-line vasopressor in septic shock patients

Self Assessment Questions:

What is the target MAP in septic shock patients?

- A 55 mmHg
- B: 65 mmHg
- C: 75 mmHg
- D: 85 mmHg

When should hydrocortisone be added to therapy in septic shock patients?

- A In fluid-resistant shock only
- B In vasopressor-resistant shock only
- C In fluid-resistant and vasopressor-resistant shock
- D Never

Q1 Answer: B Q2 Answer: C

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IMPROVING CLINICAL PHARMACIST WORKFLOW THROUGH PHARMACY ELECTRONIC SURVEILLANCE SYSTEM (ECSS)

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Purpose: The purpose of this study is to assess the impact of an electronic clinical surveillance system (ECSS) on pharmacy interventions, documentation, and communication between pharmacists to improve workflow efficiency and continuity of care. Our hypothesis is that the ECSS will improve metrics of pharmacist efficiency and pharmacist documentation, including increasing the variety of intervention types. **Methods:** This is a prospective, pre- and post-intervention, observational study of pharmacists utilizing ECSS at St. Joseph Mercy Oakland hospital. Pre-intervention, an internal medicine pharmacist and a surgical critical care pharmacist were asked to record all time spent reviewing patients and documenting patient care interventions following the a paper-based consult documentation system for one week along with usual ECSS workflow. A job aid to utilize ECSS more efficiently and introduce paperless documentation was developed and followed during the post-intervention week. The primary endpoint of the study is the number of interventions documented per patient. The secondary endpoints include total time spent per patient, consult documentation time, number of alerts captured, and alert types before and after study implementation. Metrics were adjusted for patient volume to control for any volume change between week one and week two. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Discuss the use of eCSS to improve the quantity and efficiency of pharmacists' clinical interventions
Identify ECSS as a valuable tool to assist pharmacists in evaluating antimicrobial stewardship

Self Assessment Questions:

How can ECSS improve the efficiency of pharmacists' clinical interventions?

- A: ECSS does not improve patient care
- B: ECSS can prevent patient mortality
- C: ECSS can improve pharmacists' documentation
- D: ECSS does not affect pharmacists interventions

In a previous study of antimicrobial stewardship interventions involving ECSS, which outcome was shown:

- A: ECSS implementation can decrease antibiotic costs per patient day
- B: Antibiotic related interventions increased from 140 to 270 per day
- C: Pharmacists who utilize ECSS have a positive impact on antibiotic use
- D: All of the above

Q1 Answer: C Q2 Answer: D

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EVALUATION OF ASPIRIN VERSUS RIVAROXABAN FOR THE PREVENTION OF THROMBOEMBOLISM AFTER TOTAL JOINT REPLACEMENT

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Purpose: Postoperative venous thromboembolism is recognized as a potentially life-threatening complication of major orthopedic surgeries. Incidence of venographically proven deep vein thromboembolism following total joint arthroplasty is estimated to be 20 to 40 percent. While the need for thromboprophylaxis is established, current guidelines are not in agreement of the best modality. The primary objective of this study is to evaluate patient outcomes with aspirin versus rivaroxaban for the prevention of thromboembolism after total joint replacement. **Methods:** Data will be collected from randomly selected adults identified as having an elective total knee arthroplasty or an elective total hip arthroplasty who have received either aspirin 81 mg twice daily or rivaroxaban 10 mg once daily at this institution from July 2016 through August 2017 for the use of thromboprophylaxis. Those with chronic anticoagulation prior to surgery, emergent or partial orthopedic surgery, lack of documented aspirin/rivaroxaban start date, or inappropriate dosing per renal function will be excluded. A retrospective chart review using the electronic medical system will be conducted to obtain baseline patient data, the use of concurrent anticoagulation, history of thrombosis, history of malignancy, surgery type, thromboprophylaxis method, timing of first dose of thromboprophylaxis, length of hospitalization, bleeding incidence, thrombosis incidence, and readmission or death within 35 days. The primary outcome measure is incidence of thromboembolism or major bleeding at 35 days post operation. Major bleeding is defined as being associated with one of the following: death or life threatening bleeding event, bleeding confirmed as retroperitoneal, intracranial or intraocular, transfusion of more than two units of blood cells, or a decrease in hemoglobin of two or more grams per deciliter. Secondary outcome measures include readmission rate or death at 35 days post operation. Results: Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the pharmacologic differences between aspirin and rivaroxaban.
Discuss current evidence regarding choice of pharmacotherapy thromboembolism prophylaxis following total joint replacement

Self Assessment Questions:

What do the 2012 CHEST guidelines recommend as pharmacologic prophylaxis in preference to other agents?

- A: Aspirin
- B: Rivaroxaban
- C: Fondaparinux
- D: Low molecular weight heparin

Which of the following statements concerning the 2011 American Academy of Orthopedic Surgeons guidelines and the 2012 CHEST guidelines for the prevention of VTE in orthopedic surgery patients is true?

- A: Both guidelines recommend against the routine use of post-operative low molecular weight heparin
- B: Both guidelines list low molecular weight heparin as the preferred agent
- C: Both guidelines agree that those at risk for bleeding undergoing a total joint replacement should not receive thromboprophylaxis
- D: Both guidelines list 35 days of thromboprophylaxis as the standard of care

Q1 Answer: D Q2 Answer: A

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(if ACPE number listed above)

IMPACT OF COMMUNITY PHARMACY PRACTICE INTERVENTIONS ON MEDICATION NON-ADHERENCE: A RETROSPECTIVE ANALYSIS

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Purpose: To evaluate the efficacy of current community pharmacy interventions on medication non-adherence. **Methods:** Eligible patients are defined as taking at least one of the medication classes of interest based on the Centers for Medicare & Medicaid Services Star Ratings categories (non-insulin diabetic medications, renin-angiotensin-aldosterone system medications, and statin cholesterol medications). A stratified, random sample was taken from a report generated at the corporate level of the community pharmacy that contains prescription number, medication class, and store number. Patient demographic and insurance information was obtained via manual review of the pharmacy's electronic medical record. Study group 1 consists of patients enrolled in voice recording/text message reminder services. Study group 2 is also enrolled in one of the following: SyncScript, autofill, or 30-90 day supply conversion. The primary measurement for both groups is medication adherence, measured by PDC. The primary outcome of interest is the difference in PDC for each drug class for those enrolled in IVR/text messaging versus those also enrolled in auto-fill, SyncScript, or the 30-90 day conversion. The secondary outcomes of interest include the difference in PDC within each of the following categories: free versus paid medication fills, age group, total medications, and daily doses. Categorical data will be analyzed by frequency and means, whereas metric data will be analyzed by t-test. **Results:** (Data collection and analysis in progress) **Implications/Conclusions:** This study is expected to help identify which programs currently used in community pharmacy practice lead to highest adherence rates.

Learning Objectives:

Explain the differences between two different community pharmacy tools used to bolster medication adherence.

Identify an appropriate community pharmacy intervention, given a patient case.

Self Assessment Questions:

A 64 year old male gets his medications filled at your community pharmacy and would like to not have to come in so often. Which of the following interventions would be most appropriate to offer him?

- A: Enrollment in text message reminders
- B: Enrollment in medication synchronization
- C: Making his medications fill automatically
- D: No intervention needed at this time

What is the operational difference between automatic refill programs and medication synchronization programs?

- A: Automatic refill fills regardless of what day it is, synchronization fill
- B: Automatic refill fills them automatically all at the same time, synchron
- C: Synchronization fills all medications at the same time, but does not
- D: There is no significant difference between the two programs

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-799-L04-P

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

THE IMPACT OF RAPID GASTROINTESTINAL TESTING ON TIME TO APPROPRIATE ANTIBIOTIC SELECTION OR DE-ESCALATION

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Background: Diarrheal illness has been associated with 1.8 million hospitalizations, 3,100 deaths, 73 million physician consultations and six billion dollars lost in medical care and productivity annually. The misdiagnosis and mistreatment of diarrheal illness can lead to worsened illness, additional treatment side effects, antibiotic resistance and postinfectious sequelae. Causative organisms are often viruses or self-limiting bacterial pathogens where anti-infective treatment is not warranted. Prior to the advent of rapid diagnostic testing (RDT), pathogen identification modalities relied on multiple complex, time-consuming processes that lacked sensitivity and specificity and required up to seven days to result. Utilization of RDT decreases both preparation and resultant times and allow for identification of multiple organisms in a single test with specificity and sensitivity approximating 100%. Palos Health implemented RDT with a multiplex PCR FilmArray gastrointestinal panel that targets 22 pathogens with results within 3 hours of sample collection. The primary objective was to evaluate the time to appropriate treatment pre and post gastrointestinal RDT implementation. **Methods:** Patients with suspected gastrointestinal illness were identified per retrospective chart review pre and post RDT implementation. Data points included: stool diagnostic tests, time difference (hours) from specimen collection to result time, time (hours) to appropriate treatment from both specimen collection and result time and hospital length of stay (days). The definition of appropriate treatment was derived from the '2017 Infectious Diseases Society of America Clinical Practice Guidelines for the Diagnosis and Management of Infectious Diarrhea.' A paired t-test will be utilized to determine statistical difference amongst the two arms. Final results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the benefits associated with rapid diagnostic testing compared to conventional diagnostic methods (i.e. ova and parasite exam, stool culture, enzyme immunoassay).

List appropriate therapy options for the treatment of Shiga-toxin producing E. Coli, Campylobacter, Salmonella and Giardia infectious diarrhea while referring to 2017 IDSA Guidelines.

Self Assessment Questions:

Which of the following is a benefit associated with rapid diagnostic testing (RDT) compared to conventional methodologies?

- A: Decreased time difference from specimen collection and result
- B: Decreased sensitivity and specificity
- C: Limited number of identifiable pathogens
- D: Time consuming sample preparation

What is the first line treatment for a patient with Campylobacter infectious diarrhea?

- A: Ciprofloxacin
- B: Metronidazole
- C: Azithromycin
- D: Sulfamethoxazole/trimethoprim

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-577-L01-P

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

EVALUATION OF A NALOXONE INFUSION PROTOCOL FOR ADULT OPIOID OVERDOSE REVERSAL

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Purpose: This study will compare infusion times and length of stay before and after the implementation of a naloxone infusion protocol at a 391-bed community hospital. The goal of this project is to decrease the infusion time without increased incidence of adverse events by using a step-wise titration algorithm and to assess whether an institution based titration protocol will safely and efficiently wean patients off of a naloxone infusion quicker. **Methods:** This study has been granted Institutional Review Board approval. The electronic medical record system will identify adult patients who have been on a naloxone infusion in the previous 18 months. Data collection will include naloxone bolus dose needed for arousal, naloxone infusion dose, naloxone infusion duration, medication(s)/drug(s) ingested, self-reported pain, gender, age, and relevant vitals (O2 saturation, respiratory rate, ventilation status). After the protocol is implemented, data collection will be continued retrospectively for patients on a naloxone infusion. There will be a chart-review comparison on naloxone infusion duration pre- and post-protocol implementation. Results and conclusion: to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the pharmacokinetic properties of naloxone.

Explain the role and appropriate use of a continuous naloxone infusion in the management of an opioid overdose.

Self Assessment Questions:

What is the mechanism of action of naloxone?

- A Pure opioid antagonist that competes and displaces opioids at op
- B: Directly binds to opioids to prevent them from binding to the opioic
- C: Pure opioid agonist that competes and displaces opioids at opioid
- D: Directly binds to opioids and eliminates them through renal excreti

In which of the following situations would a continuous naloxone infusior be appropriate?

- A An opioid overdose with co-ingestion of benzodiazepines
- B A patient who did not respond to initial naloxone bolus administrati
- C A patient who requires multiple naloxone bolus administrations to
- D A patient who is experiencing opioid withdrawals

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-578-L01-P

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

CREATION OF AN INTERDISCIPLINARY THERAPEUTIC DRUG MONITORING PROGRAM FOR TUMOR NECROSIS FACTOR-ALPHA INHIBITORS USED IN INFLAMMATORY BOWEL DISEASE.

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Background: Empiric dose adjustments of tumor necrosis factor (TNF)-alpha inhibitors in inflammatory bowel disease (IBD) have traditionally been the standard of care for patients who lose response to treatment. However, because loss of response can be mediated by several different mechanisms, therapeutic drug monitoring can help direct whether a dose escalation may be indicated, or whether switching to another drug, or even drug class, may be warranted. UW Health currently does not have a guideline for the therapeutic drug monitoring of TNF-alpha inhibitors. The current process is therefore variable and provider-specific, with pharmacists playing a peripheral role.

Purpose: The purpose of this project is to optimize the value obtained from TNF-alpha inhibitors in IBD by creating an interdisciplinary program for therapeutic drug monitoring of these agents in this patient population. **Methods:** A workgroup of pharmacists from the inpatient, clinic, and infusion center settings was first established. Objectives of this workgroup include: the creation of a clinical practice guideline and electronic health record tools to optimize the evidence-based ordering and interpretation of TNF-alpha inhibitor labs and subsequent dose adjustments; the development of workflows for the ordering, fiscal screening, prior authorization, sample collection, sample resulting, and interpretation of labs for therapeutic drug monitoring of these agents. These workflows will then be piloted in patients with IBD who are seen at the UW Digestive Health Center and are currently on infliximab therapy. Process and outcomes measures for implemented workflows, including interdisciplinary satisfaction with the workflows, number of patients impacted, adherence to clinical practice guideline, and cost impacts of the program, will then be assessed. **Preliminary Results:** Not available at abstract deadline. **Conclusions:** Not available at abstract deadline.

Learning Objectives:

Discuss the place in therapy of reactive therapeutic drug monitoring for TNF-alpha inhibitor therapy

Describe the key steps involved in the implementation of a comprehensive process for the interdisciplinary therapeutic drug monitoring of TNF-alpha inhibitors at UW Health

Self Assessment Questions:

In which of the following cases would dose escalation of infliximab be an appropriate treatment option?

- A Subtherapeutic infliximab concentrations, high detectable neutraliz
- B: Subtherapeutic infliximab concentrations, undetectable neutralizing
- C: Therapeutic infliximab concentrations, undetectable neutralizing ar
- D: Therapeutic infliximab concentrations, high detectable neutralizing

The UW Health workflows implemented through this project affect which patient population?

- A IBD patients on a TNF-alpha inhibitor who have not yet exhibited a
- B IBD patients who have failed TNF-alpha inhibitors and are currentl
- C IBD patients who exhibit subjective or objective signs of TNF-alpha
- D IBD patients who are currently TNF-alpha inhibitor-naïve

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-579-L01-P

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

IMPLEMENTING MEDICATION MANAGEMENT ALGORITHMS FOR DEEP VEIN THROMBOSIS PROPHYLAXIS AND PAIN/INFLAMMATION TREATMENT AFTER ORTHOPEDIC SURGERY FOR TOTAL KNEE AND HIP REPLACEMENTS.

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The purpose of this project was to ensure appropriate and safe medication therapy after knee or hip replacement for deep vein thrombosis (DVT) prophylaxis and pain/inflammation treatment. A past medical history checklist and flowsheet for DVT prevention and pain/inflammation were created by the pharmacy team and approved by orthopedic surgeon and staff, hospitalists, cardiology, and nephrology to serve as a guide for optimal medication therapy management in the perioperative period. The information collected on the checklist and the flowsheet were incorporated into the hospital's electronic medical record to provide smoother transitions of care. Before implementation of these new protocols, the orthopedic surgeon primarily used warfarin for DVT prevention and opioids for pain treatment in the post-operative period. The goal of this quality improvement project was to reduce the number of patients treated with warfarin after surgery and to reduce opioid administration during hospital admission. From August 1, 2017 to November 30, 2017, 31% of procedures were hip replacements and 69% of procedures were knee replacements. Prior to intervention 98% of patients were placed on warfarin for DVT prophylaxis and only one of those patients visited the ER post surgery, which was due to acute blood loss anemia. An opioid was administered to 96% of patients on post operation day 1 and 98% of patients were discharged from the hospital with a prescription for an opioid. The primary outcome for this study is reduction in patients treated with warfarin after surgery for DVT prophylaxis. Secondary outcomes included correct utilization of the DVT prevention treatment algorithm, correct utilization of pain/inflammation algorithm, reduction in administration in opioid(s) to patient post-operative day one, reduction in intravenous administration of an opioid, correct stop date of DVT treatment, number of emergency room visits or hospitalizations due to thromboembolic or bleeding complications, and overall adverse events.

Learning Objectives:

Identify appropriate medication therapy treatment options for DVT prophylaxis in the perioperative period for knee and hip replacements based on patient risk factors.

Reproduce a flowsheet to be utilized by health systems to improve transitions of care between pre and post operative periods for knee and hip replacements.

Self Assessment Questions:

When is warfarin a more appropriate DVT prophylaxis treatment than aspirin after knee or hip surgery?

- A: The patient's past medical history includes diabetes, hypertension
- B: The patient experienced a pulmonary embolism in 2013
- C: The patient has a history of GERD
- D: The patient was on clopidogrel prior to surgery

Which of the following could be a major adverse effect of using celecoxib as an agent to reduce pain and inflammation?

- A: Gastrointestinal bleeding
- B: Seizures
- C: Diarrhea
- D: Headache

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-886-L05-P

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

BUSINESS CASE FOR A 503B OUTSOURCING FACILITY IN A MULTISTATE HEALTH SYSTEM

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Health systems and their pharmacy operations are rapidly changing in response to factors such as reimbursement, product availability and the ever changing regulatory environment. With increasing necessity, health-systems are being forced to be more nimble while also being conscious in supplying pharmaceuticals to patients. Compounding completed in Cleveland Clinic (CC) Pharmacy falls under Section 503A of the Food, Drug, and Cosmetic Act. This requires compounding be pursuant to a prescription for a specific patient. Section 503B of the Food, Drug and Cosmetic Act allows a compounding facility to register with the FDA as an outsourcer. Such facilities are subject to FDA inspection and must comply with cGMP but may sell or distribute compounded products to pharmacies or physicians' offices without a patient-specific prescription. Due to current 503A designation, CC Pharmacy is not able to provide all needed compounded products to all facilities while maintaining regulatory compliance. Creation of a 503B facility allows for regulatory compliance while ensuring caregivers have the medications needed to care for patients at all times. Cleveland Clinic Centralized Medication Compounding Facility (CMCF) is a proposed 503b facility that will standardize and expand the services currently provided through the CC pharmacy. The central fill pharmacy will compound and stock a dedicated list of sterile and non-sterile products for use by the four ambulatory surgery centers, nine NE Ohio hospital pharmacies, eighteen family health centers, and over seventy outpatient physician practices. Additionally, the facility will allow CC to respond to product shortages, a critical necessity in the current environment. Centralized batch compounding will eliminate, or significantly reduce, the need to outsource compounding while providing needed products throughout the health system.

Learning Objectives:

Define a 503b facility.

Identify barriers to creation and health system benefits of a 503b facility.

Self Assessment Questions:

A 503b facility:

- A: Is also known as an outsourcing facility
- B: Is governed by the DEA
- C: Has rules for implementation that are in FINAL form
- D: Is held to USP 797 standards

Health-system benefits to creation of a 503b facility are:

- A: Low cost to implementation
- B: Regulations that are easy to follow and maintain
- C: Ability to provide medications in times of shortage through the system
- D: Ability to provide patient specific compounded medications through the system

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-915-L07-P

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

EVALUATION OF THE EFFICACY OF AN UNFRACTIONATED HEPARIN DOSING PROTOCOL IN ACHIEVING GOAL RANGE APTT IN AN OBESE PATIENT POPULATION IN A COMMUNITY HOSPITAL SETTING

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Purpose: Unfractionated heparin is a well-established early treatment option in patients who have experienced a venous thromboembolism (VTE) or acute myocardial infarction (AMI). A dosing strategy that achieves timely therapeutic aPTTs is necessary to reach goal clinical outcomes in this patient population. However, questions regarding proper dosing strategies in the obese population still remain. The primary objective of the study is to evaluate the efficacy of the current heparin dosing protocol, at a community based hospital, by analyzing time to therapeutic aPTT in the obese compared to non-obese baseline populations. **Methods:** Data was collected from randomly selected adult inpatients identified as receiving intravenous unfractionated heparin for at least 24 hours at this institution from January, 2017 through June 2017. A retrospective chart review was conducted to obtain baseline patient demographic information, indication for heparin, appropriateness of protocol ordered, adherence to ordered protocol, and time to therapeutic aPTT in both the obese (having a BMI > 30) and non-obese (having a BMI < 30) patient populations. The primary outcome measure is time to achievement of therapeutic aPTT. Secondary outcome measures include adherence to protocol including initial dose and subsequent adjustments by nursing, as well as safety outcomes including bleeding and recurrent embolism were also collected. **Results/Conclusion:** Results and conclusion will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify factors that influence an unfractionated heparin dosing protocol in achieving goal range aPTTs in an obese patient population in a community hospital setting

Discuss factors that predict the efficacy of an unfractionated heparin dosing protocol in achieving goal range aPTTs

Self Assessment Questions:

Which of the following factors was determined to significantly affect achieving therapeutic aPTT using an unfractionated heparin dosing protocol?

- A Age
- B: Bmi
- C: Appropriate administration
- D: Appropriate initial bolus

Which of the following are significant predictors of a heparin drip achieving a time to therapeutic aPTT in patients with BMI > 30?

- A Weight & Initial Rate
- B Age & Sex
- C Initial Bolus & Initial Rate
- D BMI & Age

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-580-L01-P

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

HOSPITALIZATION AMONG PATIENTS RECEIVING IMMUNE CHECKPOINT INHIBITORS IN A COMMUNITY SETTING

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Purpose: As immune checkpoint inhibitors continue to gain approval and expand to new indications, it is important to understand the impact their increasing use has on patient outcomes. This study will add to current literature by presenting a specific analysis of emergency medical care in patients receiving immune checkpoint inhibitors, focusing on identifying highest-risk populations and preventable causes of admission. The primary outcome was to assess the reasons and risk factors for an emergency department visit or hospital admission in patients who receive immune checkpoint inhibitors. Secondary outcomes included identifying the frequency of suspected or confirmed immune related adverse events, types of immune related adverse events, number of preventable admissions, duration of cancer immunotherapy prior to admission, and average length of stay. **Methods:** This study was a retrospective, multi-center, chart review of patients seen in the emergency department or hospitalized after receiving an immune checkpoint inhibitor. The population included patients age 18 and above who received at least one dose ipilimumab, nivolumab, pembrolizumab, atezolizumab, avelumab, or durvalumab at a network facility and had a documented emergency department visit or direct admission within one year following the first documented administration. Patients were excluded if immunotherapy was initiated at an outside hospital or if admitted for a reason other than cancer or a chronic medical condition (e.g. trauma or elective procedures). Data were analyzed in SPSS v. 25.0 with $\alpha=0.05$ set for statistical significance. Descriptive statistics were performed for all variables collected in this study and to fulfill the primary and secondary outcomes. Results and conclusions are pending and will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the most common causes for initial hospital admissions among patients receiving immune checkpoint inhibitors.

Describe the incidence of confirmed or suspected immune related adverse events among patients receiving immune checkpoint inhibitors.

Self Assessment Questions:

Which of the following were the top 3 causes of initial hospitalization for patients receiving immune checkpoint inhibitors observed in the study?

- A Cellulitis, COPD exacerbation, pain
- B: Acute kidney injury, sepsis, anemia
- C: Shortness of breath, pain, pneumonia
- D: Pneumonia, anemia, COPD exacerbation

What was the incidence of confirmed or suspected immune related adverse events across all admissions in the study population?

- A 5%
- B 15%
- C 45%
- D 60%

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-581-L01-P

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

DEVELOPMENT AND IMPLEMENTATION OF AN INPATIENT PHARMACIST PAIN MANAGEMENT CONSULT SERVICE

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Purpose: Pain affects more than fifteen percent of Americans. Effective pain management is essential because of its impact on quality patient care and medication safety. Our institution's Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores for pain management indicate that current processes can be improved. The purpose of my study is to describe the development and implementation of an inpatient pharmacist pain management consult service and to evaluate the impact of this service on improvement in patient pain satisfaction scores as well as improvement in patient safety.

Methods: Pain management protocols were developed and approved through the pharmacy and therapeutics (P&T) committee to manage the following pain syndromes: abdominal, neuropathic, sickle cell, lower back, migraine, and post-operative pain. Pharmacists received education on pain management and assessment. Physicians were then able to consult pharmacy to manage these pain syndromes per protocol. Outcomes were measured by the change in HCAHPS scores, the percentage of consult patients that demonstrated an improvement in pain scores and change in opioid-related adverse event rates. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the services provided by the pharmacist in this pain management consult service.

Describe common obstacles encountered in the implementation of an inpatient pharmacist pain management consult service.

Self Assessment Questions:

What is a major target intervention for pharmacists consulted to manage pain?

- A Patient-specific optimization of drug therapy
- B: Utilization of only opioid pain medications
- C: Identifying patients who would benefit from surgery
- D: Weaning or stopping all pain medications

Which of the following is a common obstacle encountered in the implementation of an inpatient pharmacist pain management consult service?

- A Pharmacist comfort in managing opioids and pain-related therapies
- B Obtaining physician buy-in
- C Lack of patients who would benefit from pain management service
- D A and B

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-887-L05-P

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

PRELIMINARY RESULTS OF A PRECONCEPTION CARE NEEDS ASSESSMENT OF FEMALE PATIENTS OF CHILDBEARING AGE FROM AN URBAN, COMMUNITY PHARMACY

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Preconception care is a set of interventions to identify and modify biomedical, behavioral, and social risks to a woman's health or future pregnancy outcomes through prevention and management. Community pharmacists are well-positioned to provide services to support preconception care. The primary objective of this study was to perform a needs assessment using evidence-based core indicators to describe specific preconception care needs among female ambulatory patients of an urban, Midwestern community pharmacy. Specific preconception care needs identified in this population may help to guide development of strategies to address these needs through medication therapy management (MTM) interventions. Women of childbearing age, 18 to 45 years, who collected a prescription between December 1, 2017 and January 31, 2018, received a paper survey, either in English or Spanish, containing questions about patient demographics, health status, and pregnancy considerations. Upon completion of the survey, patient medication history data was retrospectively gathered from the medication profile. Reports of de-identified, aggregate patient data from the survey and chart review will be generated and used to determine the current preconception care needs for women at this location and differences in needs based on patient demographics. This study was reviewed and approved by the Ferris State University and the Ohio Northern University Institutional Review Boards. As of February 1, 2018, 110 surveys were completed. Data analysis is ongoing. The median age was 30 (18-44) years, 79.8% of patients had an abnormal BMI (71/89), 12.8% reported untreated/under-treated depression (12/94), 78.8% were missing one or more recommended vaccinations (78/99), 66.7% were not taking a multivitamin (66/99), 75.8% were not on folic acid supplementation (75/99), and 49.5% were utilizing at least one potentially teratogenic medication (49/99). These preliminary results indicate multiple preconception care needs among women of childbearing age which may be met by pharmacists within the community pharmacy setting.

Learning Objectives:

Explain the need for preconception care services within the community pharmacy setting.

Identify preconception care parameters that can be addressed within the community pharmacy setting.

Self Assessment Questions:

Which statement about preconception care is most correct?

- A Preconception care refers to the care that only women should receive
- B: Preconception care should only be initiated when the patient becomes pregnant
- C: About half of all pregnancies in the United States are unplanned.
- D: Pharmacists are unable to make an impact on patients' preconception care

Which statement about preconception care parameters is correct?

- A All women of childbearing age should receive 800 mcg of folic acid
- B Depression status is identifiable in the community pharmacy setting
- C Vaccination status has no effect on preconception care outcomes.
- D Most women of childbearing age do not take teratogenic medications

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-800-L04-P

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

IMMUNE CHECKPOINT INHIBITORS: EXPANSION OF PHARMACY SERVICES TO OPTIMIZE RECOGNITION AND MANAGEMENT OF IMMUNE-RELATED ADVERSE EVENTS

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Immune checkpoint inhibitors (ICPIs) are a novel class of agents approved for the treatment of various malignancies and act by indirectly mediating T-cell immune responses against tumors. These agents have a unique side effect profile. The most common ICPI toxicities, known as immune-related adverse events (irAEs), are rash, diarrhea, endocrinopathies, and hepatotoxicity. Early identification and appropriate and timely treatment of grade 1 and 2 irAEs prevent severe and life-threatening toxicities. The purpose of this project is to optimize the management of ICPI toxicities to enhance patient safety and improve patient outcomes. Objectives are to create an institutional guideline to assist in the management of irAEs, design a pharmacist-driven workflow to standardize the management of ICPI toxicities, implement a pilot of the proposed workflow, and evaluate patient outcomes. The pharmacist-driven workflow includes initial and follow-up encounters for patients on ICPIs. Encounter checklists and standard documentation templates were created for pharmacists. The initial encounter workflow includes a prospective chart review and education regarding the spectrum of ICPI toxicities. Patients will be provided wallet cards describing toxicities and when to call the clinic for symptoms. Follow-up encounters will be completed with patients via telephone calls periodically during ICPI treatment for continued patient education and monitoring. Patient symptoms will be shared with the provider and treatment of irAEs will be a collaborative effort between the pharmacist and provider. The proposed workflow will continue to be refined to maximize expansion to other clinics as ICPIs are used in other disease states. The project will result in a pharmacist-driven workflow and institutional guideline to optimize the management of irAEs. Potential outcomes of this project include decreased rate of grade 3 and 4 toxicities. A pharmacist-driven workflow to provide patient education and follow-up monitoring for patients on ICPIs promotes early identification and appropriate treatment of irAEs.

Learning Objectives:

Describe the mechanism of action, indications, toxicities, and toxicity management of immune checkpoint inhibitors

Discuss a pharmacist-driven workflow to optimize management of immune checkpoint inhibitor toxicities

Self Assessment Questions:

Which of the following is a common toxicity caused by immune checkpoint inhibitors?

- A: Rash
- B: Hepatotoxicity
- C: Diarrhea
- D: All of the above

Which of the following is true regarding the management of immune checkpoint inhibitor toxicities?

- A: Steroids are used as frontline treatment for severe toxicity
- B: Dose reductions are always required for any toxicity grade ≥ 1
- C: Extending dosing frequency is required for any toxicity grade ≥ 1
- D: Immune checkpoint inhibitors should be permanently discontinued

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-801-L01-P

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

EVALUATION OF THE SAFETY AND EFFICACY OF LORAZEPAM CONTINUOUS INFUSION IN ALCOHOL WITHDRAWAL MANAGEMENT

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Purpose: Alcohol withdrawal is a syndrome of physiologic and neurologic complications that results upon abrupt discontinuation of chronic alcohol use and can lead to significant morbidity and mortality if left untreated. Eskenazi Health has adopted a protocol to standardize the assessment and management of patients at risk for alcohol withdrawal. Patient symptoms are evaluated utilizing the abbreviated Clinical Institute Withdrawal Assessment (CIWA-Ar). The CIWA-Ar scores determine symptom severity, assess response to therapy, and guide medication management, including when escalation to a continuous infusion benzodiazepine may be required. Though previous literature has solidified the benefits of benzodiazepine therapy in alcohol withdrawal syndrome, there is limited data on the use of continuous infusion dosing of benzodiazepines in this patient population. The objective of this study is to evaluate the safety and efficacy of lorazepam continuous infusion in alcohol withdrawal management. **Methods:** This is a retrospective observational study of patients receiving lorazepam continuous infusion between October 1, 2016 and September 22, 2017 for the management of severe alcohol withdrawal. Two hundred forty-nine patients were screened for eligibility, and all included patients received treatment based on an established, institution-specific protocol. The primary outcome is a composite endpoint of protocol failure, defined as the incidence of endotracheal intubation, seizure, or the addition of supplemental medication(s) for alcohol withdrawal symptoms after lorazepam continuous infusion initiation. Secondary efficacy outcomes include each individual component of the composite endpoint, CIWA-Ar score at time of infusion initiation, duration of infusion, cumulative lorazepam infusion dose, and hospital length of stay. Secondary safety outcomes include incidence of adverse events, flumazenil administration, and mortality. **Preliminary Results/Conclusions:** Data collection is currently ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify severe complications associated with alcohol withdrawal

Discuss current gaps in the literature regarding the use of continuous infusion benzodiazepines in alcohol withdrawal

Self Assessment Questions:

Which of the following is a severe complication associated with alcohol withdrawal?

- A: Agitation
- B: Hypotension
- C: Seizures
- D: Headache

Which of the following areas is lacking in current research on the use of continuous infusion benzodiazepines in alcohol withdrawal?

- A: Assessment of treatment based on standardized protocols
- B: Evaluation of ICU patients
- C: Single-center studies
- D: Safety outcomes data

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-582-L01-P

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

IMPLEMENTATION OF CLINICAL DECISION SUPPORT FOR OUTPATIENT OPIOID PRESCRIBING

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Purpose: The abuse and misuse of prescription opioid analgesics has been identified by the Centers for Disease Control and Prevention (CDC) as a rapidly growing public health crisis. Various strategies, including increased naloxone prescribing, the use of treatment agreements, have been adopted by healthcare organizations in an effort to minimize the considerable risks of chronic opioid therapy. The objective of this project is to support ambulatory providers prescribing opioid analgesics for patients with chronic, non-cancer pain by implementing a foundational structure for calculating daily morphine equivalency. This critical information will be made available to ordering providers in multiple locations in the patient's electronic health record (EHR). A clinical decision support tool displays the morphine equivalent daily dose (MEDD) at the point of order entry and alerts prescribers if the MEDD exceeds a pre-determined threshold. **Methods:** A taskforce including physician stakeholders, pharmacist clinical specialists and health information technology analysts was assembled to evaluate a morphine equivalency tool available from the EHR vendor. Pharmacists and physicians experienced with treating chronic pain assessed the foundational structure for calculating morphine equivalency. The parameters for a dosing threshold alert were customized to the needs of ambulatory physicians in this health system. The capabilities and limitations of the calculator and alert were demonstrated to the committee that approves clinical decision support tools and adjustments were made based on their feedback. Training materials were prepared and disseminated prior to implementation. Relevant prescribing data was collected for the two-month periods pre- and post- implementation for comparison. The results of the data analysis will be shared with stakeholder taskforce. **Results/Conclusions:** The results and conclusions of this ongoing project will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe various strategies used by healthcare organizations to promote safe opioid use and reduce the rates of opioid abuse and misuse
Outline the process for implementing a morphine equivalency calculator and dosing threshold alert within the electronic health record

Self Assessment Questions:

What are the dosing thresholds recommended by the Centers for Disease Control and Prevention's 2016 chronic pain guidelines?

- A: Prescribers should use caution when prescribing doses ≥ 20 mg o
- B: Prescribers should use caution when prescribing doses ≥ 50 mg o
- C: Prescribers should use caution when prescribing doses ≥ 90 mg o
- D: Since patients develop tolerances to high opioid doses, there are i

Which of the following is an important limitation to inform prescribers about when implementing a morphine equivalency calculation tool?

- A: The morphine equivalency of transdermal delivery systems such as
- B: Patients may not be taking their opioids as prescribed, so calculat
- C: Since the calculator takes cross-tolerance into account, the morp
- D: The morphine equivalency tool provides helpful information, but th

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-583-L01-P

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

DEVELOPMENT AND IMPLEMENTATION OF MEDS-TO-BEDS SERVICE AT ST. VINCENT HOSPITAL INDIANAPOLIS

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Purpose: Over recent years, hospital readmissions have been on the rise. Several risk factors have been associated with a heightened likelihood of hospital readmission including patient-specific factors, quality of inpatient care, and most importantly the quality and adequacy of discharge planning and follow-up care. Outpatient pharmacies located within hospitals can be utilized to enhance the discharge process by ensuring that patients leave the hospital with all discharge medications in-hand and receive adequate education ensuring safe and proper use of medications. The purpose of this study was to describe the impact of the newly implemented Meds-to-Beds service at St. Vincent Hospital Indianapolis. The primary objective was to determine the quantity and type of interventions per prescription volume made by the Meds-to-Beds pharmacist on discharge medications. Secondary outcome measures included determining turn-around time defined as the median time from when discharge prescriptions are received by the pharmacy to time of medication delivery, 30-day readmission rates for Meds-to-Beds service participants compared to nonparticipants, and pharmacists' interventions stratified by patient characteristics. Patient characteristics included sex, age, total number of chronic comorbidities, types of chronic comorbidities, third party insurance, primary diagnosis at discharge, and hospital discharge unit. **Methods:** This project was retrospective database review across various medical units, including general medical, surgery, medical psychiatry, cardiac, and oncology at St. Vincent Hospital Indianapolis, evaluating inpatient visits between August 24, 2017 and December 31, 2017. Adult patients 18 years and older who were discharged to home were included in the study. Patients who were not discharged on any medications, or were discharged to a nursing home, or long-term care facility were excluded from the study. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the prevalence, severity, and consequences of drug-related problems post-hospitalization based on current literature
Describe the St. Vincent Hospital Indianapolis Meds-to-Beds service process

Self Assessment Questions:

Which of the following statements is correct?

- A: Approximately 1.5 million preventable adverse drug events occur a
- B: Adverse drug events does not account for a large number of emer
- C: All hospital-related medication errors are attributed to poor commu
- D: The Hospital Readmission Reduction Program is established to in

Which of the following is LEAST appropriate based on the St. Vincent Hospital Indianapolis Meds-to-Beds process?

- A: Offering participation to the patient by the social worker
- B: Notifying the nurse of the patient's ineligibility to participate based
- C: E-prescribing discharge prescriptions to the St. Vincent Pharmacy
- D: Documenting the encounter details in the patient's electronic medi

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-802-L04-P

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

BREAKTHROUGH NAUSEA AND VOMITING IN MODERATE EMETOGENIC RISK, OXALIPLATIN BASED, CHEMOTHERAPY REGIMENS: A RETROSPECTIVE CHART REVIEW

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Purpose: National Comprehensive Cancer Network (NCCN), the Multinational Association for Supportive Care in Cancer (MASCC), and the Oncology Nursing Society (ONS) each provide guidelines for prevention and treatment of chemotherapy induced nausea and vomiting (CINV). Traditionally, oxaliplatin and carboplatin have been classified as moderate emetic risk agents, based on the acute risk of CINV. However based on a study by Hesketh and colleagues, the 2017 NCCN guidelines includes carboplatin as a highly emetogenic chemotherapy agent due to the risk of delayed N/V. Considering this finding, it is hypothesized that oxaliplatin based regimens are also highly emetogenic. **Methods:** This study is a randomized, retrospective cohort study conducted at two locations within a single health system. Patients receiving a NCCN-designated moderate emetic risk regimen with oxaliplatin between July 1, 2016 and September 1, 2017 were included. Patients are evaluated based on the presence of breakthrough nausea and vomiting secondary to chemotherapy. The primary outcome is to identify the failure rate of moderate-risk antiemetic prophylaxis regimens in patients receiving moderate emetogenic risk, oxaliplatin based, chemotherapy regimens. Failure is defined by the addition of antiemetics for nausea/vomiting, unexpected clinic and/or emergency room visit for nausea, hospital admission, and/or increase in dose of antiemetics. Secondary outcomes include comparison of CINV risk in patients treated on NCCN protocols versus other available antiemetic guidelines (ONS and MASCC guidelines) and the overall cost of admission and additional pharmacotherapy of inadequately treated CINV to the two study sites. Statistics will be performed as appropriate, using descriptive statistics of a chi-square analysis for nominal data and continuous variables analyzed using an ANOVA; with confounders accounted for using a logistical regression analysis. **Results/Conclusion:** 88 patients were included with 58.6% males and an average age of 61.9 years. Full results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the classifications of chemotherapy induced nausea and vomiting (CINV).

Review current NCCN supportive care guidelines for CINV.

Self Assessment Questions:

CINV that occurs 3 days after treatment without any prophylactic antiemetics may be classified as which of the following types of CINV?

- A Anticipatory
- B: Delayed
- C: Acute
- D: Breakthrough

RJ is a 53 year old female with past medical history significant for hypertension, anemia, and stage IV colon cancer. She presents to the outpatient oncology clinic for her first cycle of FOLFOX. Per

- A 0
- B 1
- C 2
- D 3

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-584-L01-P

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

INFORMATION OVERLOAD: USING SMART PUMP REPORTING TOOLS TO DEVELOP KEY PERFORMANCE INDICATORS

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Purpose: Smart pump technology allows for implementation of highly customized medication libraries and provides detailed information regarding each infused medication and intravenous fluid. This information can be used to examine trends and assist in drug library optimization. When smart pumps have the ability to interface with the electronic medical record (EMR) through interoperability, additional data are available for interpretation. Despite the abundance of accessible smart pump data, standardized metrics and strategies for evaluating this information are not defined by patient safety or informatics organizations. Froedtert Hospital has four data analytics tools that provide extensive information about smart pump utilization and medication administration; however, there is not a standardized approach to when and how each tool is used. Current metrics are assessed on an ad hoc basis by a team of nursing and pharmacy staff. **Methods:** This is a quasi-experimental study with a primary outcome of reducing the number of near miss events related to smart pump programming. The process of identifying and describing near miss events focused on the top 10 medications implicated in near miss event reports from April 2017 to September 2017. A risk matrix will be used to categorize the top 10 identified medications to determine what medications or workflows require further intervention. The impact of the intervention(s) will be measured. For this study, near misses are defined as differences in medication, dose, rate, concentration, or patient weight. **Summary of results:** Pre-intervention: An evaluation of 291,503 infusions found the top 10 drugs implicated in smart pump-related near miss events were: potassium chloride (27%), sodium chloride 0.9% (25%), magnesium sulfate (10%), propofol (10%), lactated ringers (8%), albumin (5%), ondansetron (5%), fentanyl (5%), and heparin (5%). Post-intervention: In progress

Learning Objectives:

Define near miss related to smart pump interoperability

Identify key performance indicators that can be used to optimize smart pump use

Self Assessment Questions:

Which of the following is most likely to be captured as a near miss error identified through smart pump interoperability reports?

- A Blacklisted medications
- B: Medications administered during a code
- C: Difference in medication rate
- D: Medications administered in a procedural area

2. Which of the following key performance indicators could be a confounding factor in the implementation of changes made to smart pumps or workflows?

- A Frequency of soft alerts
- B Time to device data set update
- C Frequency of hard alerts
- D Time to clinical advisory override

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-803-L04-P

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

EVALUATION OF GASTROINTESTINAL BLEEDS IN LEFT VENTRICULAR ASSIST DEVICE PATIENTS RECEIVING PHOSPHODIESTERASE 5 INHIBITORS

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Introduction: Advances in medical therapy are now allowing patients to survive into the later stages of heart failure. This leads to an imbalance in the supply and demand of hearts available for transplantation so patients and providers are turning to other options such as a left ventricular assist device (LVAD) implantation. This study aims to determine whether the use of phosphodiesterase 5 (PDE-5) inhibitors to reduce the occurrence of right sided heart failure in patients post-LVAD implantation is associated with an increased risk of gastrointestinal (GI) bleeds. **Methods:** This study is a single-center retrospective chart review conducted at Advocate Christ Medical Center. The trial included 319 patients implanted between 2012 and 2017 with a HeartMate II, HeartMate III, or HeartWare LVAD for a minimum of 6 months. It compared patients taking PDE-5 inhibitors with the purpose of preventing right sided heart failure secondary to the LVAD to those patients not taking a PDE-5 inhibitor. The occurrence of GI bleeding was assessed based on records of patients kept by the LVAD clinic as well as admitting diagnoses of bleeds that meet INTERMACS criteria. Included patients were also compared for the secondary outcomes including epistaxis, intracranial hemorrhage, and all-cause mortality. **Results:** Preliminary results demonstrate that the 119 patients who received PDE-5 inhibitors had an occurrence rate of GI bleeds of 45.4% compared to 38.7% of the 199 patients who did not receive the medication ($p=0.253$). **Conclusion:** The use of PDE-5 inhibitors is becoming more common in LVAD patients to prevent right sided heart failure despite limited evidence on potential adverse effects. In the population examined in the study, the use of PDE-5 inhibitors did not lead to a statistically significant increased risk of GI bleeds; however the numerically increased risk observed in patients taking a PDE-5 inhibitor warrants further investigation.

Learning Objectives:

Identify common potential adverse effects seen after implantation of a LVAD.

Recognize the role of PDE-5 inhibitors in patients with LVAD implantations.

Self Assessment Questions:

Which of the following is/are common associated adverse effect(s) of a LVAD implant?

- A: Infection
- B: GI bleeding
- C: Right sided heart failure
- D: All of the above

The use of a PDE-5 inhibitor in a patient with an LVAD may help reduce the risk of which complication associated with LVAD implants?

- A: Hypertension
- B: Right sided heart failure
- C: Pump thrombosis
- D: GI bleed

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-888-L05-P

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

IDENTIFYING CLINICAL PREDICTORS OF SWITCHING FROM DIRECT ORAL ANTICOAGULANTS TO WARFARIN

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Purpose: Current knowledge about choice of anticoagulation for the management of atrial fibrillation (AF) or venous thromboembolism (VTE) is mainly derived from studies done in populations initiating anticoagulation therapy. Little is known regarding the patient population who have switched from a direct oral anticoagulant (DOAC) to warfarin. The objective of this study is to describe and identify clinical predictors which may influence a patient's likelihood of switching from a DOAC to warfarin for the treatment of AF or VTE within our institution. **Methods:** This is a single-center, retrospective, Institutional Review Board approved, cohort study. A nested case-control will be used to identify clinical predictors of switching from a DOAC to warfarin. Patients newly prescribed a DOAC from 2014 to 2017 will be screened for inclusion and exclusion criteria. Patients switched from a DOAC to warfarin will be defined as the "switch" group and control patients will be those who remained on a DOAC. The following baseline data will be collected: patient age, gender, ethnicity, height, weight, serum creatinine, and Child Pugh score. Other variables of interest include indication for anticoagulation with CHA2DS2VASc score if applicable, number of medications at baseline, history of valve replacement, comorbid conditions as measured by the Charlson comorbidity index, specialty of prescribing provider, and any procedures completed during the defined data collection timeline. Baseline demographics will be compared between the "switch" and control group using descriptive statistics. Chi-squared and Fisher's Exact test will be used to assess categorical variables, while Mann-Whitney U test will compare continuous variables. Independent predictors of switching from a DOAC to warfarin will be analyzed in a logistic regression model by selecting clinically relevant variables from bivariate analysis. **Results:** Data is currently being collected and analyzed. **Conclusions:** Final results and conclusion will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss direct oral anticoagulant background knowledge and clinical predictors of anticoagulant choice at therapy initiation

Describe clinical predictors which may influence a patient's likelihood of switching from a DOAC to warfarin

Self Assessment Questions:

Less than ideal candidates for therapy with direct oral anticoagulants include:

- A: Patients with renal dysfunction
- B: Patients with history of myocardial infarction
- C: Patients who are morbidly obese
- D: Answer A and C are correct

Awareness of clinical predictors which may influence a patient's likelihood of switching from DOAC therapy to warfarin may result in:

- A: Improved renal function
- B: Decreased need for therapy modification
- C: Diminished prescriber satisfaction
- D: Poor patient compliance

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-586-L01-P

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

COMPARING THERAPY OUTCOMES FOR PATIENTS BEFORE AND AFTER ENROLLING IN AN ANTICOAGULATION SELF-TESTING PROGRAM

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Since its unexpected discovery nearly a century ago, warfarin has been used as an anticoagulant due to its effectiveness, availability, and cost. However, warfarin's narrow therapeutic range, variable biological effects and potential for drug and food interactions presents challenges to its safe utilization. On August 16, 2016, the Froedtert & the Medical College of Wisconsin (F&MCW) Anticoagulation Clinic (ACC) began offering self-testing to all eligible patients as an INR testing option. Currently, patients' warfarin therapy can be monitored in the following three ways: face-to-face management by a pharmacist, telephone call management by a pharmacist or nurse, or self-testing management by a pharmacist or nurse. While self-testing was incorporated into the Froedtert health system as a patient-centered approach to provide patients with a convenient solution to warfarin management, data further supports the safety and effectiveness of self-testing. The purpose of this quality improvement project is to determine if F&MCW patients taking warfarin and managed by ACC either face-to-face or via telephone call can be as effectively managed while self-testing at home. The primary outcome is the patients' time in therapeutic range (TTR), as calculated by the Rosendaal linear interpolation method, for INR values before and after enrolling in the self-testing program. Secondary outcomes include the number of major bleeding and thromboembolic events and percent of INRs greater than five before and after transitioning to INR self-testing. This retrospective, cohort study analyzes data from face-to-face or telephone call anticoagulation management for the six months prior to beginning self-testing compared to data collected the six months after self-testing. Patients will serve as their own control group. Descriptive statistics will be used to summarize the characteristics of the study cohort. Results and conclusions will be presented at the Great Lakes Residency Conference.

Learning Objectives:

Define time in therapeutic range (TTR) and explain how to utilize TTR when managing patients in an anticoagulation clinic
Discuss the differences in TTR for patients previously managed face-to-face or via telephone call versus patients self-testing at home

Self Assessment Questions:

According to recent clinical trials, anticoagulation clinics should aim for what goal TTR?

- A: Mid-to-high 50%
- B: Mid-to-high 60%
- C: Mid-to-high 70%
- D: Mid-to-high 80%

How can TTR be utilized when managing patients in an anticoagulation clinic?

- A: A high TTR would lead the clinician to provide continual support at
- B: A low TTR would lead the clinician to provide education about the
- C: A low TTR would lead the clinician to provide education about oth
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-587-L01-P

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

EVALUATION OF OPIOID DOSE REDUCTION IN VETERANS WITH LOW BACK PAIN AT THE HUNTINGTON, WV VA MEDICAL CENTER

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Purpose of the Research: Opioids are known to cause a myriad of adverse events which may include overdose and death. In October 2016, the Huntington VA Medical Center asked our primary care providers to re-assess patients on chronic opioid therapy for low back pain and initiate tapers of opioid therapy where risks of continued opioid therapy were thought to outweigh potential benefits. The purpose of this study is to evaluate patient outcomes following the initiation of an opioid taper. Through a retrospective chart review, outcomes of opioid tapers will be examined to determine the strategies with the best chance of leading to successful dose reduction. Methods: A retrospective chart review of opioid tapers initiated since October 2016 for patients on opioid therapy for chronic back pain will be conducted. Specific events for evaluation include: percent dosage reduction of opioid dose after initiation of taper, alternative medications to replace opioid use that caused adverse reactions, and alternative services consulted to help maintain positive health outcomes. Results: Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the recommendations included in the Centers for Disease Control and Prevention (CDC) Guideline for Prescribing Opioids for low back pain.

Identify alternative non-opioid therapy options and opioid tapering techniques related to the CDC Guideline for Prescribing Opioids for low back pain and discover how you may incorporate the recommendations into your everyday pharmacy practice.

Self Assessment Questions:

1. According to the CDC Guideline for Prescribing Opioids for Chronic Pain, what amount of morphine milligram equivalents per day should be avoided:

- A: \geq 50 MME/day
- B: \geq 75 MME/day
- C: \geq 90 MME/day
- D: \geq 125 MME/day

A patient is prescribed Morphine Sulfate 30mg daily and Hydrocodone 5mg/APAP 500mg TID for low back pain. What amount of morphine milligram equivalents per day is this patient prescribed?

- A: 45 MME/day; opioids are first line choice for chronic low back pain
- B: 35 MME/day; opioids are NOT first line choice for chronic low back
- C: 45MME/day; opioids are NOT first line choice for chronic low back
- D: 50 MME/day; opioids are first line choice for chronic low back pain

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-804-L01-P

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

ANTIBIOTIC STOP DATES: DESIGNING AND IMPLEMENTING A PHARMACIST-DRIVEN PROTOCOL FOR APPROPRIATE ANTIBIOTIC DURATION IN COMMON INFECTIONS

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Purpose: The project purpose is to develop and implement an antimicrobial stewardship protocol to promote utilization of evidence-based therapy durations for antibiotic medications in routine infections by allowing pharmacists to enter stop dates. While many inpatient orders have stop dates in place, these dates are often inadvertently circumvented when orders are changed, such as when converting from intravenous to oral therapy. Antimicrobial stewardship pharmacists are well equipped to impact antimicrobial duration when doing focused reviews of patients and their antibiotics. This process will potentially reduce physician workload when a stop date is necessary and the expenses associated with unnecessarily extended duration of therapy.

Methods: A protocol was developed jointly with the Infectious Diseases department with approval by the Pharmacy and Therapeutics Committee to allow pharmacists to enter antibiotic stop dates for adult inpatients with specified diseases. Length of therapy in the protocol was selected based on the recommended duration in current guidelines. The protocol excludes certain patient populations where additional clinical judgment is required. The pharmacist will identify patients receiving antibiotics for community-acquired pneumonia, chronic obstructive pulmonary disease exacerbations, uncomplicated urinary tract infection, or sinusitis in the electronic medical record. If the patient is clinically improving and the protocol stop date is less than 72 hours away, the pharmacist will modify the order to add the appropriate stop date. The medical team will be notified of the stop date by chart documentation and a staff message in the electronic medical record. The primary objective of the protocol is to promote appropriate duration of therapy. Impact of the protocol will be assessed by comparing historical therapy durations for the infection types. **Results:** The protocol has been developed and approved by the Pharmacy and Therapeutics Committee. Historical data review is pending. Final results with conclusions will be presented.

Learning Objectives:

Define the role of antimicrobial stewardship programs and potential benefits.

Recognize guideline-driven therapy durations for community-acquired pneumonia, chronic obstructive pulmonary disease exacerbations, uncomplicated urinary tract infection, and sinusitis.

Self Assessment Questions:

Which of the following statements is correct?

- A. Antimicrobial stewardship programs aim to reduce all antibiotic use.
- B. Antimicrobial stewardship programs have been found to reduce antibiotic use.
- C. Stewardship programs singularly aimed to educate staff are the most effective.
- D. There are specific and well-defined processes that should be in place for all antibiotic therapy.

JP is a 40 year old female complaining of urinary pain being treated for suspected urinary tract infection. She weighs 70 kg and has a serum creatinine of 0.6. She is being treated with nitrofurantoin.

- A. The therapy is now complete, discontinue the antibiotic.
- B. Enter a stop time on the order after the morning dose of 1/14.
- C. Enter a stop time on the order after the evening dose of 1/14.
- D. Enter a stop time on the order after the evening dose of 1/16.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-588-L01-P

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

ANALYSIS OF FACTORS THAT CONTRIBUTE TO ANION GAP RE-OPENING IN DIABETIC KETOACIDOSIS

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Purpose: This study aims to identify factors that contribute to anion gap re-opening (AGRO) in adult patients with a primary diagnosis of diabetic ketoacidosis (DKA) that were transitioned appropriately from continuous intravenous insulin to subcutaneous insulin while receiving care in the medical intensive care unit (MICU). **Methods:** This is a retrospective, single-center, observational study on adult patients admitted to the University of Chicago Medicine (UCM) MICU between November 2015 - August 2017 with a primary diagnosis of DKA. Patients who were properly transitioned per the UCM protocol were separated into two cohorts; those with AGRO and those without. Patients meet criteria for transition if blood glucose level is <200 mg/dL, patient is alert and eating, and when they meet 2 out of 3 criteria: venous pH greater than 7.3, serum bicarbonate greater than 18 mEq/L, or anion gap <12. The primary endpoint of the study was to determine the incidence of AGRO in patients properly transitioned. Secondary endpoints included median time to AGRO, time overlap with insulin drip, ICU length of stay, total length of stay, and hypoglycemic events (Glucose 50-69 mg/dL and <50 mg/dL). Student's t-test and chi-square tests will be used to evaluate continuous and dichotomous variables, respectively. This study has been approved by the University of Chicago Institutional Review Board. **Results:** Preliminary results reveal that 9/25 (36%) of patients are transitioned appropriately per the UCM protocol. Of these patients, 7/9 (78%) had AGRO. **Conclusions:** Preliminary results reveal the majority of patients with DKA are not transitioned appropriately per the UCM protocol. These results introduce areas for improvement in the existing protocol to optimize patient care. Additional data collection is needed to extract further results. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss current treatment recommendations for diabetic ketoacidosis based on American Diabetes Association guidelines

Identify patients that are candidates for transition from continuous intravenous insulin to subcutaneous insulin

Self Assessment Questions:

•What is the minimum time that continuous intravenous insulin should overlap with subcutaneous long-acting insulin?

- A. 1 hour
- B. 2 hours
- C. 3 hours
- D. 4 hours

•Which of the following patients would qualify to switch from continuous intravenous insulin to subcutaneous long-acting insulin?

- A. Patient A: Glucose 210 mg/dL, anion gap 11, serum bicarbonate 2
- B. Patient B: Glucose 210 mg/dL, anion gap 16, serum bicarbonate 1
- C. Patient C: Glucose 170 mg/dL, anion gap 11, serum bicarbonate 2
- D. Patient D: Glucose 170 mg/dL, anion gap 16, serum bicarbonate 1

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-589-L01-P

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

IMPLEMENTATION OF A PHARMACIST-MANAGED PENICILLIN SKIN TESTING SERVICE WITHIN A COMMUNITY TEACHING HOSPITAL

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Patients with documented penicillin allergies have longer lengths of hospitalization, higher use of broad spectrum antibiotics, and higher rates of *Clostridium difficile*, methicillin-resistant *Staphylococcus aureus*, and vancomycin resistant enterococcus infections. Penicillin Skin Testing (PST) is a well-known method clinicians can use to confirm or disprove reported penicillin allergies. However, this service is not routinely provided by many healthcare institutions due to barriers of service line expansion and lack of trained personnel to administer and interpret the PST. The purpose of this project is to determine the feasibility of a pharmacist-managed PST service within a 650-bed community teaching hospital. Implementation of a pharmacy service line expansion is often a time and labor-intensive process. All elements of a service line expansion specific to a PST program will be detailed to serve as a reference for other institutions considering implementation of a similar project. Barriers to implementation, including interdisciplinary collaboration, institutional policy and procedure development, and pharmacist training and practice within the legal boundaries of Ohio licensure- will be reviewed. To demonstrate PST improves patient care and is cost effective within a community hospital setting, a pilot program has been designed for a pre-surgical orthopedic population. Outcomes to be collected from the pilot program include number of positive PST results, and adverse events, impact on downstream antibiotic selection, and budgetary considerations of revenue generation and cost avoidance. This data will be used to justify expansion of this service to inpatient and other outpatient settings of the health system. Results will include descriptive analysis of service line expansion, identified barriers to implementation and possible solutions, as well as determination of permanent managerial approval of this novel pharmacy service.

Learning Objectives:

Discuss the importance of a penicillin skin test in patients with a documented penicillin allergy.

Outline the key elements of implementing a penicillin skin test within an institution.

Self Assessment Questions:

Which of the following may contribute to a low correlation between patients claiming to have a penicillin allergy and those with true penicillin allergies?

- A Loss of IgE antibodies 5-10 years after a reaction
- B: Patients may have had an allergic response to a contaminated penicillin
- C: Patient misunderstanding of adverse effects and allergic response
- D: All of the above

Who would be an ideal candidate for a penicillin skin test?

- A A 56 year old female whose mother told her she had an allergic reaction to penicillin
- B A 20 year old male who vomited after receiving amoxicillin for an ear infection
- C A 43 year old female who had skin sloughing after receiving ampicillin
- D A 17 year old female who states she had hives to penicillin a year ago

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-590-L01-P

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

OPTIMIZATION OF PERI-OPERATIVE MEDICATION RECONCILIATION ACROSS TRANSITIONS OF CARE AT AN ACADEMIC MEDICAL CENTER

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Purpose: Medication errors associated with transitions of care are common, and it has been demonstrated that nearly 50% of adult patients will experience a medication error during discharge. The current medication reconciliation process during transitions of care at UChicago Medicine has led to errors as well as medication and labor waste. The goal of this project is to improve medication safety, accessibility, and costs associated with patients who undergo surgery at UChicago Medicine by changing the medication ordering and reconciliation processes for these patients. Methods: A week of initial data regarding peri-operative medication reconciliation was collected to understand the scope of the problem. A series of meetings were then held with various stakeholders, including nursing leadership, clinical pharmacists, chief medical information officer, informatics, and physicians to determine inefficiencies in the workflow and provide recommendations to improve the process. A proposed workflow was presented to the surgery department and formal education was provided to physicians and nurses. Post-implementation data was collected for one week and compared to initial data. Study outcomes include: number of medications dispensed without administration, number of orders discontinued and re-entered, cost associated with medication and labor waste. Preliminary Results: Preliminary data was collected for 7 business days at UChicago Medicine from June 19 to June 28, 2017 and included 60 cases. During this time, 68% of patients had all inpatient medications discontinued and then reordered during the pre-operative and post-operative phases respectively. An average of 13 orders per case was discontinued pre-operatively, and an average of 12 medications per case was re-ordered post-operatively. Furthermore, an average of 2 medications per patient was discontinued after dispensing and not administered to the patient. Examples of medications affected include: antibiotics, anti-retrovirals, anti-epileptics, and parenteral nutrition. Conclusions: Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recall the incidence of statistics regarding transitions of care medications errors

Identify major sources of medication errors and waste during transitions of care for patients undergoing surgery

Self Assessment Questions:

Research in transitions of care processes has demonstrated that as much as what percentage may errors during transitions may preventable?

- A 15%
- B: 25%
- C: 50%
- D: 75%

Which of the following was an identified major contributor to medication errors during transitions of care at UChicago Medicine?

- A Inability to pause orders through different phases of care
- B Negligence on behalf of verifying pharmacists
- C The time it takes to transition patients from the floor to the operating room
- D Networking issues between the electronic health record and medication orders

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-889-L05-P

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

IMPACT OF PHARMACIST INTERVENTION ON TIME TO ANTIBIOTIC ADMINISTRATION IN EMERGENCY DEPARTMENT PATIENTS WITH SEVERE SEPSIS AND SEPTIC SHOCK

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Purpose: Severe sepsis and septic shock are conditions characterized by high degrees of mortality. In the United States, approximately 25% and 50% of patients who develop severe sepsis and septic shock, respectively, will die during hospitalization. The Surviving Sepsis Guidelines recommend administration of broad spectrum antibiotics within one hour of sepsis diagnosis. While this may be challenging, several studies have shown that pharmacist involvement in sepsis care can greatly reduce time to antibiotic administration. This study was designed to determine if the addition of a pharmacist to a multidisciplinary sepsis response team would improve time to antibiotic administration and sepsis bundle compliance. **Methods:** This is an Institutional Review Board approved, single center, retrospective, pre- and post-intervention cohort study. Patients in the pre-implementation group were included if they were ≥ 18 years of age and had an initial diagnosis of severe sepsis or septic shock in the emergency department from October 1st 2016-January 31st 2017. Patients in the post-implementation group were included if they were ≥ 18 years of age, had an initial diagnosis of severe sepsis or septic shock in the emergency department, and had a clinical pharmacist directly involved in sepsis care from October 1st 2017- January 31st 2018. Other data collected included patient demographics, length of stay, antibiotics administered, cultures, vasopressor use, qSOFA score, and mortality. Due to fewer patients in the post-implementation group, treatment groups were randomized to equal sizes based on total patients in the post-implementation group. The primary endpoint is a comparison of time to antibiotic administration between groups. Secondary outcomes are comparisons of length of stay, mortality, appropriateness of antibiotic therapy, percent of blood culture draws, and sepsis bundle compliance between groups. **Results and Conclusions:** Data collection and analysis are ongoing.

Learning Objectives:

Describe the services pharmacists provide as a member of a sepsis response team.

Identify appropriate therapy options for severe sepsis and septic shock according to CMS definitions.

Self Assessment Questions:

Which of the following is/are ways that pharmacists can improve outcomes in severe sepsis and septic shock?

- A: Assessment of risk factors and contraindications to therapy
- B: Initial empiric therapy and dose recommendations
- C: Serve as a drug information resource
- D: All of the above

According to CMS's definition of appropriate, which of the following is an acceptable empiric monotherapy option for severe sepsis or septic shock?

- A: Amikacin
- B: Aztreonam
- C: Ceftriaxone
- D: Daptomycin

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-591-L01-P

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

EVALUATION OF AN INDEPENDENT COMMUNITY PHARMACIST-LED TRANSITION OF CARE SERVICE FOR DISCHARGING SKILLED NURSING FACILITY PATIENTS

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Purpose: Evaluate how an independent community pharmacist-led transition of care (TOC) service provided to patients being discharged from a skilled nursing facility (SNF) impacts 30-day hospital readmission rates and preventable medication-related errors when partnered with a local hospital system. **Methods:** This TOC service is offered to patients being discharged from a SNF who have a primary care physician (PCP) through a local hospital. Other patient inclusion requirements include a LACE (length of stay, acuity of admission, co-morbidities, emergency room visits) Index score ≥ 5 , plans to discharge from a SNF to home or assisted living facility (ALF), and have been discharged from the local hospital within 30 days. The SNFs alert the community independent pharmacy via email with a list of patients at least 72 hours before the planned discharge of eligible patients. The pharmacist confirms patient eligibility based on the inclusion requirements and prepares for the encounter if the patient is eligible. Encounters occur at the SNF or via telephone with patients or caregivers. Documentation and recommendations are sent to PCPs through the hospital's electronic medical record (EMR). Data collection includes LACE scores, medications discontinued or added, recommendations approved by physicians, medication errors prevented, and 30-day hospital readmissions. **Results:** Based on data collected for 23 patients, only one patient was readmitted to the hospital within 30 days post-discharge. A total of 101 medication changes were made based on medication list reconciliations performed with patients. There were 53 out of 70 total post-appointment medication recommendations accepted by PCPs.

Conclusions: This pharmacist-led TOC service has prevented a high percentage of hospital re-admissions and many potential medication errors. Furthermore, this service has initiated many necessary pharmacist recommendations that have improved patient care. This data is on track to support an independent community pharmacist taking the lead role in transitioning patients from SNFs.

Learning Objectives:

Recognize the role of a community pharmacist in transitions of care service interventions.

Identify potential types of medication adjustments community pharmacists make as part of the TOC service.

Self Assessment Questions:

What role does a community pharmacist play in the TOC service for SNF patients?

- A: Performs a comprehensive medication reconciliation
- B: Addresses patient questions and concerns regarding medications
- C: Makes medication recommendations based on patient specific factors
- D: All of the above

Which of the following are types of medication adjustments that community pharmacists make as part of the TOC service?

- A: Age-related
- B: Indication-related
- C: Renal dosing-related
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-890-L05-P

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

A RETROSPECTIVE ANALYSIS OF THE EFFECT OF DIABETES MELLITUS ON SUSTAINED VIROLOGIC RESPONSE IN HEPATITIS C PATIENTS TREATED WITH DIRECT ACTING ANTIVIRAL AGENTS

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Purpose: The introduction of direct-acting antiviral agents (DAAs) has increased the sustained virologic response (SVR) to over 90% in patients with hepatitis C virus (HCV) in comparison to 50% with older regimens. Retrospective studies of peg-interferon and ribavirin-based regimens suggest that patients with diabetes mellitus (DM) have a lower response than patients without DM. Specific data regarding cure rates in patients with DM on DAAs is lacking. As such, a pilot study was completed by members of this investigational team which showed that patients with DM had 6% lower SVR rates with DAAs than patients without DM, regardless of hemoglobin A1c (HbA1c). Rapid virologic response (RVR) was also 10% lower in the DM cohort. There was a trend towards increased SVR rates in patients with DM treated with DAAs plus ribavirin, but the study was not powered to determine its significance. The purpose of the current, amended study is to assess whether patient-specific factors have an effect on SVR. Insulin-sensitizing antidiabetic agents will also be analyzed for potential effect on SVR given that previous studies have shown decreased SVR rates in patients with significant insulin resistance. Furthermore, this study will include more patients on newer DAAs, supplementing the data from the original study. **Methods:** This study will be conducted by retrospective chart review. Patients that completed a full course of therapy with a DAAs will be electronically identified through generation of a dispensed medication report. The primary endpoint of this study is SVR in the diabetic cohort versus the non-diabetic cohort. Select secondary outcomes include RVR, SVR subgroup analyses by HCV regimen and HCV genotype, and SVR subgroup analyses in the diabetic cohort by HbA1c and use of an insulin-sensitizing antidiabetic agent. **Results/Conclusions:** Research is ongoing. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Outline the difference in cure rates between newer and older hepatitis C treatments.

Discuss the effect of various antidiabetic agents on insulin sensitivity.

Self Assessment Questions:

Which of the following outcomes were noted in previous studies regarding treatment with older hepatitis C therapies in patients with insulin resistance?

- A: Patients with insulin resistance had higher RVR rates
- B: Patients with insulin resistance had higher SVR rates
- C: Insulin resistance had no effect on SVR rates
- D: Patients with insulin resistance had significantly reduced SVR rate

Which of the following antidiabetic agents improves insulin sensitivity?

- A: Glimeperide
- B: Metformin
- C: Glipizide
- D: Acarbose

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-592-L01-P

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

CLINICAL PATHWAY DEVELOPMENT FOR THE TREATMENT OF NEUTROPENIC FEVER IN THE OUTPATIENT SETTING

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PURPOSE: While hospital admission and parental antimicrobials remains the standard plan of care for most patients with neutropenic fever (NF), a growing number of low-risk patients are successfully being treated in the outpatient setting with oral therapy. The purpose of this project is to implement an institutional clinical decision guideline to promote risk stratification of patients with NF and identify appropriate low-risk patients eligible for treatment in the outpatient setting. Successful implementation of the guideline will avoid unnecessary hospitalization, limit use of broadest spectrum parenteral antibiotics, and decrease risk of hospital-acquired infections without sacrificing quality of care provided. **METHODS:** This is a single center, retrospective chart review evaluating the percentage of patients with NF presenting to an ambulatory patient care area resulting in admission treatment before and after guideline implementation. Secondary outcomes include provider adherence to risk stratification guideline, number of patients with treatment failure, antibiotic adherence in the outpatient setting, time to first dose of antibiotic administration, and determination of the pharmacist's role in treatment algorithm. Patients 18 years of age or older presenting to an ambulatory oncology patient care area with NF are included. Patients will be excluded if they have a diagnosis of hematologic malignancy or if initial empiric antibiotics for NF were started prior to presentation to an ambulatory oncology patient care area. **RESULTS/CONCLUSION:** Anticipated results include a decrease in the percentage of low-risk patients with NF admitted after implementation of the treatment guideline, identification of predominant risk factors in the study population precluding patients from outpatient treatment and qualifying patients as high-risk, and recommendations for future research and internal guideline modifications. Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the factors or characteristics of a patient at high-risk for complications related to neutropenic fever.

Recognize the role of risk assessment in febrile neutropenia and the benefits associated with stratifying patients by risk severity.

Self Assessment Questions:

Which of the following factors would exclude a patient for being treated for neutropenic fever in the outpatient setting?

- A: Patients receiving platinum agents
- B: History of prolonged neutropenia
- C: Comorbidity of hypertension
- D: MASCC* score ≥ 21

According to IDSA guidelines for management of neutropenic fever, which of the following is the recommended treatment of choice for outpatient therapy in low-risk individuals without a penicillin allergy?

- A: Amoxicillin plus levofloxacin
- B: Clindamycin plus ciprofloxacin
- C: Ciprofloxacin plus amoxicillin-clavulanate
- D: Sulfamethoxazole-trimethoprim plus amoxicillin

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-593-L01-P

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

EVALUATION OF STRATEGIES TO PREVENT WITHDRAW FROM DEXMEDETOMIDINE INFUSIONS

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Background: Sedation is frequently required for children who are critically ill. Historically benzodiazepines and opioids have been used to manage sedation, however, dexmedetomidine has seen a rise in use. It can be used in the pediatric intensive care unit (PICU) as the primary sedative or as an adjunct to other medications. When dexmedetomidine is used for long term sedation there is concern for withdrawal. For these patient's, symptoms often present as rebound hypertension, tachycardia, and agitation. To prevent withdrawal, care providers often transition patients to clonidine or wean the dexmedetomidine infusion over 24-72 hours. The primary objective of this study is to evaluate two difference strategies to prevent withdrawal from dexmedetomidine. Our hypothesis is that weaning dexmedetomidine is as effective at preventing withdrawal without increasing ICU length of stay when compared to patients who were transitioned to clonidine. **Methods:** This is a retrospective study approved by Indiana University IRB which includes patients in the pediatric intensive care unit at Riley Hospital for Children at Indiana University Health from July 1st, 2015- June 31st, 2017. Patient's demographics, dexmedetomidine and clonidine dosages and duration, blood pressures, heart rates, and any nursing documentation of agitation were collected. Patients were considered to be hypertensive and tachycardic when at least 50% of respective measurements taken in a 24-hour period were above normal for age and gender. **Results:** 148 patients received dexmedetomidine within the study time frame. Eighty patients were excluded due to not meeting the inclusion criteria. Further exclusion will be completed with data collection. Data collection and results in progress and will be presented at Great Lakes Pharmacy Residency Conference. **Conclusions:** This study may provide insight into the applicability of weaning dexmedetomidine infusions rather than transitioning to clonidine without increasing ICU length of stay.

Learning Objectives:

Identify symptoms of withdrawal from dexmedetomidine infusions in pediatric patients
Discuss strategies utilized to prevent withdrawal from dexmedetomidine in pediatric patients

Self Assessment Questions:

One of the most common signs of dexmedetomidine withdrawal is:

- A Hypotension
- B: Tachycardia
- C: Somnolence
- D: Bradycardia

Which of the options below is not a method to prevent withdrawal following a long term dexmedetomidine infusion?

- A Transitioning to oral clonidine
- B Transitioning to topical clonidine
- C Weaning dexmedetomidine drip over multiple days
- D Transitioning to oral lorazepam

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-594-L01-P

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(if ACPE number listed above)

EVALUATING THE IMPACT OF PHARMACIST INTERVENTIONS IN DOFETILIDE MONITORING

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Dofetilide is a class III antiarrhythmic medication that previously required a Risk Evaluation and Mitigation Strategy (REMS) program to ensure appropriate monitoring was completed. In 2016, the REMS program was removed; however, the monitoring of dofetilide remains necessary to reduce the risk of proarrhythmic effects and to avoid lapse in therapy. The primary objective of this project 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. This project includes patients that have been auto-enrolled with a consult from cardiology in a pilot consult service at the Chalmers P. Wylie VA Ambulatory Care Center. New patients will be enrolled into the clinic after a consult from cardiology had been placed. Eligible patients are those with a diagnosis of atrial fibrillation or atrial flutter, are prescribed dofetilide through a cardiologist at the Columbus VA, and are able to obtain laboratory parameters and EKG at required timeframes. Exclusion criteria includes patients that are followed by or prescribed dofetilide by a non-VA cardiologist and patients with a QTc greater than 500 msec or QTc greater than 550 msec (if ventricular abnormalities). Completed progress notes will be reviewed to assess frequencies and percentages of the total number and specific types of interventions made by a pharmacist. Types of interventions include dosage adjustments due to renal function or EKG, electrolyte replacement recommendations, medication changes due to drug interactions, and referrals due to signs or symptoms of adverse effects. The clinic will continue to see patients through September 2018. Clinic implementation is a rewarding experience but can be a challenge. Developing standard operating procedures that are agreed upon by all departments is crucial. Standard operating procedures allow for better understanding of work-flow when a dofetilide prescription is presented at the facility.

Learning Objectives:

Recall monitoring parameters that are required for dofetilide usage.
Identify contraindications to the use of dofetilide.

Self Assessment Questions:

Which of the following factors are considered a monitoring parameter for patients taking dofetilide?

- A Thyroid function tests
- B: Potassium levels
- C: Pulmonary function tests
- D: Chest x-ray

Which of the following factors are considered a contraindication for the continuation of dofetilide?

- A Hypersensitivity to iodine
- B Concurrent use with hydrochlorothiazide
- C Creatinine clearance less than 50 mL/min
- D QTc greater than 400 milliseconds

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-891-L05-P

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

SAFETY AND EFFICACY OF LACOSAMIDE VERSUS PHENYTOIN FOR REFRACTORY SEIZURES IN NEUROSURGICAL PATIENTS

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Purpose: Postoperative neurosurgical patients have increased risk of seizures, with the highest risk occurring early in the postoperative setting. Intravenous medications are preferred in the treatment of acute seizures for more rapid response, and traditionally fosphenytoin/phenytoin, valproic acid, and phenobarbital have been utilized most often for seizure cessation. However, these older anti-epileptic drugs are associated with significant adverse events and drug-drug interactions. At Northwestern Memorial Hospital (NMH), levetiracetam has become the initial therapy for seizure treatment in neurosurgical patients due to its similar efficacy alongside a more favorable side effect profile. More data are needed to determine the optimal second line option in these patients with refractory seizures already on levetiracetam. Lacosamide was approved by the FDA in 2009 for adjunct and monotherapy for partial seizures and is associated with less adverse effects than traditional agents. The purpose of this study is to evaluate if lacosamide is as safe and effective as phenytoin for terminating seizures in neurosurgical patients already on levetiracetam. **Methods:** This retrospective cohort study utilized the electronic health record to identify neurosurgical intensive care unit patients ≥ 18 years of age who had received levetiracetam plus either phenytoin or lacosamide at NMH between January 1st, 2016 and August 31st, 2017. Pregnant patients and patients with status epilepticus were excluded. The primary endpoint is treatment failure defined as the addition of a third anti-epileptic medication or recurrent seizure as evident by EEG. The secondary endpoint is safety which was assessed by liver function tests, blood pressure, heart rate, and EKG changes with the administration of each drug. **Results/Conclusions:** Study results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the potential benefits of using lacosamide versus phenytoin for refractory seizures in neurosurgical intensive care unit patients
Identify adverse effects associated with lacosamide and phenytoin

Self Assessment Questions:

Which of the following is true?

- A: Lacosamide is only available as PO formulations
- B: Treatment with lacosamide requires therapeutic drug monitoring
- C: The dose of lacosamide is weight based
- D: Lacosamide is FDA approved for adjunct and monotherapy for partial seizures

Which of the following is a common side effect of IV phenytoin?

- A: Myalgias
- B: Hypotension
- C: Thrombosis
- D: Serotonin syndrome

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-595-L01-P

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

UTILIZATION OF ROTATIONAL THROMBOELASTOMETRY (ROTEM) FOR MANAGEMENT OF POSTPARTUM HEMORRHAGE (PPH)

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Purpose: Although it has proven success in other patient populations (cardiac surgery, trauma and liver transplantation), use of ROTEM in obstetric practice has been minimal thus far. Fibrinogen concentrate (RiaSTAP) was incorporated into clinical practice at Michigan Medicine following Pharmacy & Therapeutics Committee approval in 2016 within the Obstetric Anesthesiology Clinical Practice Guidelines. A PPH ROTEM algorithm was created to address specific parameters for blood product and medication administration. The goal of this study is to discover if use of ROTEM-directed fibrinogen therapy for management of PPH leads to more effective use of blood and drug products and better patient outcomes. **Methods:** This study is a single center, retrospective chart review being performed at Von Voightlander Women's Hospital, part of Michigan Medicine. Study groups include pre- and post-ROTEM implementation. Patients included are women experiencing PPH, which is traditionally defined as blood loss greater than 500 milliliters following a vaginal delivery and 1000 milliliters following a cesarean delivery (American College of Obstetrics and Gynecology). Other definitions include a fall in hemoglobin or 4 or more g/L, the need for transfusion or 4 or more units of packed red blood cells or the need for an invasive procedure. Subject identification and data collection is through MiChart® (Epic®) electronic health record, Omnicell® (Fibrinogen Concentrate drug utilization report), GE Centricity (ROTEM data) and blood product administration from the hospital blood bank. Primary outcomes are blood product and fibrinogen concentrate utilization. Secondary outcomes include the effect of baseline characteristics on primary outcomes, FIBTEM A10 value at the time of fibrinogen administration, total amount of fibrinogen administered, transfusion reactions, total estimated blood loss, blood volume lost at which ROTEM was initiated, length of hospital stay and patient outcomes including hysterectomies and maternal deaths. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe ROTEM and its potential role in management of PPH
Discuss the importance of fibrinogen replacement for management of PPH

Self Assessment Questions:

Which of the following is an advantage of using ROTEM over traditional lab assays of coagulation during management of PPH at Michigan Medicine?

- A: ROTEM is more cost effective
- B: ROTEM has led to use of less blood products
- C: ROTEM has led to use of less drug products
- D: ROTEM targets patient specific deficiencies

Which of the following coagulation factors leads to an increased risk of severe postpartum hemorrhage?

- A: Hypercoagulopathy
- B: Prolonged ACT (activated clotting time)
- C: Hypofibrinogenemia
- D: Thrombocytosis

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-596-L01-P

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

COMPARISON OF DEXMEDETOMIDINE AND PROPOFOL INDUCED HEMODYNAMIC INSTABILITY IN CRITICALLY ILL ADULTS

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Purpose: The 2013 Society of Critical Care Medicine (SCCM) guidelines for pain, agitation, and delirium in the intensive care unit (ICU) recommend dexmedetomidine or propofol as first-line treatment for patients requiring continuous intravenous (CIV) sedation. Both sedatives are associated with significant hemodynamic instability (HDI), with reported incidence ranging from 1-68% and 30-68%, respectively. Prior literature has demonstrated similar rates of HDI between agents but has been limited to evaluation in neurocritical care units. This study seeks to characterize incidence of HDI events and required interventions among mixed medical/surgical ICU patients receiving dexmedetomidine or propofol. **Methods:** This retrospective cohort study was conducted in adults admitted to Spectrum Health medical or surgical ICUs from June 2014 to December 2015 who received at least 60 minutes of dexmedetomidine or propofol for CIV sedation. A total of 2865 patients received either agent during the study timeframe and were screened for inclusion. Patients were excluded for: age less than 18 or greater than 89 years; procedural sedation only; history of heart block or cardiac pacemaker; substance withdrawal; sedation initiated at an outside hospital; concomitant use of CIV ketamine or benzodiazepine; or vulnerable populations. A total of 500 included patients will be analyzed with Kaplan-Meier survival curves for the primary outcome of time to first occurrence of HDI, defined as mean arterial pressure less than 60 mmHg or heart rate less than 50 beats per minute, during sedative infusion. Secondary outcomes include incidence of HDI in patients diagnosed with sepsis or septic shock and number of HDI interventions required. Additional data analyzed will include baseline demographics, pertinent comorbid conditions, concomitant antihypertensive therapy, and sedative and hemodynamic values. **Results and Conclusion:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review sedation recommendations for critically ill adults from the 2013 SCCM guidelines on pain, agitation, and delirium
Identify common adverse effects associated with dexmedetomidine and propofol during ICU sedation

Self Assessment Questions:

The 2013 SCCM guidelines on pain, agitation, and delirium recommend which of the following agents over benzodiazepines to improve clinical outcomes in mechanically ventilated adult ICU patients?

- A: Ketamine
- B: Dexmedetomidine
- C: Propofol
- D: B and C

Which of the following is a common adverse effect associated with both dexmedetomidine and propofol?

- A: Metabolic acidosis
- B: Delirium
- C: Hypotension
- D: Respiratory depression

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-597-L01-P

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

OUTCOME AND THE SUCCESS RATE OF HCV ERADICATION USING INTERFERON-FREE REGIMENS IN VETERANS WITH UNDERLYING MENTAL HEALTH AND SUBSTANCE ABUSE DISORDERS

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Purpose: Between 2.7 to 3.9 million people in the United States are chronically infected with hepatitis C virus (HCV). Survey data suggest that veterans enrolled in the Veterans Affairs Healthcare System have a higher prevalence of HCV than their civilian. Studies have shown that veterans who served in Vietnam, those with mental health and substance abuse disorders, and those who do not have stable housing are more likely to be infected with HCV. Little is known on the impact of mental health and substance abuse disorders on the overall outcomes and success rate of HCV eradication as these disorders are often considered barriers to HCV treatment. This project was designed to determine the prevalence of veterans with mental health and substance use disorders who completed interferon-free HCV therapy, determine the success rate of HCV eradication stratified by treatment regimen and underlying mental health and substance abuse disorders, and determine any differences in the number of touch points between clinic personnel and those with and without mental health and substance abuse disorders. **Methods:** This is a retrospective chart review of patient patients enrolled in the Hepatitis C Pharmacy Clinic who completed treatment with interferon-free HCV medications from 8/17/13 to 8/17/17. Data will be retrieved from the electronic medical record. Basic descriptive statistics, Student's t test (continuous data), and Chi-square test (categorical data) will be utilized to analyze data according to the study's objectives. **Results & Conclusion:** Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the most prevalent mental health and substance use disorders among those who completed interferon-free HCV treatment at the RLR VAMC.

Describe difference in HCV eradication and clinic team member touch points in those treated with interferon-free regimens with and without mental health and substance use disorders

Self Assessment Questions:

What medication has been referred to as having a potential contraindication with mental health and/or substance use disorders in the treatment of hepatitis C?

- A: Ribavirin
- B: Interferon alpha
- C: Ledipasvir/sofosbuvir
- D: Sofosbuvir/velpatasvir

What populations of veterans are most likely to be infected with hepatitis C?

- A: Veterans with mental health and substance use disorders
- B: Veterans with HIV
- C: Veterans with stable housing
- D: Veterans from WWII era

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-599-L01-P

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

BASILIXIMAB INDUCTION IN HIV-POSITIVE RENAL TRANSPLANT RECIPIENTS COMPARED TO AN HIV-NEGATIVE COHORT

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Purpose: Renal transplant recipients who are HIV+ have an elevated risk of acute rejection and the most appropriate induction therapy in this patient population remains unclear. Use of an IL-2 inhibitor may avoid the potential risks of lymphocyte depletion on accelerated HIV disease progression and infection in the HIV+ recipient. The objective of this study is to assess the incidence of acute rejection, patient survival, and allograft survival in HIV+ renal transplant recipients who received basiliximab induction. **Methods:** This is a single center, retrospective study of adult HIV+ renal transplant recipients, matched 1:2 to an HIV- cohort, transplanted from 2006 to 2016 who received basiliximab induction. Matching was based on date of transplant within 1 year and race. BPAR, patient and allograft survival were evaluated at 1 and 3 years post-transplant. **Results:** A total of 87 patients were included. A trend towards increased biopsy proven acute rejection at 3 years was observed in the HIV+ group (Figure 1). Measured GFR at 1 year was significantly higher in HIV- patients. There was no difference between patient or graft survival at 1 year. **Conclusions:** Similar rejection, graft, and survival outcomes were observed when non-lymphocyte depleting induction and CNJ-based maintenance therapy was used in an HIV+ and HIV- matched renal transplant cohort.

Learning Objectives:

Recognize the potential risks associated with induction therapy in HIV positive renal transplant recipients.

Describe the pharmacologic action of the induction agent basiliximab.

Self Assessment Questions:

Which of the following is a potential risk associated with use of induction therapy in HIV positive renal transplant recipients?

- A: Increased medication adherence
- B: Increased rates of rejection
- C: Increased rates of infection
- D: Decreased HIV disease progression

Which of the following describes the pharmacologic action of the induction agent basiliximab?

- A: Polyclonal, lymphocyte depletion
- B: Monoclonal, IL-2 inhibition
- C: Monoclonal, CD-52 inhibition
- D: Monoclonal, CD-3 inhibition

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-598-L01-P

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

EFFICACY OF A PHARMACY-DRIVEN EFFORT TO DECREASE MEDICATION ERROR RATES THROUGH SMART PUMP OPTIMIZATION

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Purpose: Medical errors are a source of great cost and avoidable morbidity in the United States. The Network for Excellence in Health Education reported that medical errors are responsible for approximately 21 billion dollars in expense and 7,000 deaths annually in the United States. As advances are made, technology is helping healthcare providers avoid these errors in both the practice – and delivery – of medical care. One such advance is the implementation of smart infusion pumps that reduce medication administration errors. Studies like the one conducted by Larsen et al show the impact that smart pump utilization can make as their hospital had a 73% decrease in error rate when smart pumps were implemented along with standardized drug concentrations. Optimization of smart infusion pumps with sustained improvement in the setting of new electronic medical record (EMR) software and hospital formulary is a challenge for any health system. Less literature has been published on the continued modifications needed to maintain the accuracy and effectiveness of the smart pump infusion programs. Our facility had a 10% decrease in smart pump program adherence after moving facilities and changing EMRs. The purpose of this project is to determine the impact of a pharmacy-driven effort to improve adherence with the utilization of infusion pump technology before and after EMR conversion. **Methods:** This informatics study is designed as a pre- and post-intervention comparison. The pharmacy department audited the current medication programs housed in the smart pumps, optimized the programs, and developed instructional materials for the nursing educators to disseminate. Efficacy of the intervention was measured by comparing pre and post-intervention drug library compliance rates, number hard limit alerts generated for infused medications and error rates on infused high-alert medications as obtained by the hospital even reporting software.

Learning Objectives:

Identify the patient safety benefits of using modern infusion pump technology or "smart pumps"

Describe the patient safety benefits of using modern infusion pump technology or "smart pumps"

Self Assessment Questions:

Smart pumps help to prevent which of the following medication errors:

- A: Prescribing errors
- B: Wrong Dose/Administration errors
- C: Concentration errors
- D: Wrong patient/drug errors

Which of the following smart-pump related challenges may a pharmacy department face when changing Electronic Medical Record (EMR) software.

- A: Inconsistent concentrations between smart pumps programs and t
- B: Decreased number of soft limit alerts generated
- C: Decreased smart pump program compliance
- D: A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-892-L05-P

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

IMPLEMENTING A SUPPLY CHAIN STRATEGY FOR A PHARMACY SERVICES BUILDING

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Purpose: Pharmaceutical costs continue to grow and encompass a large portion of annual health system expenditures. Health system pharmacy departments have responded to rising costs by building offsite production facilities to take advantage of bulk product purchases and centralized preparation for multiple sites across the system. Though literature about the proposed benefits of pharmacy services buildings exists, there is no information for best practices surrounding supply chain operations and inventory management principles. The purpose of this project is to evaluate and implement a sustainable pharmaceutical supply chain strategy for the pharmacy services building located in Madison, Wisconsin. **Methods:** A workgroup was established with members from pharmacy operations, pharmacy service building operations, pharmacy supply chain operations, and finance. The workgroup was charged with assessing current medication utilization for the health system to identify areas for optimization and gaps in automation visibility. Utilization data was used to optimize inventory levels in automation across the system. A low unit of measure analysis was conducted to aggregate purchases across multiple sites to the central building. Strategic supply was made visible on an electronic inventory management platform to better manage their use at retail sites. Decision support tools will be developed to ensure the appropriate line items are routinely centralized and purchased as bulk product.

Results: Results will be presented at the Great Lakes Pharmacy Resident Conference. **Conclusions:** A variety of inventory analyses were used to implement a supply chain strategy for a pharmacy services building in a health system. The strategy will be sustainable with the implementation of decision support tools to ensure optimization of inventory is maintained.

Learning Objectives:

List the proposed benefits of a pharmacy services building

Describe inventory metrics that can be used to setup and monitor inventory management across the pharmacy enterprise

Self Assessment Questions:

Which of the following is a proposed benefit of pharmacy services building?

- A Avoid drug price increases by better negotiating with manufacturer
- B Support strategic supply chain efforts, such as centralizing low unit
- C Improve patient satisfaction by adding more pharmacy sites to the
- D All of the above

What inventory metrics can be used to monitor inventory management across the pharmacy enterprise?

- A Turnover rate
- B Days on hand
- C Number of totes shipped per month
- D A and B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-805-L04-P

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

AUTOMATION OR INNOVATION: A SYNCHRONIZATION OF INVENTORY MANAGEMENT SOLUTIONS

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Purpose: Automation within the pharmacy profession represents both an opportunity for significant cost savings, along with improving patient safety factors. The primary measure of this project is the cost savings involved with the coordinated implementation of a new inventory management system and an automated packing system in a new inpatient hospital pharmacy. The secondary measures will include an optimization of workflow for pharmacy personnel, and a review of safety procedures around the simultaneous implementation of the coordinated systems. **Methods:** A return on investment (ROI) was calculated in preparation for the purchase of a carousel inventory system and automated unit dose packaging system for use in a new inpatient hospital pharmacy. After approval by the hospital system administration, the two systems were installed in the pharmacy department prior to a new hospital opening in November 2017. Working directly with the pharmacy buyer, the new inventory system was then designed and implemented in a way to complement anticipated workflow design in the new hospital. After the hospital opened, several reports were used to help evaluate and improve upon the carousel and packaging softwares to assess initial cost savings, and to optimize workflow within the pharmacy department. The final segment of the project will focus on design of a monitoring process to continue to evaluate and improve pharmacy department functions, as well as evaluate continued inventory management costs beyond the initial project implementation period. **Results/Conclusion:** Conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the process of concurrently implementing a new carousel inventory management system, along with an automated unit dose packaging system in a new hospital inpatient pharmacy

Discuss the cost savings associated with implementation of this project

Self Assessment Questions:

Which of the following is a benefit of implementing a carousel system?

- A Takes up a lot of space
- B Streamlines inventory management
- C Makes the pharmacy 340B compliant
- D Interfaces with only one electronic medical record system

Combining a high-speed packager with a carousel can provide which of the following benefits?

- A A cost saving opportunity
- B Decreased efficiency of pharmacy personnel workflow
- C A process totally dependent on pharmacist supervision
- D Hinders coordination of automated dispensing unit medication replacement

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-806-L04-P

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

IMPACT OF COMBINATION VERSUS MONOTHERAPY ON CLINICAL OUTCOMES ASSOCIATED WITH STENOTROPHOMONAS MALTOPHILIA PNEUMONIA

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Purpose: *Stenotrophomonas maltophilia* is an emerging nosocomial pathogen particularly in the immunocompromised patient population. Treatment of *S. maltophilia* poses a unique challenge in that it exhibits intrinsic resistance to a variety of antibiotics. Some studies have demonstrated treatment failures and resistance development with monotherapy, and as a result, combination therapy may be preferred. While there are several studies reporting in vitro synergy using different therapeutic combinations, there are limited clinical data demonstrating improved outcomes with combination therapy. The purpose of this study is to compare clinical outcomes associated with combination versus monotherapy for *S. maltophilia* pneumonia. **Methods:** This is a retrospective study evaluating inpatients age 18 to 89 with *S. maltophilia* pneumonia between November 1, 2011 and October 31, 2017 who received at least 48 hours of effective therapy. Patients without signs of infection, polymicrobial pulmonary infections, and protected populations (e.g., prisoners, pregnancy) are excluded. The primary objective is to evaluate clinical response (i.e., improvement in signs and symptoms of infection, absence of fever for 24 hours after treatment initiation, normalization in WBC if immunocompetent, and documented negative blood cultures if bacteremic) after seven days of effective therapy in patients with *S. maltophilia* pneumonia treated with combination compared to monotherapy. Secondary objectives include microbiological cure; 30-day recurrence of infection; hospital, infection-related, and ICU length of stay; 30-day infection-related and all-cause mortality; and adverse drug events (ADEs) associated with effective therapy. Isolation of non-susceptible isolates will be evaluated to characterize resistance development with monotherapy vs. combination therapy. Quantitative variables will be compared using the Student's t test or the Wilcoxon rank sum test, while qualitative variables will be analyzed using the Pearson chi square test or Fisher's exact test, as appropriate. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the current literature on management of *S. maltophilia* infections
Identify the impact of monotherapy and combination therapy on clinical outcomes in patients with *S. maltophilia* pneumonia.

Self Assessment Questions:

Which of the following does NOT have in vitro activity against *S. maltophilia*?

- A Levofloxacin
- B: Ertapenem
- C: Ceftazidime
- D: Minocycline

What is a dose-limiting adverse effect of trimethoprim/sulfamethoxazole

- A Hyperkalemia
- B Nephrotoxicity
- C Paresthesias
- D A and B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-600-L01-P

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

CHARACTERIZATION OF DIGOXIN THERAPEUTIC DRUG MONITORING AND INCIDENCE OF TOXICITY IN PEDIATRIC PATIENTS WITH CONGENITAL HEART DISEASE

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Purpose: Recent studies have shown a reduced risk of interstage mortality in single-ventricle infants discharged from the hospital on digoxin compared with those that were not. While efficacy data is promising, questions remain regarding therapeutic monitoring and safety of digoxin in the pediatric population. The primary objective of our study was to evaluate the incidence of supratherapeutic digoxin concentrations in neonates compared to older patients less than 3 years of age with congenital heart disease. **Methods:** This retrospective chart review evaluated patients admitted to Riley Hospital for Children between January 1st, 2010 and July 31st, 2017. Included patients were less than 3 years of age at hospital admission, had a diagnosis of congenital heart disease, and received at least one dose of digoxin during the hospitalization. Patients were excluded if admitted for accidental ingestion or overdose of digoxin or any receipt of renal replacement therapy. A supratherapeutic digoxin concentration was defined as a true trough concentration > 2 ng/ml obtained at steady state, defined as a concentration drawn at least 72 hours after therapy initiation. Data collected included demographics, digoxin indication, digoxin dosing, digoxin serum concentrations, estimated glomerular filtration rate, concomitant known interacting medications, signs/symptoms of digoxin toxicity within 24 hours of digoxin serum concentration measurement, electrolytes, hospital length of stay, and mortality. The primary outcome of this study was incidence of supratherapeutic digoxin concentrations in neonates compared to other patients that qualified based on our inclusion criteria. Secondary outcomes included frequency of digoxin therapeutic drug monitoring and clinical evidence of digoxin toxicity in neonates compared to others. Categorical data will be analyzed using the chi-square test while continuous data will be assessed using Mann-Whitney U test as appropriate. **Results/Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Recognize the role of digoxin in pediatric patients with single ventricle congenital heart disease.

Identify potential signs/symptoms indicative of digoxin toxicity.

Self Assessment Questions:

In pediatric patients who are post stage 1 palliation for single-ventricle cardiac disease, digoxin therapy has been associated with a reduced risk of:

- A New onset arrhythmias
- B: Emergent ECMO support
- C: Hospitalization
- D: Interstage mortality

Which of the following signs/symptoms is most likely to be a clinical manifestation of digoxin toxicity?

- A Atrial flutter
- B Blue-tinted vision
- C Hyperkalemia
- D Renal impairment

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-601-L01-P

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

COMPARISON OF URINE ALKALIZATION METHODS IN PATIENTS RECEIVING HIGH DOSE METHOTREXATE

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Purpose: Methotrexate is an anti-folate chemotherapeutic agent used in many pediatric malignancies. Methotrexate is cleared by the kidneys and can precipitate in acidic environments causing crystalluria and subsequent acute renal failure. This can result in further accumulation of methotrexate and increased risk of additional toxicity. Standard practice to prevent nephrotoxicity in patient's receiving high dose methotrexate (HDMTX) includes alkalinizing the urine with sodium bicarbonate, proper leucovorin dosing, and adequate hydration. Alkalinizing the urine with sodium bicarbonate prior to HDMTX, along with proper leucovorin dosing and adequate hydration, facilitates clearance in an effort to prevent nephrotoxicity. This practice has been incorporated into the Children's Oncology Group (COG) protocols, but a critical national shortage of intravenous (IV) sodium bicarbonate has required the use of alternative alkalinizing agents, such as IV sodium acetate and oral sodium bicarbonate products. The objective of this study is to determine whether IV sodium acetate and oral sodium bicarbonate products are comparable to IV sodium bicarbonate in preventing delayed methotrexate clearance and subsequent nephrotoxicity in pediatric patients. **Methods:** Patients who were admitted for HDMTX at Riley Hospital for Children from January 24, 2017 through September 23, 2017 were evaluated in this retrospective cohort study. The control group includes HDMTX cycles prior to the shortage in which patients received IV sodium bicarbonate for urinary alkalization. The treatment group includes HDMTX cycles during the shortage in which patients received IV sodium acetate and sodium bicarbonate products. The electronic medical record was utilized to collect demographic information, malignancy, urine pH, methotrexate dose and levels, alkalinizing agent, fluid rates, serum creatinine, oral alkalinizing agent and dose, leucovorin dose, and the use of glucarpidase. **Results and Conclusions:** To be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the components of standard therapy to prevent methotrexate associated toxicity

Discuss the potential use of IV sodium acetate and/or oral bicarbonate products for urinary alkalization in patients receiving high dose methotrexate

Self Assessment Questions:

Which of the following is a component of standard therapy to prevent methotrexate toxicity?

- A Concomitant MESNA
- B: IV fluids with sodium bicarbonate
- C: Pre-medication with acetaminophen
- D: Two-hour infusion time

Which of the following statements regarding urine alkalization with high dose methotrexate is TRUE?

- A IV sodium acetate has been studied for the purpose of urinary alkali
- B Sodium acetate has shown significantly shorter time to goal urine
- C The median time to methotrexate clearance in pediatric patients re
- D There is no difference in time to goal urine pH between enteral and

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-807-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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ASSESSING THE SAFETY, EFFICACY AND TOLERABILITY OF U-500 IN THE TREATMENT OF VETERANS WITH TYPE 2 DIABETES

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PURPOSE: U-500 regular insulin was developed to address high insulin requirements in diabetic patients. Severe insulin resistance (IR) is frequently encountered in clinical practice. Delivering an appropriate volume of insulin to patients with severe IR is best accomplished by using a more concentrated insulin preparation than standard U-100 insulin. Previous studies have demonstrated reductions in hemoglobin A1c (HbA1c). **METHODS:** A retrospective chart review has been conducted to include adult T2DM patients being treated at VA Illiana receiving U-500 between September 1, 2013 and September 1, 2017. Patients were excluded for review if they received care for T2DM from an outside provider or if they were non-compliant with U-500. Data collected was analyzed using descriptive statistics. Primary endpoints included percent A1c reduction and number of adverse events reported.

RESULTS: 33 patients at VA Illiana Health Care System have been on U-500 during time frame selected. Of the 33 patients, 25 met inclusion criteria. The average A1C for patients on U-100 was 10.2%. After patients were switched to U-500, average A1C was 8.429%. The percent change in A1C is -1.77%. Average fasting SMBG levels decreased by an average of -19 (range: +23 to -42) and evening readings decreased by an average of -60 (range: +16 to -142). Of the 25 patients that were included, 5 reported an adverse event to U-500. All of the 5 adverse events reported were hypoglycemic episodes. Episodes were best explained by change in diet or increase in activity level.

CONCLUSIONS: U-500 is associated with a decrease in average A1C and SMBG levels. U-500 may cause hypoglycemic episodes, which may correlate with diet or exercise changes. U-500 may be a safe and effective option in patients presenting with severe insulin resistance. This quality improvement project has some limitations, including the small sample size included and the retrospective design.

Learning Objectives:

Discuss the safety profile of U500 in patients with insulin resistance diabetes

Outline the effectiveness of U500 as an alternative for patients with insulin resistant diabetes.

Self Assessment Questions:

By how much was A1c lowered when changing from U-100 to U-500?

- A 0.46
- B: 0.86
- C: 1.77
- D: 2.36

What is/are the reason(s) for patients experiencing hypoglycemic events after changing to U-500?

- A Change in diet or exercise
- B Converting from U-100 to U-500
- C Taking extra insulin U-500
- D None identified

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-602-L01-P

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

DEVELOPMENT AND IMPLEMENTATION OF A BLINATUMOMAB MONITORING GUIDELINE AND COLLABORATIVE PRACTICE AGREEMENT TO IMPROVE SAFETY AND TRANSITIONS OF CARE

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Blinatumomab is a CD19 directed bispecific T-cell engager approved for treatment of relapsed or refractory acute lymphoblastic leukemia. Blinatumomab administration is logistically challenging, as each cycle consists of a 28-day continuous infusion. Further complicating administration are serious adverse effects which require hospitalization around time of blinatumomab initiation and dose escalation. Once patients are stable, they can be transitioned to an outpatient infusion pump. The transition in care requires orders to be prepared in advance to transition to an outpatient home infusion pump with set infusion intervals. Preparing blinatumomab orders is a tedious process with high potential for error at multiple steps. Currently at Froedtert Hospital blinatumomab toxicity management is not formally standardized and current workflow requires the physician to prepare and sign orders for outpatient infusions. Opportunities exist to improve toxicity management and pharmacist involvement in the transitions of care ordering process. This could increase efficiency, patient safety, and provider satisfaction, while decreasing errors and incomplete orders.

The primary objective is to create and implement a collaborative practice agreement (CPA) that allows oncology pharmacists to prepare and manage blinatumomab infusion orders when patients transition between the inpatient and outpatient settings. Secondary objectives include developing a blinatumomab monitoring guideline and creating a workflow for the newly approved 7-day bag changes to reduce drug waste and number of infusion center visits. The primary outcome measure is the utility of the CPA, defined by the percentage of blinatumomab infusion orders that are prepared by a pharmacist after implementation of the CPA. Secondary outcome measures include adherence to the monitoring guideline, safety of the CPA, utilization of the 7-day bag changes, and cost savings for the 7-day bag changes.

Learning Objectives:

Describe the FDA approved infusion bag change intervals for blinatumomab administration
Review adverse effects commonly associated with blinatumomab

Self Assessment Questions:

Which adverse effect is commonly associated with blinatumomab?

- A Hemorrhagic cystitis
- B: Cytokine release syndrome
- C: Pulmonary fibrosis
- D: Cardiotoxicity

Which blinatumomab infusion interval option was most recently approved by the FDA?

- A 24 hours
- B 48 hours
- C 72 hours
- D 7 days

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-808-L01-P

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

AUTOMATED TRACKING OF PGY2 INTERNAL MEDICINE RESIDENTS' EXPOSURE TO PATIENT TYPES BASED ON 2017 ASHP ACCREDITATION STANDARDS

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Purpose: In 2017, the American Society of Health-System Pharmacists (ASHP) implemented new accreditation standards for the PGY2 internal medicine residency programs. One of the major changes to the ASHP accreditation standards is the requirement to track the type of patient care experiences that the PGY2 internal medicine residents need to be exposed to as part of their advanced pharmacy training. For each area in medicine, there are topics where the resident is required to encounter through direct patient experience to ensure mastery of common disease states. Also, there are disease states the residents can master through case based applications or direct patient care experiences. The purpose of this project is to develop a tracking tool for the different patient types encountered by the PGY2 internal pharmacy residents during their rotations based on ASHP accreditation standards.

Methods: This is a quality assessment project and is exempt from institution review board approval. The initial step was to develop a cross-walk to match ICD10 codes to each diagnosis listed in the 2017 ASHP PGY2 internal medicine residency accreditation standards appendix. Each PGY2 internal medicine was instructed to create a list in the electronic health record system for the patients that they have reviewed for each of the eight rotations. PGY2 Residents will manually add patients to their specific rotation list. Finally, a report will be developed to provide the patient specific diagnosis and the number of patients with that disease state that have been seen by the PGY2 resident. In addition, a reporting method will be utilized to identify resident experience with patient diagnosis based on notes written, interventions documented, and patient education. The output from both methods will be compared to determine the optimum process to use moving forward. Results/conclusions: These sections will be presented at the

Learning Objectives:

List the required four competency areas based on ASHP Accreditation Standard for Postgraduate Year Two (PGY2) Pharmacy Residency Programs

Explain the competency requirements for topics where case based application is acceptable

Self Assessment Questions:

Which of the following options list the current four competency areas based on 2017 ASHP Accreditation Standard for Postgraduate Year Two (PGY2) Pharmacy Residency Programs ?

- A Patient care, advancing practice and improving patient care, leadership
- B: Patient care, practice management, medication use evaluation, and
- C: Patient care, quality improvement, medication use evaluation, and
- D: Patient care, clinical excellence, medication use evaluation, and patient education

Which of the following is acceptable method to achieve competency in disease states where case based application is acceptable?

- A Direct patient care experience only
- B Patient case presentation only
- C Reading assignments only
- D Direct patient care experience, patient case presentation, or reading assignments

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-809-L04-P

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

EVALUATION OF THE POTENTIAL IMPACT OF AN EMERGENCY DEPARTMENT DEEP VEIN THROMBOSIS OUTPATIENT TREATMENT PATHWAY WITHIN A COMMUNITY HOSPITAL

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Purpose: Patients with an acute deep vein thrombosis (DVT) commonly present to the Emergency Department (ED) and have historically required hospital admission for therapeutic anticoagulation. Previous studies have shown DVTs can successfully and safely be managed in the outpatient setting while reducing unnecessary hospital admission and healthcare costs. The purpose of this study is to evaluate the potential impact of implementing an outpatient treatment program for DVT within a community hospital ED. **Methods:** This study is a retrospective chart review of patients 18 years of age and older diagnosed with a DVT at Baptist Health Floyd ED between July 1, 2016 and June 30, 2017. Chart reviews were conducted for patients meeting study inclusion and exclusion criteria as outlined by study protocol, and evaluated for eligibility for outpatient DVT treatment in lieu of inpatient admission. Qualifying criteria for outpatient management utilized validated risk stratification tools. The primary outcome was to determine the number of hospital-related days that could potentially be averted with outpatient DVT treatment. Secondary outcomes included days of hospitalization, rates of 30-day and 90-day readmission, and potential cost savings for hospital days averted. **Results/Conclusion:** Final results and conclusion to be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the rationale and evidence supporting outpatient treatment for deep vein thrombosis (DVT) in the Emergency Department
Identify the potential impact of implementing an outpatient DVT treatment program within a community hospital Emergency Department

Self Assessment Questions:

Which of the following recommendations from the American College of Chest Physicians on antithrombotic therapy for venous thromboembolism is true?

- A: For DVT without an associated cancer diagnosis, all direct anticoagulants are recommended for patients with a first episode of DVT
- B: Compression stockings are recommended routinely for patients with a first episode of DVT
- C: Anticoagulation should be given for 6 months in patients with a first episode of DVT
- D: Warfarin is no longer recommended for the treatment of DVT

What potential benefit(s) can be seen with an outpatient DVT treatment program?

- A: Increase in patient satisfaction
- B: Reduction in healthcare expenditures
- C: Avoidance of unnecessary hospital admission
- D: All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-810-L01-P

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

MULTI-SITE STUDY EXAMINING THE VALIDITY, INTER-RATER RELIABILITY, AND EASE OF USE OF THE HIGH-ALERT MEDICATION STRATIFICATION TOOL-REVISED (HAMST-R)

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Purpose: The Institute for Safe Medication Practice defines high-alert medications (HAMs) as those that carry a heightened risk of causing significant patient harm when used inappropriately. Unfortunately, minimal literature exists to guide health-systems on methods to systematically identify and develop their own HAM list. Our health-system conducted a pilot study to validate an objective tool to identify HAMs, known as the High Alert Medication Stratification Tool-Revised (HAMST-R). Published results from our single-center study indicate that a HAMST-R score of 4 or higher (out of a possible score of 10) denotes a HAM when compared to control medications. The primary objective of this multi-site study is to assess the external validity of the HAMST-R. Secondary aims are to evaluate inter-rater reliability and ease of use.

Methods: Medication safety experts from health-systems across the United States volunteered to participate. Participants completed a demographic survey, oversaw evaluation of 47 HAMs and 37 controls utilizing HAMST-R, and submitted scores for each medication evaluated. Additionally, participants rated each component of the HAMST-R on its relevance in assessing a medication's risk using a standard scale. Scale and item content validity indexes (S-CVI and I-CVI, respectively) were calculated from these data. Inter-rater reliability will be evaluated using the kappa statistic and ease of use assessed using a mixed methods approach. **Preliminary Results:** The S-CVI of the tool was 0.78, indicating validity. Individual I-CVI scores ranged from 0.45 to 1.0. Further data collection is ongoing to summarize demographic characteristics of participating institutions and to evaluate inter-rater reliability and ease of use of the HAMST-R. **Conclusions:** No previously published literature addresses validity, reliability, or ease of use of a tool for evaluating HAMs. Our tool provides a valid, objective method institutions may implement to evaluate a medication's potential safety risk.

Learning Objectives:

Describe gaps between current safety standards and available published data or tools for high-alert medications.

Identify items from a validated tool that are highly relevant when categorizing medications as high-alert.

Self Assessment Questions:

Which of the following statements best describes current practice as it relates to HAMs?

- A: The Joint Commission requires institutions to maintain a HAM and update it annually
- B: ISMP developed three HAM lists by expert consensus using a validated tool
- C: Medications reported through FDA MedWatch and other medication safety programs are included on HAM lists
- D: Individual institutions develop a process to identify, manage, and update HAM lists

Which of the following items is considered to be highly relevant in determining a HAM?

- A: The medication is primarily restricted to vulnerable populations
- B: Auxiliary labels are applied or the equivalent is present on the label
- C: The medication undergoes an independent double check prior to administration
- D: Verbal and/or telephone orders are allowed at an institution

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-893-L05-P

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

IMPLEMENTING THE USE OF A STANDARDIZED DIABETIC KETOACIDOSIS MANAGEMENT PROTOCOL TO IMPROVE CLINICAL OUTCOMES

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Purpose: Diabetic ketoacidosis (DKA) is an acute, life-threatening complication of diabetes, which more commonly occurs in Type 1 than Type 2 patients. This condition is a complex metabolic state characterized by hyperglycemia, ketoacidosis, and ketonuria. Studies have been performed in the past that show that implementation of a computerized DKA order set and protocol led to improved guideline compliance. Staff at Presence Saint Joseph Medical Center (PSJMC) have voiced concern regarding the confusing nature of the current paper protocol. This confusion has led to a lack of standardization when ordering and following the current protocol. The objective of this study is to determine the effect on the time to DKA resolution following an improved DKA protocol, along with education provided to nurses, doctors, and other medical staff involved in the care of these patients.

Methods: This study was approved by the Institutional Review Board. This study is comprised of a retrospective chart review of DKA orders for patients admitted to PSJMC both prior to and after the implementation of a new protocol and education of medical staff. The primary outcome of this study is to determine time to DKA resolution pre- and post-education. The secondary outcomes of this study include length of stay, severity of diabetic ketoacidosis, and accuracy of orders entered by nurses, doctors, pharmacists, and other medical staff pre- and post-education. **Results:** Analysis of data prior to education demonstrates that the protocol may benefit from alterations in order to make sure that patients are being treated efficiently and effectively upon presentation. Complete results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss vital components of an evidence-based diabetic ketoacidosis protocol

Identify serious complications of diabetic ketoacidosis if not treated appropriately

Self Assessment Questions:

Which of the following is considered a serious complication of a patient with DKA?

- A Persistent, dry cough
- B: Hepatic failure
- C: Cerebral edema
- D: Abnormal bleeding/bruising

Which of the following is considered a routine test used to investigate DKA patients?

- A Prothrombin time
- B Serum electrolyte determinations
- C Thyroid stimulating hormone
- D Lipase

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-811-L01-P

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

THE EFFECT OF DIET ON SODIUM REQUIREMENTS IN PRETERM INFANTS

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Purpose: In the United States, 12 percent of babies are born prior to 37 weeks gestation (preterm) putting them at a higher risk of developing sodium (Na) deficiencies as compared to term infants. Na deficiency has been associated with growth and neurologic developmental delay. Preterm infants often require enteral Na supplementation due to the nutritional composition differences in breast milk. Little evidence is available regarding the incidence of hyponatremia in relation to type of diet and fortification. The objective of this study is to identify preterm neonates at risk for the development of hyponatremia in order to proactively supplement nutritional needs. **Methods:** A retrospective, case-control study was conducted at University of Louisville Hospital. Patients born at less than 32 weeks gestational age from May 2016 to December 2017 were screened for inclusion. The treatment group included patients who received enteral sodium chloride supplementation during hospitalization and were compared to a control group who did not receive Na supplementation. Treatment groups were matched based on birth weight and diet type. Diet types included mother's breast milk with or without fortifier and donor breast milk with or without fortifier. Any patient who received diuretics for greater than three consecutive days, received systemic steroids for greater than five consecutive days, were mechanically ventilated for greater than or equal to 14 days, and had major malformations deemed incompatible with life were excluded. The primary endpoint was the percentage of patients requiring Na supplementation in each diet type. Secondary endpoints included average seven day growth velocity, time to Na initiation, and total daily Na requirement. Chi-square tests, student's t tests, and logistic regression were used for data analysis. **Results/Conclusions:** Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the need for sodium supplementation in the preterm infant population

Describe the effect of diet type on sodium regulation in the preterm infant population

Self Assessment Questions:

1. Sodium deficiency in preterm infants has been linked to which of the following complications:

- A Growth restriction
- B: Developmental delay
- C: Cerebral palsy
- D: All of the above

Which of the following statements is correct?

- A Donor breast milk has a higher sodium concentration when compared to mother's breast milk
- B Mother's breast milk has a higher sodium concentration when compared to preterm infant formula
- C Preterm infant formula has a higher sodium concentration compared to all milk products
- D All milk products contain the same amount of sodium

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-603-L01-P

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

EVALUATION OF FLUID RESUSCITATION WITH ALBUMIN IN REFRACTORY SEPTIC SHOCK PATIENTS: A RETROSPECTIVE, SINGLE CENTER COHORT STUDY

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Septic shock is a life threatening organ dysfunction caused by dysregulated host response to infection with circulatory and cellular dysfunction. Literature supports fluid administration in early stages of sepsis to prevent development of septic shock. The Surviving Sepsis Campaign Guidelines recommend crystalloids over colloids for initial resuscitation fluid based on absence of clear benefit with colloid administration compared to crystalloids. However, several studies have shown secondary analyses that suggest trends in potential benefit with albumin, a colloid, in patients with refractory septic shock. This retrospective, single center, cohort study included adult patients admitted to an intensive care unit with a diagnosis of refractory septic shock. Refractory septic shock is defined as MAP \leq 65 mmHg despite a norepinephrine equivalents (NEeq) of \geq 10 mcg/min and fluid resuscitation \geq 30 ml/kg of total intravenous crystalloid intake within the previous 24 hours. The primary objective of this study compared total daily average and total average NEeq at the start of refractory septic shock until shock resolution, defined as no vasopressor requirements for 24 consecutive hours, in patients receiving albumin with crystalloids versus crystalloids alone. Secondary objectives included comparison of total daily and total overall fluid administrations, in-hospital mortality, ventilator free days, hospital length of stay (LOS), intensive care unit LOS, and incidence of renal replacement therapy and acute respiratory distress syndrome. Amount of fluids administered, NEeq, and percentage of mean arterial pressure change from baseline, defined as time of first albumin administration, will be described in the albumin with crystalloid subgroup. Continuous data were analyzed using student t-test or Wilcoxon Rank Sum and categorical data were analyzed using chi-square or Fischer exact test, as appropriate. Kaplan-Meier curves and log-rank tests were utilized to assess mortality outcomes. Data collection and analysis are ongoing.

Learning Objectives:

Review the current recommendations for treatment of sepsis provided by the 2016 Surviving Sepsis Campaign Guidelines
Discuss the impact of albumin with crystalloids on vasopressor requirements in refractory septic shock patients

Self Assessment Questions:

Based on the 2016 Surviving Sepsis Guidelines, at least 30 mL/kg of IV crystalloid fluids should be administered within what time frame for patients with sepsis-induced hypoperfusion?

- A: Within 24 hours
- B: Within 12 hours
- C: Within 6 hours
- D: Within 3 hours

What group of patients at enrollment within the Albumin Italian Outcome Sepsis (ALBIOS) subgroup analysis showed benefit with albumin administration?

- A: Septic patients
- B: Severe septic patients
- C: Septic shock patients
- D: Traumatic brain injury patients

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-604-L01-P

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

RETROSPECTIVE EVALUATION OF THE EFFICACY OF VARENICLINE VERSUS BUPROPION SA FOR SMOKING CESSATION AT THE JESSE BROWN VA MEDICAL CENTER

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Purpose: Smoking remains the leading preventable cause of premature death in the United States. Although there has been a decline in the prevalence of smoking, rates remain high in patients with substance abuse and mental illness. Studies have found that compared to the general patient population, VA patients tend to have poorer health status and more medical conditions including a higher prevalence of mental illness. The EAGLES trial found that varenicline had higher abstinence rates compared to bupropion in those with and without a history of psychiatric disorders. Although the EAGLES trial included patients with psychiatric disorders, the generalizability of the results to the veteran population may be limited by the fact that those included in the psychiatric cohort had to be clinically stable with no recent or concurrent substance abuse other than nicotine. Additionally, individuals with severe COPD, "clinically significant" cardiovascular disease or "severe acute or chronic" medical conditions were excluded from the study. Furthermore, most of the study participants were Caucasian and female. Jesse Brown VA Medical Center (JBVAMC) serves a predominantly African-American, male population. The aim of this study is to evaluate the efficacy of varenicline versus bupropion SA among veterans at JBVAMC. Methods: This study is a retrospective, electronic chart review of patients who were prescribed and received varenicline or bupropion SA between January 1, 2012 to August 1, 2016. The primary endpoint is abstinence from smoking at 3 months post-treatment (+/- 1 month) with varenicline versus bupropion SA. Secondary endpoints include abstinence from smoking at 6 and 12 months post-treatment (+/- 2 months), abstinence of smoking at 3, 6, and 12 months post-treatment for patients with or without a history of mental illness, and the percentage of patients who discontinued varenicline or bupropion SA along with reason for discontinuation. Results/Conclusions: Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the impact of varenicline and bupropion SA on smoking cessation.

Identify differences in the rates of smoking cessation among patients with or without a history of mental illness.

Self Assessment Questions:

The EAGLES Trial was a large double-blind randomized study evaluating the efficacy of varenicline versus bupropion SA for smoking cessation among a cohort of patients with and without a history of psy

- A: Varenicline had lower abstinence rates compared to bupropion for
- B: Varenicline had higher abstinence rates compared to bupropion for
- C: There was no difference between varenicline and bupropion for
- D: Varenicline had higher abstinence rates compared to bupropion for

Cigarette smoking is the largest preventable risk factor for morbidity and mortality in the United States. Which of the following is true in regards to smoking rates/behavior among patients with a his

- A: Patients with mental illness have higher smoking rates than the ge
- B: Patients with mental illness have lower smoking rates than the bas
- C: Smoking rates between patients with and without a history of ment
- D: Patients with mental illness are less likely to quit smoking than tho

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-812-L01-P

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

EVALUATION OF ACUTE BACTERIAL SKIN AND SKIN STRUCTURE INFECTION (ABSSSI) TREATMENT AND IMPLEMENTATION OF A SINGLE-DOSE DALBAVANCIN PROTOCOL IN THE EMERGENCY DEPARTMENT (ED).

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Statement of Purpose: The purpose of this study is to examine the role of dalbavancin, a long-acting lipoglycopeptide, for patients who require intravenous antibiotics for ABSSSI. Utilization of single-dose dalbavancin provides advantages in the ED including increased compliance, reduced total therapy cost, avoidance of hospital admissions and prevention of associated nosocomial infections. Data collected will be used to guide effective utilization and candidate selection for dalbavancin therapy. **Statement of Methods Used:** Retrospective analysis of patients admitted for ABSSSI was completed prior to adding dalbavancin to formulary at Union Hospital Terre Haute. The parameters assessed for these patients includes disease severity, comorbidities, antibiotic regimen, culture data, length of stay (LOS), ED visits, and readmission frequency. For patients admitted for ABSSSI average facility cost of an admission was \$5,561.39 with an average LOS of 3.6 days (\$1,544.83/day). Results were compared to dalbavancin acquisition cost of \$1,986.60 per single-dose at 340b pricing for outpatient administration. Research data was utilized to develop an ED protocol outlining appropriate dalbavancin use by pharmacy and ED staff. The protocol includes required criteria to qualify for dalbavancin administration as well as guidance regarding observation, follow-up, and concomitant antibiotic administration. Educational materials regarding prescribing information and dosing were developed and presented to ED providers prior to utilization of dalbavancin. Candidates for dalbavancin treatment will be evaluated on culture data, recurrent ED visits or hospital admissions, and follow-up appointment compliance. Patient outreach to assess tolerance and success of therapy will be conducted by phone within 72 hours and, again, at 10 to 14 days after dalbavancin administration. Post-intervention data collected will be used to modify current treatment practices in the ED to improve patient satisfaction, ABSSSI cost, and admission rates. **Summary of Preliminary Results to Support Conclusion & Conclusions Reached:** Data collection and analysis are currently in progress.

Learning Objectives:

List inclusion and exclusion criteria for dalbavancin administration.
Define advantages and disadvantages of single-dose dalbavancin administered in the ED.

Self Assessment Questions:

Dalbavancin spectrum of activity covers all microorganisms except:

- A: Enterococcus faecalis (vancomycin-susceptible isolates)
- B: Staphylococcus aureus (methicillin-resistant isolates)
- C: Escherichia coli
- D: Streptococcus pyogenes

Which of the following requires a dose reduction for dalbavancin?

- A: Creatinine clearance less than 30 mL/min
- B: Patients on intermittent hemodialysis
- C: Age greater than 70 years of age
- D: Patients with BMI greater or equal to 30 kg/m²

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-605-L01-P

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

EVALUATION OF HEMATOLOGY/ONCOLOGY PHARMACY WORKLOAD AND ESTABLISHMENT OF A BUSINESS PLAN FOR APPROPRIATE STAFFING FOR DISTRIBUTIVE AND CLINICAL FUNCTIONS

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Purpose: The hematology/oncology (hem/onc) department at the Cincinnati Veterans Affairs Medical Center (VAMC) has experienced an increase in workload over recent years without an increase in pharmacy staffing. The primary objective of this study is to analyze the current workload of the pharmacist in the hematology/oncology department and determine the need for an additional full-time equivalent (FTE).

Methods: This quality improvement project utilizes the computerized patient record system (CPRS) at the Cincinnati VAMC to do a retrospective chart review of patients that have received care from the hematology/oncology department between the dates of January 1, 2013 to December 31, 2016. The number of hem/onc clinic visits per year, unique oral chemotherapy prescriptions dispensed per year, and hazardous drug infusion consults completed per year will be analyzed to assess the pharmacist's workload. This data will be collected electronically without patient identifiers and will be evaluated by one PGY1 pharmacy resident and two clinical pharmacy specialists. The project will measure the workload of pharmacists in the hem/onc department by analyzing the number of patients being treated with intravenous or oral chemotherapy. To account for the amount of hazardous drug products being used by other departments, the number of consults per year the hem/onc pharmacist completes will also be evaluated. The information obtained in this assessment will be used to evaluate the need for a second FTE and, if justified, utilized to develop a business plan. Other potential advancements which could be implemented with the addition of a second pharmacist will also be explored. This includes double-check of chemotherapy, rounding on inpatient chemotherapy patients, more extensive patient counseling, and establishment of an outpatient clinic to manage long-term oral chemotherapy. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the responsibilities of a hematology/oncology pharmacist and their impact on patient care
Identify trends in cancer prevalence and relate the results to a hematology/oncology pharmacist's workload

Self Assessment Questions:

A study published in 2016 demonstrated that a pharmacist led outpatient oral chemotherapy clinic had a ____ increase in adherence rates compared to usual care.

- A: 15%
- B: 23%
- C: 42%
- D: 75%

A study published by Chen et al assessed the economic burden of chronic lymphocytic leukemia with oral therapies. The results demonstrated the out-of-pocket cost for Medicare patients was \$9,200 in 20

- A: \$20,000
- B: \$37,000
- C: \$57,000
- D: \$75,000

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-813-L04-P

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

IMPLEMENTATION OF TRADITIONAL GLYCEMIC CONTROL IN CRITICAL CARE PATIENTS: PREVENTION OF HYPOGLYCEMIC OCCURRENCES IN THE INTENSIVE CARE UNIT.

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Purpose: Intensive glycemic control is utilized in the intensive care unit (ICU) to achieve and maintain a blood glucose level of 100 to 150 mg/dL at a regional community hospital. Such goals put patients at higher risk of experiencing hypoglycemia defined as a blood glucose value less than 70 mg/dL. Institutional reports from glucose monitoring software show that the patients experience hypoglycemia frequently. The primary outcome is to align the hospital policy and practice with current guidelines in order to reduce the frequency of hypoglycemic episodes while still maintaining glycemic control. **Method:** To decrease the occurrence of hypoglycemic states within the ICU, current institutional policies were amended to align with current glycemic control guidelines of 140 to 180 mg/dL, as suggested by the American Diabetes Association. Recommendations were reviewed by the diabetes team for modification and approval before being presented to the physician team for acceptance. Order sets were modified within the electronic medical record to support these changes and education was provided to ICU nursing staff, physicians, and pharmacists. Electronic medication records were utilized to identify patients with an insulin drip order within the ICU. The following data is being collected: age, gender, ethnicity, history of diabetes, and blood glucose readings while on the insulin drip. Data pre- and post- policy changes will be presented for frequency of hypoglycemic episodes and time to glycemic control. **Summary of Results:** Preliminary results and conclusions will be presented during the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the definition of clinically significant hypoglycemia as determined by the American Diabetes Association.

Identify the proper glycemic target for inpatient therapy, based on recommendations from the American Diabetes Association.

Self Assessment Questions:

According to the American Diabetes Association, what is considered the threshold of clinically significant hypoglycemia that requires corrective treatment?

- A 120 mg/dL
- B: 100 mg/dL
- C: 80 mg/dL
- D: 70 mg/dL

What is the glycemic target for inpatient therapy?

- A >200 mg/dL
- B 140-180 mg/dL
- C 100-150 mg/dL
- D <100 mg/dL

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-894-L05-P

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

IMPLEMENTATION OF A PHARMACIST-DRIVEN TRANSITIONS OF CARE CLINIC

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Purpose: Transitions of care (TOC) are pivotal points in the healthcare continuum. As patients move from high-level, acute care to the ambulatory setting, the possibility of medication errors exists. It's estimated that 30% of medication lists at hospital discharge contain at least one discrepancy. Furthermore, nearly 20% of discharged patients will experience an adverse event within 3 weeks of leaving the hospital, more than half of which are preventable. These errors and preventable adverse events lead to unnecessary readmissions and redundant expenditure of healthcare resources. Currently, the JBVA discharge pharmacists conduct medication reconciliation with the medical team before each patient is discharged. Medication counseling is provided to the patient prior to discharge when possible. The current system is effective; but to augment the existing services, a post-discharge TOC clinic was piloted in one clinic starting in August of 2017. Its impact on clinical outcomes and readmissions is currently unknown. **Methods:** The study involves a retrospective, matched cohort comparison of readmission rates between the groups before and after implementation of a pharmacist-driven TOC clinic. All patients who received post-discharge medication reconciliation services from a pharmacist and were discharged between August 1, 2017 and December 1, 2017 are included. Retrospectively, patients discharged from the JBVA between January 1, 2017 and December 1, 2017 who did not receive post-discharge medication reconciliation services were reviewed. Cases and controls are matched in a 1:2 ratio based on admission diagnosis and medication changes made upon hospital discharge. The study's primary objective is to determine whether post-discharge follow-up from a pharmacist improves readmission rates and clinical outcomes. **Descriptive statistics, Chi-square test, Fisher's exact test, and unpaired t test** will be used to analyze the data. **Results/Conclusions:** To be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the complexity of care transitions and how it increases the risk for errors

Explain the growing role of clinical pharmacists in improving transitions of care

Self Assessment Questions:

According to the literature, what percentage of discharge medication lists contain at least one discrepancy?

- A 10%
- B: 70%
- C: 30%
- D: 45%

Which of the following is true regarding pharmacist involvement in care transitions?

- A Pharmacists have not demonstrated benefit in care transitions
- B Interdisciplinary involvement has been associated with improved c
- C Evidence suggests that pharmacists should be limited to filling anc
- D There is currently no evidence on the matter

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-814-L04-P

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

THE IMPLEMENTATION OF A NOVEL ALCOHOL WITHDRAWAL PROTOCOL WITHIN A LARGE, TEACHING HOSPITAL

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Purpose: Alcohol use disorder (AUD) is an extremely prevalent disease with a lifetime prevalence of 17.8%. It is even more common in the intensive care unit (ICU), with up to one-third of patients presenting with concomitant AUD. These patients experience worse outcomes, including prolonged mechanical ventilation and increased hospital length-of-stay. The incidence of alcohol withdrawal syndrome (AWS) increases in patients admitted to the ICU and presentations can be more severe and detrimental. The objective of this study is to determine if the implementation of a novel protocol can have a positive impact on the management of AWS in the ICU. **Methods:** This study is a quality improvement, pre- and post-interventional study. Data will be collected in a retrospective manner via chart review prior to and after the implementation of a novel alcohol withdrawal protocol. Patients will be identified via the ordering of the institution's Clinical Institute Withdrawal Assessment for Alcohol (CIWA) protocol as well as international classification of diseases (ICD)-10 codes for alcohol-related disorders. The protocol will include the implementation of the prediction of alcohol withdrawal severity scale (PAWSS) risk stratification tool to determine who requires pre-emptive alcohol withdrawal treatment. Patients in both the pre- and post-interventional groups will be assessed via CIWA scores to assess severity of withdrawal, average total benzodiazepine or barbiturate doses administered per patient, ICU length-of-stay, hospital length-of-stay and duration of mechanical ventilation. Additionally, the frequency of points attributed to each PAWSS question will be collected to assess correlation between AUD characteristics and withdrawal. Data will be collected and compared between groups to determine the benefits of the AWS protocol utilization in the ICU. **Results:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define alcohol withdrawal syndrome and identify clinical manifestations of alcohol withdrawal in the critically ill

Discuss the impact of a novel alcohol withdrawal protocol on the management of alcohol withdrawal in the critical care setting

Self Assessment Questions:

Which of the following are negative outcomes associated with alcohol abuse and withdrawal in the critical care setting?

- A: Prolonged mechanical ventilation
- B: Increased intensive care unit and hospital length-of-stay
- C: Increased incidence of delirium
- D: All of the above

Which of the following assessment tools has been validated for alcohol withdrawal syndrome risk stratification in the medically ill?

- A: Clinical Institute Withdrawal Assessment for Alcohol (CIWA) Scale
- B: Total Alcohol Withdrawal Syndrome Scale (AWS)
- C: Prediction of Alcohol Withdrawal Severity Scale (PAWSS)
- D: No tools have been validated for risk stratification in the medically ill

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-607-L01-P

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

DURATION OF ANTIBIOTIC THERAPY FOR LOWER RESPIRATORY TRACT INFECTION AT A COMMUNITY HOSPITAL FOLLOWING PHARMACIST PROCALCITONIN ORDERING PROTOCOL

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Background: Procalcitonin is a chemical biomarker that may be elevated in patients with lower respiratory tract bacterial infections. Procalcitonin, along with clinical assessment, can help determine if antibiotics are indicated for patients presenting with respiratory symptoms when chronic obstructive pulmonary disease, heart failure, and/or pneumonia are part of the differential diagnosis. Previous studies have shown that pharmacist-coordinated procalcitonin monitoring decreases antibiotic duration and shortens length of stay. Mercy Health Muskegon started utilizing onsite procalcitonin testing in June of 2017. A pharmacist ordering procalcitonin protocol was approved in January of 2018 and was implemented in February of 2018. **Purpose:** To evaluate the impact on duration of antibiotic therapy in patients presenting with lower respiratory tract symptoms before onsite procalcitonin utilization, after onsite procalcitonin utilization, and following a pharmacist procalcitonin ordering protocol. **Methods:** A pharmacist procalcitonin ordering protocol was developed in conjunction with pharmacy and infectious disease. The protocol was approved through Pharmacy and Therapeutics and Medical Executive committees at Mercy Health Muskegon prior to institution. Data was collected via retrospective chart review. Inclusion criteria consisted of adult inpatients with a diagnosis-related group code of heart failure, pneumonia, or chronic obstructive pulmonary disease who received antibiotics or had a procalcitonin drawn. Patients were excluded if they had a documented coexisting infection or if the first procalcitonin was ordered more than 24 hours after admission. The primary outcome was duration of antimicrobial therapy. The secondary outcomes were percent utilization of procalcitonin monitoring, length of stay, and provider specialty utilizing procalcitonin. **Results:** Pending. **Conclusion:** Pending

Learning Objectives:

Explain the role of procalcitonin monitoring in patients with lower respiratory tract infections

Discuss the potential benefit of a pharmacist procalcitonin ordering protocol

Self Assessment Questions:

Which of the following is true regarding procalcitonin?

- A: Recent trauma may cause a falsely elevated procalcitonin
- B: Procalcitonin is elevated in viral infections
- C: A procalcitonin level <0.05 ng/mL is considered positive
- D: Procalcitonin peaks between 36 to 72 hours

What is a potential benefit of a pharmacist ordering procalcitonin protocol?

- A: Increase antibiotic duration
- B: Increase length of stay
- C: Increase utilization of procalcitonin monitoring in appropriate patients
- D: Decrease the amount of time physician spends providing direct patient care

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-608-L01-P

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

EFFECTIVENESS OF A QTc INTERVAL-DRUG INTERACTION CHECKING CLINICAL DECISION SUPPORT STRATEGY (CDS) IN THE ELECTRONIC HEALTH RECORD

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Vendor-based electronic health record (EHR) systems integrate drug-drug interaction (DDI) checking utilizing metadata from third-party drug knowledge systems. However, vendor-based DDI's, including the QTc-QTc prolonging category, can typically result in false-positive alerts. Michigan Medicine's EHR recently introduced the capability to report discrete QTc interval results for CDS. As a result, custom alerts could be built based on the drug ordered and the patient's QTc interval. Thus, research was conducted to determine best practices using two separate CDS strategies built to notify clinicians upon order entry of a QTc prolongation medication in patients with a QTc \geq 500 ms. This is a retrospective, single-center study in Michigan Medicine's inpatient hospital setting. The CDS support strategies were implemented in a time series dependent manner. The first strategy is described as a passive alert that displays the last three patient-specific QT interval results upon order entry of a QTc prolongation medication. After completion of the first CDS strategy, a second CDS strategy informing clinicians of patient specific risk factors upon order entry was implemented. Data was collected into three separate time intervals— frequency of QTc prolongation medications prescribed at baseline, during the passive alert CDS strategy, and during the second CDS strategy. Data was collected for patients who met inclusion criteria for a two-month duration within each phase. The primary outcome was the frequency of prescribed QTc prolongation medications in patients with a documented QTc \geq 500 ms per patient day. We hypothesize the second CDS alert strategy will significantly reduce the frequency of QT prolongation medications ordered compared to baseline and the passive alert. Additionally, we hypothesize the passive alert will significantly reduce the frequency of QTc prolongation medications ordered compared to baseline. Results and conclusions to be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall risk factors for Torsades de Pointes

Recognize medications with known risk for Torsades de Pointes

Self Assessment Questions:

A risk factor for Torsades de Pointes is:

- A Hypokalemia
- B: Hyperlipidemia
- C: Tachycardia
- D: Male gender

A medication with known risk for Torsades de Pointes is:

- A Cyclobenzaprine
- B Ciprofloxacin
- C Oxycodone
- D Amoxicillin

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-895-L05-P

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

ECONOMIC IMPACT OF INPATIENT TREATMENT OF ACUTE BACTERIAL SKIN AND SKIN STRUCTURE INFECTIONS (ABSSSI) AND POTENTIAL COST SAVINGS ASSOCIATED WITH OUTPATIENT TREATMENT WITH DALBAVANCIN

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The aim of this retrospective study is to evaluate the economic impact of inpatient treatment of acute bacterial skin and skin structure infections (ABSSSI) compared to available outpatient long-acting intravenous (IV) antibiotics. This study is a single-center, retrospective chart review. Patients 18-85 years old with an ICD-10 code primary diagnosis of cellulitis or abscess from July 1, 2016 through July 31, 2017 were screened for enrollment. Patients were excluded if they had an unapproved indication for the use of a lipoglycopeptide; had a severe infection defined as sepsis or septic shock, necrotizing fasciitis or gas gangrene, osteomyelitis, endovascular infection, diabetic foot infections; critical limb ischemia; immunosuppression; had undergone a surgical procedure during the visit; use of IV antibiotics for longer than 14 days; had a CCI score of \geq 2; or had a primary diagnosis other than ABSSSI. After patients were screened for exclusions, those remaining were included as qualifying for outpatient IV antibiotic therapy. The hospital charges for included patients were then compared with current economic data of lipoglycopeptides for potential cost savings. The primary objective was to determine the main reason for hospital admission and observe the total charges associated with that admission. The secondary objective was the comparison of the primary objective to current economic data of dalbavancin and oritavancin in patients closely matching the study population. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the pharmacologic characteristics of long-acting lipoglycopeptides

Recognize patients who qualify for outpatient IV antibiotic therapy

Self Assessment Questions:

Which of the following characteristics of the lipoglycopeptides offer a unique treatment option for patients with ABSSSI?

- A No drug-interactions
- B: Oral formulation
- C: Long half-life
- D: Inexpensive

Which patient would qualify for outpatient therapy with a lipoglycopeptide?

- A A patient with facial cellulitis that failed outpatient antibiotics
- B A patient with right leg abscess, MRSA positive, with sepsis
- C A patient with left hand cellulitis and diabetes and COPD
- D A patient with right arm abscess and MRSA culture in blood

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-610-L01-P

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

PRESCRIBING AND UTILIZATION PATTERNS OF ALBUMIN IN PATIENTS WITH LIVER DISEASE AND EITHER ACUTE KIDNEY INJURY OR HEPATORENAL SYNDROME

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Purpose: Due to the increased use and cost of albumin an evaluation of prescribing and utilization patterns of albumin in patients with liver disease and either acute kidney injury (AKI) or hepatorenal syndrome (HRS) was conducted at The Ohio State University Wexner Medical Center (OSUWMC). **Methods:** A single-center, retrospective evaluation was performed using OSUWMC's Integrated Health Information System (IHIS). Albumin orders were entered by providers using either the HRS panel in the albumin order set, or via a free-text entry. Patients were randomly selected for inclusion if they were administered albumin between January and July 2017 for the indication of active liver disease with AKI or HRS as noted by the provider. Data collection included baseline demographics, albumin indication, dose, duration, peak albumin level, renal function, consult orders, ordering method, and ordering service were evaluated. **Results:** A total of 773 patients were identified for review with 100 patients randomly selected for inclusion. The majority of albumin (63%) was prescribed by the hepatology and general medicine services. Twelve (18%) patients received albumin without a hepatology or nephrology consult. Indications for albumin were categorized as suspected or confirmed HRS (74%), AKI in cirrhosis (15%), AKI (5%), ascites/diuresis (4%), cirrhosis (1%), and albumin replacement (1%). Only forty-seven percent of orders were dosed appropriately per the OSUWMC guidelines. The median albumin dose per day was 88 [66-105] g and the median duration of albumin therapy was 2.7 [1.9-4.3] days. The median peak albumin level amongst all patients was 3.6 [3.1-4.1] g/dL. The median change in serum creatinine from baseline to 72 hours post albumin was -0.07 [-0.4 - 0.2] g/dL. Sixteen (16%) patients required dialysis. Ten (62.5%) patients were continued on albumin while receiving dialysis. **Conclusion:** Results from the final analysis will be presented to the appropriate committees, services, and departments for review and recommendations.

Learning Objectives:

Review existing recommendations for the pharmacological treatment of hepatorenal syndrome

Identify the current guideline recommendations for the appropriate dosing of albumin for suspected or confirmed hepatorenal syndrome

Self Assessment Questions:

Which of the following is the most appropriate drug regimen for a patient with HRS?

- A Intravenous albumin, oral propranolol, and subcutaneous octreotide
- B Oral spironolactone plus oral furosemide
- C Intravenous albumin, oral midodrine, and subcutaneous octreotide
- D Intravenous albumin, intravenous ceftriaxone, and oral midodrine

Per the American Association for the Study of Liver Diseases, what is the recommended albumin dose for suspected or confirmed HRS?

- A 1.5 g/kg for 7 days
- B 1 g/kg (maximum of 100 g/day) followed by 25-40 g per day
- C 1.25 g/kg indefinitely
- D 50 g every 8 hours for 14 days

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-606-L01-P

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

ASSESSING SAFETY AND EFFICACY OF DPP-4 INHIBITORS AMONG NON-INSULIN VETERAN PATIENTS

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Purpose: According to the Centers for Disease Control and Prevention, 30.3 million people in the United States have diabetes. Within the Veteran's Health Administration nearly one in four veterans receiving care from the VA have diabetes, most of which have type 2 diabetes. Despite guideline therapy recommendations, it is not always clear which anti-diabetic agent is most appropriate after first line therapy with metformin. Saxagliptin, a dipeptidyl peptidase-4 (DPP-4) inhibitor, is one option and is the formulary DPP-4 inhibitor at the VA. Currently in clinical practice at the VA, there have been observations raising questions of the effectiveness of DPP-4 inhibitors. Therefore, this study looks to determine efficacy and safety of DPP-4 inhibitors in non-insulin veteran patients and better determine which patients would benefit from addition of these agents. **Methods:** A list of patients prescribed DPP-4 inhibitors at the Richard L. Roudebush VA Medical Center from August 1, 2016 to August 1, 2017 was generated. To be included in this retrospective chart review, patients must have been 18 years or older, have a diagnosis of type 2 diabetes mellitus, have use of DPP-4 inhibitor for at least 3 months, and have baseline and subsequent A1c available in medical record. Patients were excluded if on insulin therapy. The primary outcome is change in hemoglobin A1c from baseline. Secondary outcomes include change in fasting blood glucose from baseline, change in weight from baseline, and portion of patients who achieved a hemoglobin A1c <7%. These outcomes will be analyzed using a paired t test and descriptive statistics. **Results and Conclusions:** Results and conclusions are pending and will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify dipeptidyl peptidase-4 (DPP-4) inhibitors' and other anti-diabetic medications' place in therapy per recommendations outlined by the American Diabetes Association guidelines

Describe factors to consider when initiating DPP-4 inhibitors including efficacy, compliance, and safety

Self Assessment Questions:

According to the American Diabetes Association, an A1c of \geq ___% indicates a patient should be considered for initiation of dual therapy.

- A $\geq 7\%$
- B $\geq 8\%$
- C $\geq 9\%$
- D $\geq 10\%$

Which of the following is a common side effect patients may experience while taking saxagliptin?

- A Peripheral edema
- B Diarrhea
- C Elevation in LFTs
- D Upper respiratory infection

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-815-L01-P

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

APPROPRIATE ANTIBIOTIC PRESCRIBING IN PRIMARY CARE CLINICS FOR UPPER RESPIRATORY INFECTION AND URINARY TRACT INFECTION

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Purpose: The CDC has declared antimicrobial resistance to be one of the greatest current public health threats. Inappropriate antibiotic prescribing may approach close to 50% of all outpatient antibiotic prescribing. Antimicrobial resistance is spurred by multiple factors including inappropriate prescribing of antibiotics such as wrong drug, dose, or duration. Antimicrobial stewardship programs are a current Joint Commission Medication Management standard for all hospitals, critical access hospitals, and nursing care centers, but there is limited data on implementation and success of outpatient antimicrobial stewardship programs. Primary care physicians prescribe about half of antibiotics in the United States, so targeting antibiotic prescribing in primary care clinics will help to cut back on overall inappropriate prescribing. In order to be successful, antimicrobial stewardship programs must include a variety of components that target both providers and patients. A new outpatient antimicrobial stewardship initiative will be implemented at this facility starting in October 2017. The purpose of this project is to assess the impact of the new outpatient antimicrobial stewardship initiative. **Methods:** All outpatient antibiotic prescriptions written by facility primary care providers from October and November 2017 will be reviewed for indication. Prescriptions written for urinary tract infection and upper respiratory infection will be further reviewed for appropriateness including whether or not the antibiotic was indicated, as well as whether the dose and duration were correct for the indication. This information will be shared with the prescribers as a part of the outpatient antimicrobial stewardship initiative during the months of January and February 2018. After this intervention, all outpatient antibiotic prescriptions from March and April 2018 will be reviewed as above. The rates of correct prescribing will be compared between the two time periods to assess the impact of the intervention. **Results and Conclusions:** Results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define the recommended components of an outpatient antimicrobial stewardship program.

Describe the impact of an antimicrobial stewardship program on primary care antibiotic prescribing practices.

Self Assessment Questions:

What percentage of outpatient antimicrobial prescriptions are anticipated to be inappropriate?

- A: 34%
- B: 42%
- C: 50%
- D: 71%

Which of the following is a recommended core element of an outpatient antimicrobial stewardship program per the Centers for Disease Control and Prevention (CDC)?

- A: Advice
- B: Action
- C: Consensus
- D: Complacency

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-609-L01-P

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

EVALUATION OF THE IMPACT OF STATIN THERAPY ON TAXANE INDUCED HEPATOTOXICITY

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Purpose: Hepatotoxicity is a commonly known class effect of statin therapy as well as numerous chemotherapy agents, in particular taxane derivatives. It is unknown if concomitant use of these agents increases risk of hepatotoxicity. However, should it pose no additional risk, unnecessary dose reductions or delays in taxane therapy can be avoided, as the treatment goal is cure for many breast cancer patients. By determining if there is an increased risk of hepatotoxicity in patients who receive statins with taxane therapy, providers may be able to make modifications to a patient's medications prior to initiating treatment, minimizing risk of toxicity, while maximizing therapeutic benefit. The objective of this study is to evaluate the impact of statin therapy on the development of paclitaxel and nanoparticle albumin bound (nab) paclitaxel induced hepatotoxicity in order to optimize therapy in patients with breast cancer. The primary outcome will assess the incidence of hepatotoxicity associated with taxane therapy. Secondary outcomes include: the impact of hepatotoxicity on overall treatment tolerability and the incidence of hepatotoxicity of patients on statin therapy compared to those who were not. **Methods:** This single center, retrospective, cohort study with nested case control evaluated adult female patients treated with paclitaxel or nab-paclitaxel for breast cancer at Henry Ford Health System from October 2013 to July 2017. Patients were divided into two groups, those that received concomitant statin therapy with taxane therapy and those that did not. Groups were further divided into whether or not patients developed hepatotoxicity during therapy. Logistic regression will be used to measure the relationship between hepatotoxicity and concomitant statin therapy with paclitaxel or nab-paclitaxel. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify adverse effects of paclitaxel and nab-paclitaxel

Discuss the impact of concomitant statin and taxane therapy in breast cancer patients

Self Assessment Questions:

Which of the following is an adverse effect of paclitaxel and nab-paclitaxel?

- A: Cardiotoxicity
- B: Hepatotoxicity
- C: Pulmonary toxicity
- D: Ototoxicity

Hepatotoxicity during taxane therapy may lead to which of the following?

- A: Dose reduction
- B: Dose delay
- C: Poor clinical outcomes
- D: All the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-611-L01-P

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

DEVELOPMENT OF A COMPREHENSIVE CRITICAL MEDICATION STOCKING LIST ACROSS A MULTI-CAMPUS HOSPITAL SYSTEM

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Background: In a poisoning, overdose, or toxic exposure, critical medications, such as antidotes and reversal agents, must be available in order to optimize treatment. The effectiveness of these medications in reducing morbidity and mortality often hinges upon appropriate and time sensitive administration. A potential barrier to the timely administration of critical medications exists if these agents are not immediately accessible or inadequately stocked. However, there are limited and conflicting published studies detailing specific agents and recommended stocking quantities. **Purpose:** The purpose of this study is to create a comprehensive list of critical medications to stock, including defined par levels, for use at a multi-campus community hospital. **Methods:** A literature review was performed and included expert consensus guidelines, state-wide poison control recommendations, and stocking quantities provided by various hospitals. From this review, a list of critical medications and recommended stocking quantities was created. The appropriateness and practical application of this list was then reviewed by emergency medicine pharmacists, providers, and emergency preparedness personnel. A gap analysis was performed comparing the recommended stocking quantities of these critical medications to current quantities across three Mercy Health West Michigan area hospitals. A hazard vulnerability assessment was utilized for customized application in determining which antidotes to stock. For agents deemed inessential to stock, due high cost and low utilization, a method to obtain these agents was defined. The primary outcome of this study was to evaluate the compliance of our current antidote stock to that which is recommended by the expert consensus guidelines. Secondary endpoints included number of critical medications overstocked or understocked, and estimated cost to become fully compliant with the consensus recommendations. **Results:** Pending **Conclusion:** Pending

Learning Objectives:

Discuss advantages of developing a comprehensive critical medication stocking list
Identify potential resources in creating appropriate critical medication par levels

Self Assessment Questions:

Which of the following are potential advantages of developing comprehensive medication stocking list?

- A Reduce morbidity and mortality
- B: Decrease time to administration of medications
- C: Comply with federal and regulatory environment
- D: All of the above

Which of the following resources could be utilized in guiding the creator of critical medication par levels?

- A State poison control recommendations
- B Expert-consensus guidelines on stocking antidotes
- C Critical medication stocking quantities of comparable institutions
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-816-L04-P

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

IMPROVE APPROPRIATE IDENTIFICATION AND MANAGEMENT OF HEPARIN INDUCED THROMBOCYTOPENIA (HIT)

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Purpose: Heparin induced thrombocytopenia (HIT) is a rare complication for patients treated with heparinoid products that can cause significant morbidity and mortality. This adverse reaction can also lead to increased hospital length of stay and increased cost associated with HIT diagnosis and treatment. Patients suspected of HIT are often transitioned to a non-heparinoid anticoagulant, such as a direct thrombin inhibitor (DTI), which is more expensive and requires more intensive monitoring. Early diagnosis and treatment of HIT are essential for positive outcomes. Current institutional-specific guidelines recommend testing for HIT only if the 4T score, a clinical scoring system that assesses the probability of HIT, is greater than three. Recent studies have shown that providers frequently order PF4 assays in low risk patients, despite the guideline recommendations. The goal of this project is to optimize the management of patients with suspected HIT by utilizing tools created in the electronic health record (EHR). **Methods:** The first intervention in the electronic health record will be to require documentation of the 4T score in the PF4 lab order. If the 4T score is less than four, an alert will signal to the ordering provider that the patient likely does not have HIT and therefore should not have further testing done. The second intervention will be to update pharmacists' educational materials regarding the relevant laboratory monitoring in order to improve early identification and management of patients with suspicion for HIT. A quasi-experimental study design will be used to compare pre and post intervention data on appropriateness of PF4 and SRA lab tests ordered and the percent of overall guideline compliance. Cost associated with inappropriate guideline compliance will also be assessed. **Results/Conclusions:** EHR implementation and post data collection are still ongoing. Preliminary conclusions will be completed during Spring 2018 and presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe what scoring tool is used to assess the probability of heparin induced thrombocytopenia (HIT) and what tests are used to confirm the diagnosis of HIT.
Describe ways the electronic health record can be used to optimize appropriate testing and management of HIT.

Self Assessment Questions:

Which 4T score would require further testing for HIT?

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

In what way can the electronic health record be used to optimize appropriate testing of HIT?

- A Require provider to document the 4T score in the PF4 lab order
- B Have the SRA lab automatically be ordered if the PF4 lab is strong
- C Have the PF4 and SRA lab orders automatically be ordered together
- D Have an alert fire in the PF4 lab order, if the 4T score is <5, that re

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-612-L01-P

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

IMPLEMENTATION OF A HIGH DOSE INSULIN THERAPY PROTOCOL

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Purpose: High dose insulin therapy has emerged as a leading treatment option for calcium channel and beta blocker toxicity. There are no guidelines regarding administration of high dose insulin therapy, and wide practice variation exists. Published case reports describe insulin infusion rates that range from 0.1 to 10 units/kilogram/hour. Significant adverse effects of therapy and errors in ordering and administration leading to tenfold dose errors have also been reported. The Institute for Safe Medication Practices (ISMP) already labels insulin as a high-alert medication, and utilizing insulin in this manner adds additional risk. ISMP recommends putting safeguards into place to reduce the risk of errors such as standardizing ordering, preparation, and administration of this product. Currently, at Premier Health, there are no such safeguards in place for administration of high dose insulin. The goal of this project is to develop and implement a system wide process, utilizing Epic and Alaris smart pump technology, for administration of high dose insulin therapy for beta blocker or calcium channel blocker toxicity. **Methods:** This is a quality improvement project and is exempt from Institutional Review. A literature search was conducted using PubMed, MEDLINE, and Embase to determine current standards for treatment of calcium channel or beta blocker toxicity. Benchmarking was completed to evaluate high dose insulin therapy protocols at other institutions. A protocol was developed based on benchmarking and a literature evaluation for ordering, administering, and monitoring high dose insulin therapy. Protocol implementation is in progress and results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the rationale for creating a process for administration of high dose insulin therapy for beta blocker or calcium channel blocker toxicity. Recognize risks associated with the administration of high dose insulin therapy.

Self Assessment Questions:

Which of the following is true?

- A Administration of high dose insulin therapy for calcium channel an
- B: ISMP requires a standardized process for manual independent do
- C: Administration of high dose insulin therapy for calcium channel an
- D: ISMP defines insulin as a high-alert medication capable of causing

Which of the following is a risk of administration of high dose insulin therapy?

- A Hyperglycemia
- B Hypokalemia
- C Dehydration
- D Hyponatremia

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-896-L05-P

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

IMPACT OF A MEDICATION SAFETY COMMITTEE ON SAFETY CULTURE AT ST. VINCENT ANDERSON

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Purpose: In high reliability organizations (HROs), employees freely report errors and unsafe conditions and consistently adhere to agreed-upon safety procedures, resulting in extremely high levels of safety. This study aims to describe the ability of a medication safety committee to improve safety culture at a hospital endeavoring to become an HRO. **Methods:** A modified version of the Agency for Healthcare Research and Quality's Hospital Survey on Patient Safety Culture was administered before the creation of a multidisciplinary medication safety committee and will be re-administered after the committee has met for four months to evaluate its impact upon hospital safety culture. Respondents rate twenty-three statements on a five-point Likert scale, give the hospital a safety grade, and record how many event reports they have recently submitted. Trends in other data (e.g. number of events reported, number of root cause analyses performed, number of policy changes made, number of departments involved in follow-up for each error) will also be tracked and compared to baseline. **Results:** Survey responses are reported using the percent of respondents that answered positively. Areas where St. Vincent Anderson (SVA) scored significantly below the 2016 national average on the pre-committee survey included overall perceptions of patient safety (52% vs 66%), frequency of events reported (51.6% vs 67%), and safety grade (68.8% vs 76%). Areas where SVA's scores were comparable to the national average but low in an absolute sense included nonpunitive response to errors (45.3% vs 45%), communication openness (63% vs 64%), and feedback and communication about error (64.1% vs 68%). Preliminary trends in other data include an increase in number of root cause analyses performed and number of departments involved in follow-up for each error. Further results will be available following administration of the post-committee survey. **Conclusions:** Will follow analysis of the post-committee survey results.

Learning Objectives:

Describe a high reliability organization
Identify areas for improvement related to safety culture

Self Assessment Questions:

Which of the following best describes a high reliability organization?

- A Employees consistently perform repetitive tasks and duties and ob
- B: Employees can be relied upon to produce innovative ideas and prc
- C: Employees freely report errors and unsafe conditions and consiste
- D: Employees are dependable and can be trusted by customers to of

Which of the following statements is correct?

- A Organizations with strong safety cultures tend to report fewer medi
- B Nonpunitive response to errors is a potential area of improvement
- C Focusing on communication openness is not something that can i
- D A majority of organizations gave themselves an overall safety grac

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-897-L05-P

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

PHENOBARBITAL VERSUS DEXMEDETOMIDINE AS AN ADJUNCT TO LORAZEPAM FOR REFRACTORY ALCOHOL WITHDRAWAL SYNDROME

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PURPOSE: For patients with benzodiazepine refractory alcohol withdrawal syndrome (AWS) an adjunct agent can be added to avoid adverse effects that may occur from excessive doses of benzodiazepines, such as propylene glycol toxicity and delirium. The purpose of this study is to determine patient outcomes when utilizing phenobarbital versus dexmedetomidine as an adjunct to lorazepam in AWS for patients admitted to the intensive care unit. **METHODS:** This is a retrospective cohort study evaluating patients treated for AWS in a critical care unit over a 4-year time period. Patients were included if a lorazepam infusion was used as the primary treatment, received ≥ 1 dose of phenobarbital or dexmedetomidine infusion for ≥ 6 hours initiated between 12 to 96 hours after first dose of lorazepam. Exclusion criteria included age < 18 years old, pregnancy or phenobarbital use prior to hospital admission. The primary endpoint is the change in lorazepam requirements at 12 and 24 hours after initiation of phenobarbital or dexmedetomidine. The secondary endpoints include time on mechanical ventilation, adverse effects, and drug cost. **RESULTS:** Forty patients were included in the analysis (dexmedetomidine=9, phenobarbital=31). There were no significant differences in the change in lorazepam requirements found at 12 hours (-10mg (-67-97) dexmedetomidine vs. 3mg (-102-254) phenobarbital, $p=0.76$) and at 24 hours (-27mg (-87-146) dexmedetomidine vs. 6.5mg (-234-404.5) phenobarbital, $p=0.55$). The time on mechanical ventilation was similar between groups (101.4 hours dexmedetomidine vs. 123.9 hours phenobarbital, $p=0.58$). There were no patients in either group that experienced hypotension or bradycardia that led to discontinuation of the study drug. There was no significant difference in cost per patient between groups (\$41.80 dexmedetomidine vs. \$22.80 phenobarbital, $p=0.29$). **CONCLUSIONS:** Dexmedetomidine and phenobarbital have comparable effects on lorazepam requirements and either medication can be used as an adjunct to lorazepam in patients with benzodiazepine refractory AWS.

Learning Objectives:

Describe the role of dexmedetomidine and phenobarbital as adjunctive agents in refractory alcohol withdrawal syndrome

Discuss the evidence supporting the use of dexmedetomidine and phenobarbital as adjunctive agents in refractory alcohol withdrawal syndrome

Self Assessment Questions:

Dexmedetomidine cannot be used as monotherapy for alcohol withdrawal for which of the following reasons?

- A: May cause respiratory depression
- B: Lacks GABA receptor activity
- C: Increased risk for delirium
- D: Lacks NMDA receptor activity

Phenobarbital was shown to have a significant effect on which of the following clinical outcomes?

- A: Time on mechanical ventilation
- B: Blood pressure
- C: Mortality
- D: ICU admission rates

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-613-L01-P

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

EVALUATION OF A 48-HOUR ANTIBIOTIC TIME OUT IN A COMMUNITY HOSPITAL HEALTHCARE SYSTEM

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Purpose: In order to optimize therapy for patients with infectious diseases, it is critical to de-escalate antibiotics to cover known pathogens when isolated and to establish correct duration early in their course. Excessively broad antimicrobial coverage and overuse places patients at risk for adverse effects without adding clinical benefit. Overuse can also lead to increased cost of medical care and contributes to the growing problem of resistance. With the increasing incidence of inappropriate antibiotic usage, it is essential that institutions utilize the antibiotic time out strategy endorsed by the Centers for Disease Control and Prevention (CDC). An antibiotic time out is described as a way of encouraging the provider or antibiotic steward to review therapy on the second or third calendar day of treatment, promoting reassessment of the continuing need of antibiotics. In efforts to reduce inappropriate use of antibiotics, this four-hospital community health system implemented a 48-hour antibiotic time out alert and will evaluate its effectiveness by comparing broad-spectrum antibiotic use before and after the implementation in patients admitted to the intensive care unit. **Word Count:** 174 **Methods:** A chart review of patients in the intensive care unit who are prescribed vancomycin and/or piperacillin-tazobactam was conducted. The primary objective will compare the proportion of appropriate end antimicrobial therapy of these antibiotics prior to and after the implementation of the 48-hour time out into the electronic medical record. Appropriate end antimicrobial therapy is defined as final antimicrobial regimen (correct drug and dose) chosen for the intended target pathogen. This is a quality improvement evaluation and is exempt from Institutional Review Board approval. **Word Count:** 83 **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference. **Word Count:** 13 **Total Word Count:** 270

Learning Objectives:

Describe the method of a 48-hour antibiotic time out

Identify 2 reasons for antibiotic de-escalation

Self Assessment Questions:

Which of the following describes a 48-hour antibiotic time out?

- A: A computer programming system that automatically de-escalates
- B: A computer programming system that automatically stops broad s
- C: A way of encouraging the provider or antibiotic steward to review th
- D: An approach that restricts antimicrobial usage after a patient has t

Which of the following reasons emphasizes the importance of antibiotic de-escalation?

- A: Reduces excessive antimicrobial overuse and resistance rates
- B: Only reduces excessive antimicrobial overuse
- C: Reduces excessive antimicrobial overuse and resistance rates in e
- D: Antibiotic de-escalation is important as it only contributes to the re

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-817-L04-P

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

EVALUATION OF NALOXONE USE AT A COMMUNITY HOSPITAL

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Purpose: Opioids are one of the most common medications associated with adverse drug events, which can include respiratory depression and death. Naloxone is an opioid reversal agent used to treat emergency opioid toxicity. This study is designed to evaluate naloxone usage and identify potential areas of intervention. The primary endpoint is to determine potentially preventable adverse drug events from opioid use. The secondary endpoint is to identify opportunities to improve pain management in a community hospital. **Methods:** This study was approved for commencement by the Franciscan Health - Hammond Investigational Review Board. A retrospective chart review will be conducted to evaluate the appropriate use of naloxone and narcotics. All patient cases will be reviewed and analyzed by the investigational team. Patients will be included in the study if they received a dose of naloxone at Franciscan Health - Hammond, Dyer, or Munster between January 2016 and December 2017. Patients who presented with drug overdose prior to hospital arrival and patients on naloxone for indications other than opioid toxicity, such as pruritus or nausea, will be excluded from the study. Information collected will include patient demographics, narcotic usage history, naloxone order and administration detail, pertinent concurrent medications, vital signs, laboratory data, and patient outcomes. **Results/Conclusion:** Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patient risk factors for oversedation or respiratory depression associated with opioid use
List opioid prescribing factors related to adverse events associated with opioid use

Self Assessment Questions:

Which of the following is a characteristic of patients who are at higher risk of opioid toxicity such as respiratory depression?

- A Opioid naivety
- B: Younger age
- C: Post-surgery
- D: Both A and C

Which of the following can lead to adverse drug events associated with opioid use?

- A Adjusting opioid medications based on renal function
- B Monitoring patients' pain scores
- C Prescribing multiple opioid medication
- D Having naloxone available for administration

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-898-L05-P

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

A COMPARISON OF SUGGESTED ALTERNATIVES, ACCOUNTABLE JUSTIFICATION, AND PEER COMPARISONS AS WAYS TO INFLUENCE OPIOID PRESCRIBING BEHAVIOR: A RANDOMIZED CONTROLLED TRIAL

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The overall goal of this research is to impact post-surgical opioid prescribing by introducing behavioral interventions to influence prescribing that is guideline driven and literature supported. Our objective is to expand the proven methods for improving appropriateness of prescribing to post-surgical opioid order quantities that have a high impact on patient outcomes and diversion prevention. We hypothesize by implementing the successful methodologies previously described including suggested alternatives, accountable justification, and peer comparison, we will achieve higher rates of appropriate, literature supported opioid prescribing. This study is a single site, randomized controlled trial. Physicians will act as the unit of randomization and will be randomized in a 2 x 2 x 2 factorial design receiving a single or mix of behavioral interventions including accountable justification, suggested alternatives, and peer comparison, for post-surgical opioid prescription quantity. Periodic data reporting will be provided to the primary investigator with provider opioid prescription details. We will enroll providers including physicians, advanced nurse practitioners, and physician assistants. Baseline data will be retrospectively collected for a three month prior to start of interventions. All providers will receive educational materials at the time of consent and enrollment. Surveys will be administered at the time of enrollment and upon completion of intervention and the data collection period. All data from the electronic medical records will be collected on a weekly basis.

Learning Objectives:

Discuss the need to influence opioid prescribing behaviors to minimize diversion potential
Recognize the role of behavioral interventions as way to influence prescribing behavior

Self Assessment Questions:

Approximately what percentage of patients report having unused opioids that are prescribed for post-surgical pain management?

- A 25%
- B: 40%
- C: 70%
- D: 92%

Which of the following are examples of behavioral interventions in attempt to influence prescribing behavior?

- A Suggested alternatives
- B Accountable justification
- C Peer comparison
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-818-L04-P

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

COST ANALYSIS OF INHALER STANDARDIZATION AND NEBULIZER CONVERSION

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Background: Various methods of bronchodilator delivery, such as inhalers and nebulizers, are used across health systems today with similar clinical efficacy for a multitude of indications. Current practice at many institutions is to have a variety of bronchodilator therapies on formulary. For example having multiple medications within the same pharmacological class and in various delivery systems available for unrestricted use. While studies have determined medications within the same class to be equally effective, the cost-benefit of standardizing inpatient therapies remains elusive. Some studies, most within a singular department, have looked at a cost comparison between different delivery systems such as metered-dose inhalers, intermittent nebulization, and continuous nebulization. These studies have found nebulized treatments to be significantly less costly, yet equally as effective. On the contrary, other studies have shown that utilizing a common canister, with spacer for metered-dose inhalers, can also result in cost savings as compared to nebulized treatment. The purpose of this study is to assess the financial impact of formulary standardization of all pharmacological classes of inhalers, and further formulary substitution (where clinically appropriate) of all nebulization solutions for dry powder and metered-dose inhalers (MDIs) at an academic health system. Methods: The study was conducted at an urban academic health system. Data was collected regarding all respiratory medication administrations during a twelve-month period, January 2017 to December 2017. Purchasing data was compiled for this time period. Medications, and associated costs were projected for formulary standardization and nebulization conversion. From these conversions a cost comparison was done to measure the impact on pharmacy cost of the formulary standardization, and conversion to nebulized medications. Additional costs, such as respiratory therapists (RT) workload were taken into account for this substitution and conversion. Results/Conclusion: To be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:

Review the utility of using various economic models
Discuss the importance of formulary standardization in terms of cost-effectiveness

Self Assessment Questions:

What does ICER stand for?

- A Internal Conflict of Economic Regression
- B: International Conjugated External Relativity
- C: Incremental Cost Effective Ratio
- D: Institute for Clinical and Economic Review

What potential benefits does standardizing a formulary have?

- A Increased therapeutic opportunities for pharmacists
- B Decreased waste, associated with decreased costs
- C Reduction in practice variation and improve efficiencies
- D All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-819-L04-P

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

COLISTIN DOSING AND ADVERSE REACTIONS

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Background: Cystic Fibrosis (CF) is a disease characterized by the inheritance of a dysfunctional protein known as cystic fibrosis conductance transmembrane regulator protein, which produces mucous with increased viscosity, airway inflammation, and recurrent bacterial infections that leads to thick secretions obstructing the airways, affecting the digestive tract and other organs. Due to the increasing rates of *Pseudomonas aeruginosa* resistance to conventional antibiotics, the prevalence of intravenous colistin therapy for the treatment of acute pulmonary exacerbations in cystic fibrosis has increased dramatically. The primary objective of this study is to assess if lower doses of colistin (3 mg/kg/day) result in fewer side effects, manifested as nephrotoxicity or neurotoxicity, and more patients completing a full 14-day course of treatment vs. the more traditional dosing of 5 mg/kg/day. Methods: Cystic fibrosis patients treated with colistin from January 1, 2012 to August 31, 2017 at Indiana University Health University Hospital will be enrolled retrospectively. In addition, data will be collected from CF centers at the University of Utah Hospital and St. Michaels Hospital in Toronto. Data will be collected from chart reviews through electronic medical records and will be collected from the time the IV colistin was started until stopped or changed to an inhaled formulation. Patients included: CF patients at least 18 years old, received IV colistimethate sodium for at least 48 hours to treat an acute pulmonary exacerbation; those excluded: patients who received renal replacement therapy, received systemic colistin within previous 14 days of admission, and those who were switched from colistin to polymyxin b during therapy. Primary and secondary endpoints will be evaluated with Chi-square or Fisher's exact test where appropriate. Continuous variables will be evaluated with Student's t-test or Wilcoxon rank sum test. Results: Data collection in progress and will be presented Conclusion: Results pending and will be presented

Learning Objectives:

Recognize the spectrum of activity for colistin.
Discuss the potential adverse effects associated with colistin therapy.

Self Assessment Questions:

Colistin will exhibit greatest activity against which of the following organisms?

- A Methicillin-resistant staphylococcus aureus
- B: Vancomycin-resistant enterococcus faecium
- C: *Pseudomonas aeruginosa*
- D: *Streptococcus pneumoniae*

Which of the following is not an adverse effect commonly associated with colistin therapy?

- A CNS toxicity
- B Hepatotoxicity
- C Superinfection
- D Renal toxicity

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-614-L01-P

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

IMPLEMENTING AND EVALUATING THE IMPACT OF A PHARMACIST-RUN OUTPATIENT DIABETES CLINIC

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Background: The National Center for Chronic Disease Prevention and Health Promotion reports that 9.4% of the United States population has a diagnosis of diabetes. As recommended by the American Diabetes Association, practice sites have begun implementing collaborative practice models to improve diabetic patient care. In San Diego, California, one site utilized a pharmacist to provide a diabetes intensive outpatient management program resulting in decreased cost of care, improved glycemic control, and reduction in long-term complication risk. Focusing on improved care for this patient population has become a goal at Southwest General as many patients with diabetes are cared for on a daily basis that could benefit from improved follow-up. Implementing pharmacist driven inpatient education and outpatient follow-up has become the starting point for improving care for this population at Southwest General. **Objectives:** To measure the impact of pharmacist led follow-up visits on HbA1c after 6 months. To monitor the impact of pharmacist led assessments on standards of care for patients with diabetes. **Methodology:** Patients with an HbA1c of greater than 10% will be identified via a daily report and ordered a pharmacist diabetic education consult. Patients will receive inpatient education before the time of discharge. After discharge, they will follow up in the pharmacist-led outpatient diabetes clinic within 1-2 weeks. After the visit, recommendations to maximize care will be made to the patient's endocrinologist and/or primary care physician. These patients will be monitored and followed up with as appropriate. The primary outcome is change in HbA1c in patients that follow up in the clinic compared with the HbA1c of those that do not follow up. Secondary outcomes will also be measured to assess the compliance with other diabetes standards of care. **Results and conclusions:** To be determined.

Learning Objectives:

Discuss the importance of continuous follow-up with diabetic patients. Identify the interventions that a pharmacist can complete with diabetic patients to impact care.

Self Assessment Questions:

What portion of the population of the United States has a diagnosis of diabetes?

- A: 1 in 5
- B: 1 in 10
- C: 1 in 50
- D: 1 in 100

Which of the following is an effective strategy pharmacists can use to improve care?

- A: Offer all education during the inpatient stay so the patient does not
- B: Tell a patient that his or her HbA1c is not at goal
- C: Provide the patient with a phone number for an endocrinologist
- D: Create a care plan with the patient that includes patient-driven health

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-615-L01-P

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

EVALUATION OF A PHARMACIST-LED HEART FAILURE CLINIC AT A SINGLE VETERANS AFFAIRS MEDICAL CENTER

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Purpose: Heart failure (HF) is one of the most common and costly diseases among Americans. Specifically, HF is the most common reason for hospitalizations among our nation's veterans. Twenty percent of patients hospitalized for HF will be readmitted with an exacerbation within 30 days of their initial hospitalization. In an effort to improve patient outcomes and reduce the costly burden of HF to our healthcare system, the Lexington Veterans Affairs Medical Center implemented a pharmacist-led HF clinic. The objective of this study is to determine the impact of pharmacists' interventions on reducing 30-day hospital readmission rates and improving patient outcomes. **Methods:** This retrospective chart review received approval from our facility's Institutional Review Board. The electronic medical record system will be used to identify patients admitted with a primary or secondary diagnosis of HF during two 6 month intervals, one pre and one post-clinic implementation. Patient outcomes will be compared between the 2 groups, 1 of which received "usual care" and 1 of which received, at a minimum, weekly post-discharge telephone follow-up by clinical pharmacy specialists. It is estimated the study will encompass approximately 300 patients total. Study outcomes include 30-day readmission rates, rates of medication optimization, and rates of use of guideline-directed therapies in patients with systolic HF. Data collection will include patient demographics, comorbid conditions, type of HF, New York Heart Association functional class, use of HF standard of care medications and doses, days to HF-related readmission, and type of follow-up preceding readmission (PharmD vs. usual care). Descriptive statistics will be used to evaluate demographic variables. Continuous variables will be evaluated using the Student's t-test and categorical variables using the Pearson X2 test. Results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the effect of heart failure in the veteran population and the steps taken by the Veterans Health Administration to improve patient outcomes.

Review the impact of pharmacist involvement in improving medication utilization and decreasing 30-day readmission rates.

Self Assessment Questions:

Which of the following is a major goal of the VA's Chronic HF-Quality Enhancement Research Initiative (CHF-QUERI)?

- A: To increase the use of aldosterone antagonists and beta-blockers
- B: To increase tobacco cessation
- C: To redirect efforts from heart failure prevention to heart failure treatment
- D: To emphasize face-to-face follow-up over home-based monitoring

Which of the following are heart failure symptoms a pharmacist might help to manage?

- A: Orthopnea
- B: Peripheral edema
- C: Bradycardia
- D: Both A and B

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-617-L01-P

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

IMPACT OF AMBULATORY CARE PHARMACIST COLLABORATIVE DRUG THERAPY MANAGEMENT VISITS ON DIABETES OUTCOMES

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Purpose: Diabetes mellitus is a significant cause of morbidity and mortality and results in increased healthcare costs. Literature currently published on interprofessional team-based care has shown positive results for diabetes outcomes. Pharmacist involvement has also been associated with positive results in numerous studies. However, limited data is available that describes pharmacist impact and how a broad range of factors correlate with this impact. Hence, the objective of this study is to understand the impact that pharmacists have on outcomes of patients referred for diabetes management and to identify factors that may correlate to an increased or decreased likelihood of an impactful outcome. **Methods:** This is a retrospective, chart review conducted across a health-system's ambulatory pharmacy department. The cohort for analysis includes a targeted 250 adult patients < 90 years old with type 2 diabetes and baseline hemoglobin A1c greater than nine percent. Patients are required to have met with a pharmacist for ≥ 2 face-to-face appointments under the collaborative drug therapy management protocol with the initial pharmacy visit occurring between January 1, 2017 and June 30, 2017. Demographic and clinic data will be obtained via the electronic medical record. The primary outcome assessed is the mean A1c reduction per patient at six months from initiation of pharmacist management. Secondary outcomes assessed are changes in hypertension control, statin therapy, weight, and care gaps (pneumococcal immunization, foot exam, eye exam, and urine albumin to creatinine ratio) at six months after the initiation of pharmacy management. Multivariate analysis will then be utilized to assess the impact of various demographic and clinical factors on whether patients reach goal A1c. **Results & Conclusion:** Data collection and evaluation is currently being conducted. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss measures that can be used to evaluate the pharmacist's impact when working under a collaborative drug therapy management agreement.

Describe the impact that pharmacists can have on diabetes management when involved in collaborative team-based care.

Self Assessment Questions:

Which of the following items would not be the best measure to demonstrate the impact that a pharmacist, working under a collaborative drug therapy agreement, had on patient outcomes?

- A Process measures (show rate, visit length)
- B: Clinical measures (A1c, blood pressure)
- C: Care gap measures (pneumococcal immunization)
- D: Adherence measures (drug selection/cost savings)

According to Irons et. al., pharmacist management of diabetes in the primary care clinic setting as opposed to provider management resulted in which of the following?

- A A non-significant increase in hypoglycemic episodes due to tighter
- B Five times greater likelihood in achieving an A1c less than 7 perce
- C No difference in the number of unscheduled diabetes clinic visits.
- D Increased time to attain the goal A1c in patients 65 years and olde

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-616-L01-P

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

EVALUATING THE UTILIZATION OF PRESCRIBING ATYPICAL ANTIPSYCHOTICS FOR ICU DELIRIUM AT TRANSITIONS OF CARE

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Purpose: Delirium is prevalent in intensive care unit (ICU) patients, affecting up to 80% of the population, and is associated with increased length of ICU stay, mortality and long-term cognitive impairment. The administration of atypical antipsychotics (AA) for the treatment of delirium has become widespread, despite the paucity of data, and the use of these agents are not without risks. Side effects associated with long-term use include new-onset diabetes, hyperlipidemia, extrapyramidal side effects and risk of death in patients with dementia related psychosis. The benefits of these agents are unlikely to outweigh the long-term side effects when continued beyond hospital discharge. Recent studies have reported 24% to 47% of patients prescribed an AA for ICU delirium were continued with a prescription at hospital discharge. The aim of this study is to describe the utilization of AA for the treatment of ICU delirium at transitions of care from an ICU at the Cleveland Clinic Health System (CCHS). **Methods:** The primary objective is to determine the frequency of patients initiated on an AA in the ICU and continued upon hospital discharge. Secondary objectives include the frequency of AA continuation at ICU discharge and incidence of AA tapering at transitions of care. This multicenter, retrospective chart review included patients admitted to an ICU within the health system from April 2016 to September 2016. All patients administered an AA during ICU admission and discharged from the hospital alive will be included. Patients on an AA prior to admission or who received less than 24 hours of AA therapy were excluded. Statistical analysis, including descriptive statistics, will be performed. **Results and Conclusion:** Data collection and analysis in process.

Learning Objectives:

Describe the long-term clinical outcomes of patients with ICU delirium.
Describe the long term side effects of atypical antipsychotics

Self Assessment Questions:

Delirium in the ICU is associated with which of the following outcome(s)?

- A Increased length of ICU stay
- B: Cognitive impairment
- C: Mortality
- D: All of the above

Which of the following is/are long term side effects of atypical antipsychotics?

- A New-onset diabetes
- B Extrapyramidal side effects
- C Hyperlipidemia
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-820-L01-P

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

MEDICATION USE EVALUATION OF BLOOD FACTORS FOR HEMOPHILIA

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An evaluation of the use of blood factor products for hemophilia at The Ohio State University Wexner Medical Center was completed to characterize utilization and to identify opportunities for optimization of blood factor regimens, assess length of stay, bleeding and thrombotic outcomes, and cost. Patients who received one or more doses of Factor VII, Factor VIII, Factor IX, or Anti-Inhibitor Coagulant Complex from July 1, 2016 to June 30, 2017 in the inpatient, emergency department, or observation setting with an indication noted for hemophilia were included. These patients were identified using reporting tools in IHIS. Data was collected and analyzed through retrospective chart review using Microsoft Excel. Thirty-two patients were identified as receiving factor products. The median length of stay for patients with a bleed was 4.1 days, whereas it was 1.8 days for a planned procedure. Of the 194 peaks and troughs drawn, 57 of 107 (53.3%) troughs and 45 of 87 (51.7%) peaks were drawn appropriately. Thirty-two of the 39 encounters had a hematology consult during their stay. Twenty-seven of the 39 encounters had prophylactic factor product prescriptions prior to admission. Nineteen of the 25 encounters admitted for bleed were receiving prophylactic factor products prior to admission. Twelve of the 39 encounters included the patient receiving an anticoagulant or a medication that increases the risk of bleed. Eight major hemoglobin drops occurred in the bleed category, whereas four occurred in the planned procedure group. Of note, zero thromboembolism events occurred in either group. Of the 39 encounters, \$982,847.58 was spent on the cost of these medications. Patients who presented with bleed had a longer median length of stay compared to those admitted for a planned procedure. Opportunities for improvement were identified including peaks and troughs, bleeding, hematology consults, prophylaxis, and use of anticoagulants.

Learning Objectives:

Identify strategies to optimize the utilization of blood factor products for hemophilia.

Recognize the importance of appropriate monitoring and dosing of factor products and the role healthcare providers play.

Self Assessment Questions:

Which of the following is an opportunity identified at OSUWMC to optimize the use of blood products for hemophilia?

- A: Appropriate timing of drawing peaks and troughs
- B: Increased utilization of imaging to evaluate joint bleeds
- C: Increasing length of stay for patients undergoing procedures
- D: Prevention of thromboembolic events

Which would be considerations when a patient with hemophilia is admitted?

- A: Do not check factor peaks and troughs
- B: Consult hematology
- C: Monitor INR throughout admission
- D: Ensure patient adherence to anticoagulation regimen

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-618-L01-P

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

COMPARISON OF DURATION OF ATYPICAL ANTIBIOTIC COVERAGE FOR PNEUMONIA IN PATIENTS WITH A RESPIRATORY VIRAL PANEL AND THOSE WITHOUT

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Background: The role of antibiotics for empiric coverage of atypical pathogens in the setting of pneumonia in adult ICU patients remains unclear. As these organisms are difficult to grow on culture media, empiric coverage may arbitrarily be initiated and continued for an entire treatment course. A respiratory viral panel with polymerase chain reaction technology has been reported to have a high sensitivity and specificity for chlamydia and mycoplasma species, and may be a useful tool in tailoring atypical pathogen coverage. Purpose: To determine the impact that respiratory viral panel results have on duration of atypical antibiotic coverage for pneumonia. Methods: This retrospective chart review evaluated patients > 18 years of age admitted to an IU Health ICU between January 1, 2014 and December 31, 2017 and received an empiric antibiotic regimen which covered atypical pathogens within 48 hours. Patients were excluded if they were pregnant or incarcerated, admitted with a concomitant diagnosis of COPD or asthma exacerbation, had a history of cystic fibrosis, HIV, organ transplant, or were not admitted directly from the emergency department. Patients were grouped based on whether they had a respiratory viral panel or not. The primary objective was to assess the number of atypical antibiotic days between groups. Secondary endpoints included ICU and hospital length of stay. Data to be collected include age, gender, height, weight, admitting diagnosis, and use of mechanical ventilation on ICU admission. Categorical and continuous variables will be assessed using Fisher's exact or Chi-squared test and Mann-Whitney U or Student's t-test, respectively. Results/Conclusions:

Data collection and analysis are ongoing. Results and conclusions will

Learning Objectives:

Recall antibiotics used to treat atypical pathogens.

Review the IDSA guideline recommendation on duration of treatment for community acquired pneumonia.

Self Assessment Questions:

Which antibiotic is used for coverage of atypical pathogens?

- A: Vancomycin
- B: Azithromycin
- C: Ceftriaxone
- D: Meropenem

What is the minimum duration of therapy that the IDSA guidelines recommend for the treatment of community acquired pneumonia?

- A: 3 days
- B: 7 days
- C: 5 days
- D: 8 days

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-619-L01-P

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

PHARMACIST-DRIVEN DISCONTINUATION OF ANTIPSYCHOTICS STARTED FOR ICU DELIRIUM

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Purpose: Intensive care unit (ICU) delirium can affect up to 80% of critically ill patients. Delirium is defined as an alteration in mental status, characterized by disturbances of consciousness and attention, change in cognition, development over a short period of time, and fluctuation in level of consciousness. Antipsychotics are commonly used to shorten the duration of ICU delirium. Despite ICU delirium resolution, inappropriate continuation has been reported up to 50 and 72% of patients at ICU and hospital discharge, respectively. Potential risks of antipsychotics include QTc prolongation, arrhythmias, extrapyramidal symptoms, and increased risk of death in the elderly. Therefore, the risk may outweigh the benefit if continued upon hospital discharge. The purpose of this study is to establish a pharmacist-driven discontinuation protocol of antipsychotics started for ICU delirium upon resolution of delirium. **Methods:** This was an IRB-approved quasi-experimental, single-center study conducted at Henry Ford Hospital in Detroit, MI. Pharmacists used a systematic process to determine when antipsychotics were no longer indicated and if a taper was needed. Patients were included if they had an antipsychotic initiated in the medical-, surgical- or cardiac ICU for ICU delirium. Exclusion criteria included the use of an antipsychotic as a home medication, an antipsychotic initiated by behavioral health services, a new psychiatric diagnosis, and/or patients who enrolled in hospice, comfort care, or expired prior to hospital discharge. The pre- and post-protocol groups included patients between 11/1/2015-4/1/2016 and 11/1/2017-4/1/2018, respectively. The primary endpoint was rate of antipsychotic continuation at hospital discharge. A sample size of 158 patients was used to detect a 20% difference between the two arms. Chi-square test or Fisher's exact test will be used for categorical data, and Mann-Whitney U or T-test for continuous variables. **Results:** Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify potential adverse effects with the use of antipsychotic medications

Recognize when antipsychotics initiated for ICU delirium can be discontinued

Self Assessment Questions:

Which of the following is a potential adverse effect of antipsychotics?

- A: QTc prolongation
- B: Increased energy
- C: Splenomegaly
- D: Gingival hyperplasia

JB is a 58 year old male admitted into the ICU with pneumonia and septic shock. On his third day in the ICU, JB became delirious and agitated requiring initiation of quetiapine 50 mg PO nightly. By day

- A: Increase quetiapine to 100 mg nightly
- B: Change quetiapine to risperidone 0.5 mg twice daily
- C: Discontinue quetiapine
- D: Continue quetiapine 50 mg nightly indefinitely

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-620-L01-P

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

AN EVALUATION OF PERIOPERATIVE DRUG ALERTS IN ORDER TO REDUCE CLINICALLY INSIGNIFICANT ALERTS

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Purpose: Clinical decision support systems (CDSS) are implemented in hospitals in order to aid prescribers to safely choose medications for their patients. Drug alerts warn prescribers when there may be potential errors in drug prescribing. While CDSS are implemented to prevent errors, an excess in number of drug alerts can cause prescribers to suffer from "alert fatigue," which is a term used to describe when health care workers become desensitized to drug alerts. This may result in ignoring clinically significant alerts and therefore lead to medication errors. Although drug alerts are intended to decrease harmful errors, it can paradoxically increase patient error due to alert fatigue. In order to reduce this hazard, alerts can be filtered accordingly to allow only alerts that are truly relevant. **Word Count:** 124 **Methods:** Data was collected from this health system's electronic health record for all drug alerts fired in perioperative areas in May 2017. Alerts that fired greater than 20 times were included in the analysis. The following drug alert types were assessed: duplicate medication, duplicate therapy, lactation, pregnancy, drug-drug interaction, and dose alerts. The drug alerts with potential for modifications were reviewed by a pharmacy task force and approved by relevant stakeholders for approvals. These modifications will be presented at our hospital's Pharmacy and Therapeutics committee, and then implemented within the electronic health record system. Post-implementation data will be assessed and presented at the Great Lakes Pharmacy Resident Conference. This is a quality improvement evaluation and is exempt from Institutional Review Board approval. **Word count:** 121 **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference. **Word Count:** 13

Learning Objectives:

Describe the benefits of suppressing drug alerts.

Recognize types of drug alerts that can be suppressed.

Self Assessment Questions:

Drug alert fatigue is defined as:

- A: Health care workers who become desensitized to drug alerts.
- B: Drug alerts firing excessively in a short period of time.
- C: Substitution of present drug alerts with other types of alerts.
- D: Physicians can ignore all alerts because alerts have the option to t

What is a benefit to suppressing drug alerts?:

- A: Physicians and pharmacists will miss overriding drug alerts.
- B: Drug alerts will not only be suppressed for inpatient medications, b
- C: May improve quality of patient care as providers will look more clo
- D: Decreases physician/pharmacist interactions due to fewer drug ale

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-821-L04-P

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

PREDICTIVE VALUE OF SCORING TOOLS IN DETERMINING HEPARIN-INDUCED THROMBOCYTOPENIA IN PATIENTS ON EXTRACORPOREAL MEMBRANE OXYGENATION

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Thrombosis and thrombocytopenia are complications commonly seen with the use of mechanical circulatory support, including extracorporeal membrane oxygenation (ECMO). To prevent clotting of the circuit, the standard of care is anticoagulation with unfractionated heparin (UFH), thus presenting a concern for heparin-induced thrombocytopenia (HIT). There are currently no validated scoring tools to predict HIT in patients receiving ECMO. This study aims to determine the predictive value of the 4T HIT score, the Lilo-Le Louet (LLL) model, and the HIT expert probability (HEP) score in detecting HIT in ECMO patients. This is a single center, retrospective, observational cohort study that has been approved by the Institutional Review Board at Rush University Medical Center (RUMC). Data will be collected from Epic from February 2009 to August of 2017. Patients included were at least 18 year of age, on ECMO for any indication, and had a heparin-PF4 antibody ordered. Patients were excluded if they had a pre-existing heparin allergy or an equivocal heparin-PF4 antibody result. The primary endpoint is the positive predictive value (PPV) of an intermediate or high score determined by any of the various scoring tools. Secondary endpoints include identification of clinical predictors of HIT in ECMO patients, as well as alternative anticoagulation practices. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recall the mechanism by which thrombocytopenia occurs in patients receiving ECMO.

Recognize the various scoring tools used to predict HIT, advantages and disadvantages of each tool, and their impact on treatment.

Self Assessment Questions:

Why does thrombocytopenia commonly occur in patients on ECMO?

- A: They always require open heart surgery with the use of cardiopulm
- B: Lack of sufficient platelet transfusions
- C: Platelet activation due to the presence of a foreign device
- D: Severe hemorrhage that occurs commonly with ECMO

Which of the following scoring tools is used exclusively for patients that have recently been on cardiopulmonary bypass?

- A: 4T Score
- B: LLL Score
- C: HEP Score
- D: CPB score

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-621-L01-P

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

ASSESSMENT OF A SINGLE INSTITUTION COMMUNITY ACQUIRED PNEUMONIA TREATMENT ALGORITHM

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Purpose: Community acquired pneumonia (CAP) is treated with standard empiric therapy of a beta-lactam and macrolide or monotherapy with a respiratory fluoroquinolone. Typical treatment does not include extended gram negative (*Pseudomonas aeruginosa*) or methicillin resistant *Staphylococcus aureus* (MRSA) coverage. Historically, patients presenting from the community at risk for either *Pseudomonas aeruginosa* or MRSA were identified utilizing the criteria for healthcare associated pneumonia (HCAP). This definition was excluded in the Hospital Acquired Pneumonia and Ventilator Associated Pneumonia guidelines published in 2016 due to data concluding that this definition did not accurately identify patients at risk for *Pseudomonas aeruginosa* and/or MRSA. In April 2017, Northwestern Memorial Hospital (NMH) implemented a protocol to more accurately discern patients with CAP at risk for *Pseudomonas aeruginosa* or MRSA. This study will validate the use of the protocol in identifying patients with CAP requiring extended gram-negative and gram-positive therapy. Methods: This single center, retrospective chart review will be conducted utilizing the electronic medical record to identify patients treated with antibiotics for pneumonia from June 1, 2017 to December 31, 2017 at NMH.

Demographic information will be collected utilizing information provided upon admission. Primary outcomes that will be analyzed will be length of stay and readmission for pneumonia 30 days after discharge. These outcomes will be compared to historical data collected before the implementation of the CAP protocol in April 2017. Secondary outcomes will analyze patients with cultures that grew organisms not covered by typical empiric community acquired pneumonia treatment. Risk factors will be analyzed to determine the association between risk factors identified in the protocol and growth of these resistant organisms. Other variables of interest that will be collected include duration of antibiotic therapy including both intravenous and oral antibiotics. Results and conclusions will be presented at the Great Lakes Pharmacy Resident's Conference.

Learning Objectives:

List common etiologies of community acquired pneumonia.

Identify appropriate empiric treatment of community acquired pneumonia in the inpatient setting based on risk factors.

Self Assessment Questions:

Which of the following pathogens is a common etiology of community acquired pneumonia?

- A: *Streptococcus pneumoniae*
- B: *Escherichia coli*
- C: *Staphylococcus aureus*
- D: *Pseudomonas aeruginosa*

Which of the following is an appropriate non-ICU inpatient treatment for community acquired pneumonia based on the 2007 IDSA guidelines?

- A: Doxycycline monotherapy
- B: Piperacillin-tazobactam and levofloxacin
- C: Ceftriaxone and azithromycin
- D: Ceftriaxone and levofloxacin

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-622-L01-P

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

PRESCRIBING PATTERNS OF PHARMACOLOGIC SLEEP AGENTS FOLLOWING THE IMPLEMENTATION OF A SLEEP PROTOCOL IN ADULT BURN PATIENTS

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Purpose: Sleep disturbances are a complication in burn patients that prolong recovery and cause psychological/physiological stress. Results from studies assessing sleep in critically ill patients have shown reduced time and quality of sleep which can put patients at risk for additional complications. Therefore, sleep-promoting interventions are utilized in intensive care units. However, a gap exists in the literature regarding optimal pharmacologic sleep agents in intensive care and burn patients. In September 2014, a sleep protocol was introduced in our burn center to promote sleep-wake cycles through use of non-pharmacologic interventions and pharmacologic agents. The study objective is to assess implementation of the sleep protocol and its subsequent effects on prescribing patterns of pharmacologic sleep agents in adult burn patients. **Methods:** This is a retrospective chart review evaluating outcomes of a sleep protocol in adult patients admitted for burn or inhalational injury at Eskenazi Health between 10/1/16 and 8/31/17. Exclusion criteria include active psychological/neurological disorders, pregnancy, or incarceration. The primary outcome is the prescribing pattern of pharmacologic sleep agents inclusive of medication class, name, dose, administration frequency, and treatment duration. Secondary outcomes include non-pharmacologic interventions, nursing assessment and documentation, and provider assessment and documentation. **Preliminary Results:** Preliminary results for 242 patients admitted during the study period show 67 (28%) patients received first-line sleep medications for pharmacologic intervention as defined by the sleep protocol. Of those who received pharmacologic treatment, 60% received melatonin, 18% received trazodone, and 22% received both. The study population was primarily male (n=38, 57%) with a median age of 46 years (IQR 32-65). **Conclusions:** Further data collection is on-going to evaluate non-pharmacologic interventions and adherence to the protocol's alternative pharmacologic recommendations in those who did not receive first-line agents. To our knowledge, no previously published literature exists evaluating prescribing patterns of pharmacologic sleep agents in adult burn patients.

Learning Objectives:

Explain the negative effects of sleep disturbances in critically ill patients
Identify current gaps in the literature regarding sleep assessment and management in adult burn patients

Self Assessment Questions:

Which of the following is a psychological effect of sleep disturbances in the intensive care unit?

- A: Metabolic alterations
- B: Neuroendocrine dysfunction
- C: Delirium
- D: Immune compromise

Which of the following is lacking in current published data regarding management of sleep disorders in adult burn patients?

- A: Specific recommendations for pharmacologic sleep agents
- B: Burn-specific sleep questionnaires
- C: Quality of sleep in the outpatient burn setting
- D: Risk factors for sleep disturbances

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-623-L01-P

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

EVALUATING UTILITY OF THE DIABETES POWERPLAN IN THE MANAGEMENT OF DIABETIC FAMILY MEDICINE PATIENTS

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Purpose: Nearly one-third of patients experience hyperglycemia during hospitalization. Poor blood glucose control is associated with longer hospitalizations, increased risk of infection, and higher mortality. The American Diabetes Association (ADA) recommends target blood glucose levels between 140-180 mg/dL for the majority of hospitalized patients. Sole use of insulin sliding scale is discouraged with the recommended approach being a basal-bolus regimen. Utilization of standardized order sets can aid in achieving target blood glucose levels. While Advocate has a diabetes management powerplan (including basal, bolus, and correctional insulin), it is largely underutilized at Advocate Lutheran General Hospital (ALGH). The aim of this study is to document the extent to which the powerplan is underutilized and determine whether increasing its use by an interdisciplinary team will improve glycemic control among hospitalized patients on the Family Medicine service. **Methods:** This is a pre/post, quasi-experimental, single-center study comprised of a historical control period (November-December 2017) and an interventional period (January-February 2018). The interventional period consists of an interdisciplinary team evaluating glycemic regimens and making adjustments based on blood glucose levels, nutritional status, and clinical presentation. Results from the interventional period will be compared to a retrospective chart review of diabetic patients managed by the Family Medicine service alone to assess the impact of the interdisciplinary team and utilization of a standardized powerplan. The primary endpoint is the percent of blood glucose readings that were well-controlled, defined as 70-140 mg/dL (fasting) and 70-180 mg/dL (random), during the patient's hospitalization. Percent of blood glucose readings that patients were hypoglycemic (<70 mg/dL) and hyperglycemic (>180 mg/dL) will also be evaluated. Secondary endpoints include type of glycemic regimen, utilization of hypoglycemic rescue agents, length of stay, and incidence of infection. Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the ADA recommended blood glucose targets for hospitalized patients
Identify the most appropriate regimen for glycemic control of non-critically ill hospitalized patients

Self Assessment Questions:

Which of the following is the ADA recommended blood glucose target for the majority of critically and noncritically ill hospitalized patients?

- A: 110-140 mg/dL
- B: ≤ 140 mg/dL
- C: 140-180 mg/dL
- D: ≤ 180 mg/dL

The following regimen is recommended for glycemic control in noncritically ill hospitalized patients with good nutritional intake:

- A: Basal with correctional insulin
- B: Continuous intravenous insulin infusion
- C: Oral antihyperglycemic with correctional insulin
- D: Basal, nutritional, and correctional insulin

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-624-L01-P

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

IMPACT OF SPLIT-DOSING CEFTRIAXONE IN CRITICALLY ILL, BACTEREMIC PATIENTS WITH HYPOALBUMINEMIA

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Purpose: Ceftriaxone is dosed once-daily for most indications, with its killing activity dependent on drug concentrations above the minimal inhibitory concentration (MIC) for at least 60-70% of the dosing interval. It has a long elimination half-life mainly because it is highly protein-bound; however, the pharmacokinetic (PK) properties may be altered in critical illness and/or hypoalbuminemia. With these alterations in PK properties, there may be risk of treatment failure with once-daily ceftriaxone dosing. The purpose of this study is to evaluate whether switching once-daily administration of ceftriaxone to twice daily at the same dose per day leads to improved clinical outcomes in bacteremic ICU patients with hypoalbuminemia. Methods: A single-center, retrospective chart review was conducted to evaluate bacteremic patients who received ceftriaxone and admitted to an intensive care unit (MICU, CICU, SICU, NSICU) between January 1, 2009 to December 31 2017. The study included patients 18 years of age or older, serum albumin level less than or equal to 2.5 g/dL, and positive blood cultures. Patients were excluded if they had an indication requiring any dose besides ceftriaxone 1Gm q12h or 2Gm q24h (ie, meningitis), intermediate or resistant isolates, or were pregnant. The primary outcome of this study was to assess clinical cure rates at the end of therapy. Secondary outcomes included time to resolution of leukocytosis and fever, time to negative blood cultures, use of rescue antibiotics, 28-day mortality, duration of hospitalization, re-infection and evidence of resistance within 90 days. Results/Conclusions: Data collection and analysis are currently being conducted. Results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the main pharmacokinetic properties of ceftriaxone.

Discuss current literature evaluating ceftriaxone plasma concentrations in the presence of hypoalbuminemia.

Self Assessment Questions:

Which of the following is true about ceftriaxone?

- A Concentration-dependent antibiotic
- B: Highly protein bound
- C: Short elimination half-life
- D: Standard frequency is usually every six hours

In the presence of hypoalbuminemia, which of the following is true about ceftriaxone?

- A Higher fraction of free (unbound drug) available for elimination
- B Lower fraction of free (unbound drug) available for elimination
- C Once daily dosing of ceftriaxone is predicted to still achieve time o
- D No change in plasma concentrations since ceftriaxone does not bi

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-625-L01-P

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

UTILIZATION OF THE CRITICAL-CARE PAIN OBSERVATION TOOL TO ASSESS THE APPROPRIATENESS OF PAIN MANAGEMENT DURING SPONTANEOUS AWAKENING TRIALS

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The Critical-Care Pain Observation Tool (CPOT) is a behavior pain score used for critically-ill nonverbal patients. Appropriate pain management may lead to less sedation and a higher pass rate of the spontaneous awakening trial (SAT). The purpose of the study is to determine the appropriateness of pain management during a SAT for patients in the intensive care unit (ICU) and cardiac intensive care (CIC). Through utilization of the CPOT, pain medication dose, frequency, and administration will be analyzed taking into account patient specific factors. The study has been submitted to the institutional review board for approval. A retrospective chart review of patients sedated in the ICU or CIC during a three-month period from December 2017 to February 2018 will be included in the study. Inclusion criteria include patients that are at least 18 years old, hospitalized and sedated in the ICU or CIC, undergoing a SAT, and a recorded CPOT score as a result of a SAT. Exclusion criteria include patients less than 18 years old, received a neuromuscular blocker in the ICU or CIC at least 48 hours after admission, and a Glasgow Coma scale score less than 4 at the time of assessment. The following will be collected from the electronic medical record (EMR): age, gender, weight, height, previous opioid use, blood pressure, temperature, heart rate, respiratory rate, CPOT score, Richmond Agitation-Sedation Scale (RASS) score, SAT outcome, dose of sedative before and after SAT, analgesics administered, and dose of medication. The dose of opioid administered to each patient during a SAT will be compared based on equivalent dosing. Appropriateness of the dose will be determined depending on opioid naivety, whether reversal agents were used and follow-up CPOT scores. All data collected will be maintained confidentially. Data collection is currently in progress. Results will be presented at the Great Lakes Pharmacist Resident Conference.

Learning Objectives:

List the components of the Critical-Care Pain Observation Tool (CPOT)

Define the scoring associated with the Critical-Care Pain Observation Tool (CPOT)

Self Assessment Questions:

Which of the following statements regarding the Critical-Care Pain Observation Tool (CPOT) is correct?

- A The CPOT is not a valid and reliable behavioral pain scale for non-
- B: There are 5 total sections of the CPOT score with each section sc
- C: The CPOT is used for both intubated and extubated patients
- D: The total possible score for the CPOT ranges from 0 to 10

What are the sections of the Critical-Care Pain Observation Tool (CPOT)?

- A Facial expression, body movements, muscle tension, compliance
- B Facial expression, upper limb movement, compliance with mechar
- C Facial expression, body movements, vital signs, respiratory rate
- D Facial expression, upper limb movements, vital signs, compliance

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-899-L05-P

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

A PROCESS FOR THE DEVELOPMENT OF CLINICAL PHARMACY TOOLS WITHIN AN ELECTRONIC MEDICAL RECORD

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Purpose: Pharmacists' clinical roles within the inpatient setting are essential for delivery of quality care. In order to enhance pharmacists' impact and expand the ability to improve patient outcomes, the electronic medical record (EMR) can be leveraged to facilitate roles of the pharmacist in specified patient populations. Thoughtful development of clinical pharmacy tools within the EMR can improve prioritization, workflow, and efficiency of pharmacist functions. Additionally, a standardized process for development could guide the appropriate utilization of limited resources. Currently at Norton Healthcare, no standardized process exists for creating and implementing clinical pharmacy tools. The purpose of this project is to create the process for developing clinical pharmacy tools within a robust EMR. **Methods:** This process improvement project utilizes define, analyze, and improve methodology to develop a process for creating clinical pharmacy tools. In the define phase, criteria are outlined to determine which populations are eligible for the development of workflow tools as well as to define the characteristics of elements within the workflow tools. Next, specific characteristics of criteria are analyzed to ensure integrity of applicability, alignment with the needs of the institution, and optimal roles of the pharmacist. Evidence based literature and guidelines are utilized in the improve phase to tailor the criteria for a specific patient population.

Results/Conclusion: Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the benefits of developing clinical pharmacy tools in an electronic medical record.

Identify characteristics of a patient population for development of clinical pharmacy tools.

Self Assessment Questions:

Which of the following is a benefit of developing clinical pharmacy tools in an electronic medical record?

- A Increase workload of the pharmacist
- B: Improve pharmacist efficiency
- C: Provide pharmacy technician documentation
- D: Develop provider relationships

Which of the following criteria prioritize a patient population for clinical pharmacy tool development?

- A High volumes of high risk medications
- B Defined role of the pharmacist
- C Pharmacist job functions encompass safety, efficacy, and steward
- D All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-822-L04-P

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

PRIMARY CARE PROVIDERS' PERSPECTIVES, PERCEIVED BARRIERS, AND PREFERRED FACILITATORS REGARDING HEPATITIS C VIRUS SCREENING IN THE PRIMARY CARE SETTING

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Purpose: National data shows that 49.7 percent of patients are unaware of their hepatitis C virus (HCV) infection. National guidance recommends HCV screening in patients born between 1945 and 1965, as they have a six-fold higher risk of infection than the general population. Baseline data shows that primary care providers (PCPs) at the author's institution have low HCV screening rates among patients born between 1945 and 1965. The objective of this study is to assess PCPs' perspectives and perceived barriers toward HCV screening, and preferred facilitators for the implementation of a HCV screening process in the primary care setting. **Methods:** The research design is a single-center cross-sectional survey. Authors developed a twenty-five question survey using Qualtrics. Demographic questions include: location and length of practice time, age, gender, licensure, residency type, average number of patients seen in one week, and age of patients. Likert scale questions were used to assess confidence, comfort, and attitude towards HCV screening, test result interpretation, and treatment. Knowledge about HCV guideline-indicated risk factors were assessed with multiple choice questions. Perceived barriers and facilitators were collected as free text. This study was submitted to the Institutional Review Board for approval. Upon approval, a link to the electronic survey was emailed to PCPs at multiple primary care locations affiliated with the academic medical center. All survey responses were anonymous and confidential. Investigators analyzed free text data for thematic content. Qualitative and quantitative data was analyzed using parametric and nonparametric tests as well as descriptive statistics. Results and conclusion will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the epidemiology, presentation, and disease progression of hepatitis C virus (HCV) infection

Recognize risk factors and screening recommendations associated with HCV infection

Self Assessment Questions:

According to the National Health and Nutrition Examination Survey, approximately what percent of patients who have hepatitis C virus (HCV) were unaware of their infection?

- A 25%
- B: 50%
- C: 75%
- D: 90%

Which of the following birth cohorts is a risk factor for HCV infection?

- A 1935-1955
- B 1945-1965
- C 1965-1985
- D 1985-2005

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-626-L01-P

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

INAPPROPRIATE STRESS ULCER PROPHYLAXIS VS. APPROPRIATE STRESS ULCER PROPHYLAXIS AND RATES OF CLOSTRIDIUM DIFFICILE INFECTIONS

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The primary objective of this study is to examine the use of stress ulcer prophylaxis at OSF Saint Francis Medical Center (OSF SFMC) and compare the rates of Clostridium difficile infections (CDI) in patients where stress ulcer prophylaxis (SUP) is prescribed following hospital protocol (appropriately) or not following hospital protocol (inappropriately). A secondary objective of this study is to determine the difference in appropriate and inappropriate use of SUP at OSF SFMC, an academic medical center. This study will be retrospective, and will consist of reviewing electronic medical record data of adults at OSF SFMC prescribed stress ulcer prophylaxis from January 1 to January 31 2016. Information collected will be de-identified and include demographics (age, sex), PPI or H2RA use (agent, dose, route), admitting unit, laboratory confirmation of CDI within 2 to 14 days of starting SUP, coagulation status, mechanical ventilation, trauma, history of gastrointestinal bleed, medications prior to admission, and SUP use if patient was hospitalized 30 days prior to encounter. In addition, the use of PPI or H2RA for SUP will be evaluated and classified as appropriate or inappropriate. The criteria for appropriate use of SUP includes: history of gastrointestinal bleed within the past year, mechanical ventilation over 24 hours, platelet count less than 50,000 per uL, INR greater than 1.5, aPTT greater than two times control (not anticoagulated), home medication, spinal cord injury, or traumatic brain injury. Rates of CDI will be compared amongst patients where SUP is being used appropriately and inappropriately. Results and conclusions will be discussed at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe risks for developing Clostridium difficile infections
Identify appropriate indications for stress ulcer prophylaxis

Self Assessment Questions:

Which of the following medications increase a patient's risk for developing a C. diff infection?

- A: Pantoprazole
- B: Amiodarone
- C: Fluoxetine
- D: Rivaroxaban

Which of the following scenarios describes an appropriate indication for stress ulcer prophylaxis?

- A: 19 yo M s/p MVA admitted for surgery to repair a broken leg
- B: 45 yo F admitted for a PE currently being treated with heparin
- C: 74 yo F with severe HAP requiring mechanical ventilation for 3 days
- D: 66 yo M stating he ate spicy food last week

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-627-L01-P

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

POSACONAZOLE THERAPEUTIC DRUG MONITORING WITH DELAYED-RELEASE TABLETS IN PATIENTS WITH A HEMATOLOGIC MALIGNANCY RECEIVING ANTIFUNGAL PROPHYLAXIS

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Purpose: Posaconazole suspension is used for candida and mold prophylaxis in acute myeloid leukemia and hematopoietic stem cell transplant but this formulation has a large pharmacokinetic variability affected by food intake and gastric pH, requiring therapeutic drug monitoring. The newer, delayed-release tablet formulation has a more predictable pharmacokinetic profile. It is unclear if therapeutic drug monitoring is required with the new tablet formulation and if it is required which patients necessitate therapeutic drug monitoring. The purpose of this study is to determine factors associated with levels that are sub-therapeutic or supra-therapeutic, for patients receiving the delayed release posaconazole tablet. **Methods:** This study was approved by the Rush University Medical Center Institution Review Board. The electronic medical record system identified patients who have received posaconazole delayed release tablets and had trough levels drawn after at least 5 days after initiation of therapy. For levels that are subtherapeutic or supratherapeutic, the research team will evaluate if there are factors associated with not achieving therapeutic levels. The following data will be collected: number of days on posaconazole therapy, trough levels, number of missed doses while on posaconazole, incidence of breakthrough invasive fungal disease, duration of neutropenia, QTc prolongation on therapy and if absent at baseline, clostridium difficile infection, mucositis, diarrhea, short bowel syndrome, liver and renal function and interacting drugs administered while on therapy. Patients who received dose adjustments of posaconazole based on initial trough levels will be reviewed to see if therapeutic levels were subsequently achieved. **Results:** N/A **Conclusion:** N/A

Learning Objectives:

List the differences between posaconazole suspension and posaconazole delayed release tablets
Recognize sub-therapeutic and supra-therapeutic trough levels

Self Assessment Questions:

What is the recommended therapeutic posaconazole level for candida and mold prophylaxis in acute myeloid leukemia and hematopoietic stem cell transplant?

- A: Greater than 2.0
- B: 1.0-1.5
- C: Greater than or equal to 0.7
- D: Less than 0.7

What is an advantage of using posaconazole delayed release tablets?

- A: It is the cheapest azole anti-fungal on the market
- B: It is more likely to achieve necessary trough levels compared to the suspension
- C: It never requires trough levels
- D: It does not cause increases in LFTs like other azole anti-fungals

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-628-L01-P

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

COMPARISON OF INSULIN SLIDING SCALES

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Purpose: The prevalence of hyperglycemia in the acute care setting is increasing as the percentage of Americans with diabetes has increased. Patients on high dose steroids, under acute stress, or on enteral/parenteral nutrition may also experience hyperglycemia. The American Diabetes Association (ADA) recommends initiating insulin in hospitalized patients with persistent blood glucose levels ≥ 180 mg/dL and adjusting insulin for a target blood glucose of 140-180 mg/dL. Insulin is classified as a high-alert medication by ISMP due to the significant harm that may occur if an error is made. Under or over dosing insulin can lead to hyperglycemia or hypoglycemia respectively. Hyperglycemia in hospitalized patients is frequently managed by sliding scale insulin (SSI). Community Health Network has used both weight-based and low, moderate, or high dose insulin sliding scales. The objective of this study was to compare rates of hyperglycemia and hypoglycemia between patients initiated on a low, moderate, or high dose insulin sliding-scale versus a weight-based insulin sliding-scale. **Methods:** Patients included in the study were identified by electronic medical record if they had an order for insulin lispro sliding scale during admission. The number of episodes of hyperglycemia (blood glucose ≥ 180 mg/dL), hypoglycemia (blood glucose <70 mg/dL), and severe hypoglycemia (blood glucose < 50 mg/dL) were compared between the two order sets. Key patient characteristics that were evaluated include patients' total average daily dose of insulin (units/kg) administered during admission, cause of hyperglycemia, diet, presence of long acting insulin or carbohydrate coverage insulin, and antidiabetic medications prior to admission. Average blood glucose during admission was calculated. **Results and Conclusion:** Research currently in progress. The results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define blood glucose targets for patients in the acute care setting according to the 2018 ADA Standards of Care.
Identify adverse outcomes associated with both hypoglycemia and hyperglycemia.

Self Assessment Questions:

At what blood glucose level should insulin be initiated according to the 2018 ADA Standards of Care?

- A: ≥ 100 mg/dL
- B: ≥ 140 mg/dL
- C: ≥ 180 mg/dL
- D: ≥ 200 mg/dL

Which of the following may be a contributing factor to the development of hyperglycemia?

- A Use of high dose steroids
- B NPO status
- C Infection
- D Use of total parenteral nutrition (TPN)

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-823-L04-P

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

IMPACT OF RAPID IDENTIFICATION OF GRAM NEGATIVE BLOOD CULTURES IN A COMMUNITY HOSPITAL SYSTEM

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Purpose: Rapid polymerase chain reaction (PCR) identification of blood cultures has improved the treatment of bacteremia by quickly identifying common pathogens. The technology is often incorporated into antimicrobial stewardship programs to guide antibiotic therapy, but there is less literature available for its impact with gram negative bacteria. Parkview Health began utilizing rapid PCR identification for blood cultures in November 2015 in conjunction with pharmacist review and stewardship interventions. The system in use can identify many common gram negative bacteria, as well as the *Klebsiella pneumoniae* carbapenemase (KPC) gene. Results for all hospitals in the network are processed and reviewed at a central hospital location, with subsequent dissemination of recommendations. The system-wide approach provides a broad population to study the benefits of the technology due to pharmacy's integral role in the process. This study aims to evaluate the impact of rapid PCR culture identification on antibiotic therapy in patients with gram negative bacteremia in multiple community hospitals. **Methods:** A retrospective chart review of Parkview Health patients was conducted, comparing a pre-PCR group and a post-PCR group. Subjects were included if they were 18 years of age or older, had gram negative bacteremia, were admitted to a Parkview Health hospital, and received at least one dose of antibiotics. Subjects were excluded if they were on hospice, had polymicrobial bacteremia, or were immunocompromised. If patients were admitted for multiple incidences of gram negative bacteremia, only the first admission was included. The primary endpoints were the differences in time to first de-escalation of therapy and time to targeted therapy between the two groups. Secondary outcomes included time to removal of gram positive coverage, hospital length of stay, intensive care unit length of stay, in-hospital mortality, and documented pharmacist interventions. **Results and conclusion:** To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the functionality of rapid polymerase chain reaction (PCR) blood culture identification technology
Discuss how antimicrobial stewardship programs can optimize antimicrobial therapy using rapid PCR blood culture identification technology

Self Assessment Questions:

Which of the following best describes the capabilities of rapid PCR blood culture identification technology for gram negative bacteremia?

- A Identifies all gram negative species
- B: Recognizes select antimicrobial resistance genes
- C: Identifies antimicrobial susceptibility and MIC values
- D: Replaces the need for traditional blood cultures

Hospitals that utilize rapid PCR blood culture testing in conjunction with antimicrobial stewardship programs can:

- A Increase time to de-escalation of antibiotic therapy
- B Decrease overall mortality
- C Increase overall cost for the patient
- D Improve time to targeted therapy

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-631-L01-P

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

THE EFFECT OF DEXMEDETOMIDINE VERSUS PROPOFOL ON THE INCIDENCE OF POST-CARDIAC SURGERY ATRIAL FIBRILLATION

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Purpose: Post-operative atrial fibrillation (POAF) is a surgical complication estimated to occur in up to 50% of patients after cardiac surgery. Following cardiac surgery, many patients will return to the intensive care unit mechanically ventilated requiring sedation. Liu, et al. conducted a randomized controlled trial evaluating the use of two sedatives, dexmedetomidine and propofol, on the incidence of POAF. This study found that dexmedetomidine decreased the incidence of POAF following elective coronary artery bypass graft surgery compared to propofol. Urgent cardiac surgical patients have been excluded from many trials and the effect of dexmedetomidine in this population is unknown. The purpose of this study is to evaluate the use of dexmedetomidine and propofol in urgent and elective cardiac surgery. **Methods:** This is a retrospective cohort study of adult patients without pre-existing atrial fibrillation admitted to a major teaching hospital from January 2011 to August 2017 who underwent cardiac surgery and received either dexmedetomidine or propofol after surgery. The primary objective is to determine the incidence of POAF in patients who received dexmedetomidine versus those who received propofol. Secondary objectives include the need for atrial fibrillation treatment at discharge and differences in hospital length of stay. Data collection will include demographics, home use of rate control medications or anticoagulation, comorbid conditions, the use of prophylactic amiodarone, type of cardiac surgery, and if the surgery was urgent or elective. Documentation in the electronic health record will be used to determine if patients developed POAF, to determine if patients required treatment for POAF at discharge, and to determine hospital length of stay. **Results and conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the incidence and risk factors of post-operative atrial fibrillation (POAF) following cardiac surgery
Explain the rationale for the use of dexmedetomidine to prevent POAF

Self Assessment Questions:

When are patients at the highest risk of developing POAF?

- A: 1-6 hours after surgery
- B: 6-12 hours after surgery
- C: 12-24 hours after surgery
- D: 48-72 hours after surgery

Which of the following is a mechanism by which dexmedetomidine may decrease the incidence of POAF following cardiac surgery?

- A: Decreased heart rate
- B: Increased blood pressure
- C: Decreased blood pressure
- D: Increased inflammation

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-630-L01-P

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

TICAGRELOR VERSUS CLOPIDOGREL AFTER PERCUTANEOUS CORONARY INTERVENTION IN PATIENTS WITH LIVER DISEASE

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Background: Dual antiplatelet therapy with a P2Y12 inhibitor and aspirin following percutaneous coronary intervention (PCI) reduces cardiovascular related endpoints.¹ In patients with liver disease data regarding the safety and efficacy of P2Y12 inhibitors is limited. Clopidogrel and ticagrelor both undergo hepatic metabolism and altered hepatic function may impact safety and efficacy of these agents. The purpose of this study is to assess the safety and efficacy of ticagrelor and clopidogrel in patients with chronic liver disease. **Methods:** Patient over 18 years old with liver disease who underwent PCI at IU Health Methodist hospital between January 1, 2012 to December 15, 2017 were assessed for inclusion. Patients receiving concomitant anticoagulation or strong inhibitors or inducers of cytochrome P-450 3A4 were excluded. IRB approval was granted with waiver of informed consent. Included patients were grouped based on receipt of either clopidogrel (control) or ticagrelor (study) following PCI. The primary efficacy endpoint is a composite of mortality, myocardial infarction, or stent thrombosis. Secondary endpoints include death from any cause, myocardial infarction, stent thrombosis, and stroke. Safety endpoints include major life-threatening bleed (defined by fatal bleeding, hemorrhagic stroke, a decline in hemoglobin level of 5.0 gram per deciliter or more, retroperitoneal bleed, gastrointestinal bleed, genitourinary bleed, or tamponade), minor bleed (access site bleeding or hematoma), and dyspnea requiring drug discontinuation. Descriptive statistics will be used to compare baseline characteristics with the Chi-squared test being used for categorical endpoints.

Results/Conclusions: Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the role of antiplatelet therapy after coronary artery stent placement.
Identify pharmacokinetic and pharmacodynamics differences between antiplatelets.

Self Assessment Questions:

Following acute coronary syndrome and PCI, dual antiplatelet therapy has been shown to decrease which of the following?

- A: Cardiovascular death
- B: Fatal arrhythmias
- C: Kidney dysfunction
- D: Mean blood pressure

Which of the following antiplatelets is a prodrug requiring liver metabolism to become active?

- A: Ticagrelor
- B: Cangrelor
- C: Clopidogrel
- D: Aspirin

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-629-L01-P

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

ASSESSING IMPACT OF PRESCRIPTION DISCHARGE PROGRAM ON HOSPITAL READMISSIONS IN A LARGE ACADEMIC MEDICAL CENTER

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Purpose: A patient's transition of care from the inpatient to the outpatient setting is an important step in the medication management process. If this process is not completed properly, patients are at risk for a hospital readmission which can negatively affect patient outcomes and can be costly to institutions. In 2008, Indiana University Health Methodist Retail Pharmacy developed the Meds-In-Hand Prescription Discharge Program to help prevent medication related readmissions. The objective of this study is to assess patients who participated in the Meds-In-Hand Program compared to patients who did not participate in the Meds-In-Hand Program and the incidence of 30 day hospital readmissions. **Methods:** This study is a retrospective chart review from February 1, 2016 until December 30, 2017. IRB approval has been submitted. All admitted inpatients that were discharged from Indiana University Health Methodist Hospital are included in this study. Patients that filled discharge prescriptions at Indiana University Health Methodist Retail Pharmacy are considered patients participating in the Meds-In-Hand Program. Patients who are less than 18 years old, pregnant, incarcerated, discharged from an intensive care unit (ICU), transferred to another facility, have zero prescriptions upon discharge, and hospice patients are excluded from this study. Baseline demographics including age, gender, length of stay, admission diagnosis, and insurance payer type will be collected. Discrete variables will be compared by the Chi-squared test and continuous variables will be compared by the t-test as appropriate. **Results:** Data collection and analysis is ongoing and will be presented at GLPRC. **Conclusions:** Results are pending and will be presented at GLPRC.

Learning Objectives:

Describe concerns that can result from incomplete transitions of care.
Identify roles for pharmacists to improve transitions of care.

Self Assessment Questions:

What is the estimated incidence of adverse events for patients discharging from the hospital?

- A 2%
- B: 10%
- C: 20%
- D: 100%

Which program was initiated in October 2012 by the Affordable Care Act (ACA) to help decrease the costs associated with preventable readmissions?

- A The Prevention and Public Health Fund (PPHF)
- B Hospital Readmissions Reduction Program (HRRP)
- C National Prevention Strategy
- D Centers for Medicare & Medicaid Services (CMS)

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-824-L04-P

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

COST-BENEFIT ANALYSIS OF AN ELECTRONIC MEDICAL RECORD INTEGRATED, PERPETUAL PHARMACY INVENTORY SYSTEM AT A LARGE ACADEMIC MEDICAL CENTER

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Disruptions in the medication use process due to out-of-stock medications can negatively impact patient care. This must be balanced by the financial implications of carrying excess medication stock. Unlike traditional inventory control methods that require manual counting, perpetual inventory systems that integrate with electronic medical records can provide inventory counts at any point in time, thus providing accurate data for operational optimization. We aim to examine the cost-benefit of a newly implemented, electronic medical record integrated real-time inventory system in our health system. The program went live across the entire health system over one week in October of 2017. Perspective for this study will be that of the implementing hospital for a five-year time period. Cost examination will be fully inclusive and there will be no washout period for this study. The financial impact will be determined for any changes in inventory on hand, cost of purchases over time, the cost of system implementation, as well as changes in labor costs. A break-even point will be calculated and the study will be tested for sensitivity to varied inputs. Cost savings are expected due to reduction of inventory on hand and a resulting increase in inventory turns leading to increased cash on hand. Additional savings may come through reduction in staff time required for both transfer of product between business units and for manual counting activities related to inventory management. Secondary analysis will include an examination of the ability to make more frequent financial adjustments according to inventory levels; tighter control of national drug code level purchasing; increased flexibility of critical, par, and maximum levels; and an analysis of overall effects for individual business units within the health system. Results to be presented at the Great Lakes Residency Conference.

Learning Objectives:

Describe pharmacy inventory systems
Identify benefits and costs of electronic medical record integrated, perpetual pharmacy inventory systems

Self Assessment Questions:

Primary benefit from perpetual pharmacy inventory systems is due to which of the following?

- A Reduction in staff labor costs due to reduced time requirements for
- B: Reduction in inventory on hand leading to increased cash on hand
- C: Reduction in staff labor costs for financial analysis
- D: Reduced drug pricing

Primary cost for the maintenance of perpetual pharmacy inventory systems is which of the following?

- A Up front implementation cost to the vendor
- B Ongoing maintenance costs to the vendor
- C Labor costs due to staff time required to optimize and maintain the
- D Fees for system auditing

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-825-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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DEVELOPMENT OF AN ANTIMICROBIAL STEWARDSHIP PROGRAM IN AN OFFICE BASED PRACTICE SETTING.

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Purpose: Rates of antimicrobial resistance are increasing, which has increased efforts to reduce inappropriate antimicrobial prescribing. Meanwhile, few novel therapies are being developed, despite these growing resistances. As resistance continues to rise, regulating bodies such as the Joint Commission and the Centers for Disease Control and Prevention are searching for ways to decrease inappropriate prescribing of antimicrobials. This retrospective review will seek to assess if interventions including provider education and newsletter updates on antimicrobial stewardship practices can improve antimicrobial stewardship in two primary care office settings. **Methods:** This Indiana University Institutional Review Board approved study was conducted in two physician offices in Bloomington, Indiana between November 2016 and February 2017. Two sets of data will be collected: baseline data, as well as interventional data. These sets of data will be compared to assess for the primary outcomes of this study. The primary outcomes will be the percentage changes in the rate of antimicrobial prescribing in patients diagnosed with acute bronchitis and the rate of fluoroquinolone prescribing in patients diagnosed with urinary tract infection (UTI) after education on stewardship has been provided. Secondary outcomes will include utilization rates of other antimicrobial agents for UTI, rates of allergy and allergic reaction documentation to an antimicrobial agent prior to diagnosis, and rates of documentation of antibiotic necessity in acute bronchitis. Education occurring between the sets of data focused on guideline recommendations and local antibiogram trends to recommend treatments for uncomplicated cystitis and acute bronchitis, as well as an additional newsletter further reinforcing earlier information. **Results:** Results are pending further data collection in March 2018. **Conclusions:** Conclusion is pending further data collection in March 2018.

Learning Objectives:

Describe the need for antimicrobial stewardship initiatives in outpatient settings.

Identify opportunities and strategies for improving antimicrobial stewardship initiatives in outpatient settings.

Self Assessment Questions:

Approximately what percentage of antimicrobial prescribing occurs from outpatient practice sites?

- A: 15%
- B: 30%
- C: 60%
- D: 75%

Which of the following is a Core Element of Outpatient Antibiotic Stewardship from the Centers for Disease Control and Prevention?

- A Initiative
- B Commitment
- C Leadership
- D Recommendation

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-826-L04-P

Activity Type: Knowledge-based Contact Hours: 0.5
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RISK OF ACUTE KIDNEY INJURY IN OBESE PATIENTS ON CONCOMITANT VANCOMYCIN AND PIPERACILLIN/TAZOBACTAM

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Purpose: The purpose of this study is to evaluate the correlation between nephrotoxicity and weight-based vancomycin dosing with concomitant piperacillin/tazobactam in the obese population compared to the non-obese population. It has been noted that obese patients receiving only vancomycin are at a higher risk for acute kidney injury than non-obese patients. Many studies have also suggested that concomitant vancomycin and piperacillin/tazobactam put patients at a higher risk for nephrotoxicity compared with other empiric regimens, specifically vancomycin and cefepime. However, no study has focused solely on the risk for acute kidney injury in the obese population. This study aims to evaluate whether the obese population is at a higher risk for nephrotoxicity than the non-obese population when receiving the combination of vancomycin and piperacillin/tazobactam. Additionally, this study will look to identify any dosing strategies or confounding factors that may contribute to acute kidney injuries in the obese population. **Methods:** This is a retrospective chart review of patients who received concomitant vancomycin and piperacillin/tazobactam (VPT) between January 1 and November 30, 2017. Patients who were ≥ 18 years old, received concomitant VPT started within 24 hours of each other and for at least 48 hours, had at least one vancomycin trough drawn, and who have a BMI < 25 or ≥ 30 will be included. Patients with serum creatinine > 1.5 mg/dL at admission or who are overweight (BMI 25-30) will be excluded. Data collected will include patient demographics, vancomycin doses and frequencies, vancomycin total daily dose, BMI, baseline and subsequent serum creatinine, vancomycin trough levels, duration of VPT therapy, presence of AKI, timing of AKI, indication for treatment, and administration of concomitant nephrotoxic agents. Data will be analyzed following data collection completion. **Results:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the RIFLE criteria and their use in the classification of acute kidney injuries.

Review pharmacokinetic properties of vancomycin in the obese population

Self Assessment Questions:

Jim Hopper is a morbidly obese 42 YOM who presents to the ED with suspected hospital-acquired pneumonia and is started on empiric vancomycin and piperacillin/tazobactam. His serum creatinine was 1.2

- A Risk
- B Injury
- C Failure
- D Loss

Due to Mr. Hopper's obesity, what can we expect to happen to the vancomycin volume of distribution compared to a patient with normal weight?

- A Increase
- B Stay the same
- C Decrease
- D All of the above

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-632-L01-P

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

IMPACT OF PHARMACIST-DRIVEN ORDERING OF FIRST-DOSE ANTIBIOTICS IN PATIENTS WITH STAPHYLOCOCCUS AUREUS BACTEREMIA

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Background: Staphylococcus aureus bacteremia (SAB) is an important focus in healthcare, with reported 30-day and 90-day mortality rates of 20% and 26%, respectively. Timely administration of antibiotics in the setting of bloodstream infections has been extensively studied and validated as an effective method for improving patient outcomes. The rate of SAB in the state of Kentucky was 25% above the national average in 2014. Despite this, many patients are not started on adequate empiric antibiotics when blood cultures are drawn due to alternate suspected diagnoses, or antibiotics with an inadequate spectrum of activity being ordered. In an effort to reduce the time to appropriate antibiotics the antimicrobial stewardship team at Norton Healthcare implemented the Rapid Bacteremia Response Program (RBRP) which incorporated new rapid diagnostic technology and changed the microbiology notification process. Pharmacists are the first clinicians informed of Gram stain and rapid diagnostic results. If patients were determined to not already be receiving appropriate therapy, the RBRP included a standing order for pharmacists to order a stat dose of an appropriate antibiotic. The purpose of this study is to measure the impact of the RBRP in patients with SAB. **Methods:** A retrospective quasi-experimental study was conducted at four adult hospitals located in Louisville, Kentucky. Patients were included if they had blood cultures positive for S. aureus and were not on adequate empiric antibiotics between March 6, 2016 and December 31, 2016 (control group) or between March 6, 2017 and December 31, 2017 (study group). The primary outcome was the time from Gram-stain to the administration of an adequate antibiotic. Secondary outcomes include length of stay, in-hospital mortality, and time to appropriate de-escalation in patients with methicillin-susceptible S. aureus. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference in 2018

Learning Objectives:

Describe the process of the Rapid Bacteremia Response Program implemented at Norton Healthcare.

List the benefits associated with pharmacist involvement in the notification process for positive blood cultures.

Self Assessment Questions:

In patients not already on adequate antimicrobial therapy, what was the average time from Gram stain to appropriate antibiotics in patients with SAB before and after the RBRP was implemented?

- A 8 hours before, 2.5 hours after
- B: 18 hours before, 7 hours after
- C: 10 hours before, 1.5 hours after
- D: 6.5 hours before, 5 hours after

Which of the following are true regarding the process changes included with the RBRP at Norton Healthcare?

- A The nurse was no longer the first person notified of a positive blood culture
- B A standing order was implemented allowing pharmacists to order antibiotics
- C The RBRP only applied to blood cultures with Gram-positive cocci
- D A & B

Q1 Answer: C Q2 Answer: D

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(if ACPE number listed above)

AN EVALUATION OF THE HARTFORD NOMOGRAM IN CRITICALLY ILL PATIENTS

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Purpose: Aminoglycosides are a class of antibiotics with activity against aerobic gram negative bacilli. Extended interval dosing (EID) regimens enhance concentration-dependent killing by maximizing the peak concentration/MIC ratio while also decreasing nephrotoxicity and ototoxicity. This dosing regimen was initially studied and validated in healthy patients which makes these results difficult to extrapolate to the critically ill population due to their altered pharmacokinetics. Therefore, this study aims to compare two-point kinetics to the Hartford nomogram to determine the accuracy of the Hartford nomogram in a critically ill population. **Methods:** This is a prospective, single center, pharmacokinetic study of patients admitted to an intensive care unit (ICU) at Rush University Medical Center (RUMC) from July, 1 2017 – June 30, 2018. Patients 18 years or older and having received one extended interval dose of either amikacin, gentamicin or tobramycin with two drug levels obtained will be included. Patients receiving intermittent hemodialysis will be excluded. The primary endpoint is the percentage of appropriately predicted dosing regimens based upon the Hartford nomogram. Secondary endpoints include microbiological cure, incidence of nephrotoxicity, average drug-free period, and average dose and rate of target attainment of peak goals using Hartford Nomogram dosing. **Results/Conclusion:** These will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify pharmacokinetic changes that are prominent in the critically ill population which may alter drug pharmacodynamics.

Describe dosing considerations and pharmacokinetic targets of aminoglycosides in the critically ill population.

Self Assessment Questions:

Which one of the following is a pharmacokinetic change you would expect to see in a critically ill patient?

- A Augmented renal failure
- B: Decreased drug clearance
- C: Increased absorption
- D: Decreased volume of distribution

Which of the following is the target Cmax/MIC ratio for aminoglycosides?

- A > 5:1
- B > 20:1
- C > 50:1
- D > 10:1

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-634-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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IMPACT OF INHALED VASODILATOR THERAPY IN LUNG TRANSPLANT RECIPIENTS

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Purpose: Within the first 72 hours of lung transplant, recipients may be at risk for developing primary graft dysfunction (PGD), a severe form of ischemia reperfusion acute lung injury. PGD is associated with acute and chronic rejection, and PGD Grade III at 72 hours is a known predictor of early mortality. Currently, supportive therapy is standard of care; however, inhaled vasodilators, such as inhaled nitric oxide (iNO), have been used for both prevention and treatment of PGD. Alternatively inhaled epoprostenol (iEPO) is another pulmonary vasodilator, which has not been well studied in lung transplant but demonstrates non inferiority to iNO in other indications and has a cost advantage. The objective of this study is to evaluate the impact of inhaled vasodilator therapy (either iNO or iEPO) on PGD in lung transplant recipients.

Methods: This was a retrospective, single centered, cohort study of adult lung transplant recipients from January 2012 to August 2017 at Loyola University Medical Center. Patients were stratified by whether or not they received inhaled vasodilator therapy (iNO or iEPO). Patients were excluded if they had to return to the operating room or had multiple organs transplanted simultaneously during their lung transplant admission. The primary endpoint was PGD at 72 hours after lung transplantation in patients that received an inhaled vasodilator compared to those that did not. Secondary endpoints included acute cellular rejection (ACR) within the first 6 months, PGD at 6, 24, and 48 hours, hospital length of stay, intensive care unit length of stay, hemodynamic data, renal failure, acute rejection, graft survival at 30 days and 6 months, and pharmaco-economic analysis. **Results & Conclusion:** Data collection and analysis is ongoing. These will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define primary graft dysfunction (PGD) in lung transplant recipients.
Explain the role of inhaled vasodilators in PGD and lung transplant recipients.

Self Assessment Questions:

What objective measure(s) defines primary graft dysfunction?

- A: Biopsy & P/F ratio
- B: Chest Radiography & P/F ratio
- C: Chest Radiography & PFTs
- D: Biopsy & PFTs

Inhaled vasodilators have the potential to reduce primary graft dysfunction and potential complications by which mechanism(s)?

- A: Vascular smooth muscle relaxation
- B: Anti-inflammatory properties
- C: Antithrombotic effects
- D: All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-635-L01-P

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

IMPACT OF OBESITY ON PROPOFOL UTILIZATION AND ADVERSE EFFECTS FROM A LARGE DE-IDENTIFIED DATABASE

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Purpose: To date, there have been no studies conducted to evaluate the use of propofol for continuous ICU sedation in obese patients (BMI ≥ 30) versus non-obese patients (BMI < 30). The hypothesis of this study is that total body weight (TBW) dosing of propofol has higher rates of oversedation and propofol-related side effects in obese patients when compared to non-obese patient populations. **Methods:** This study is a single-center retrospective cohort study. Patients who received a cumulative duration of propofol of at least 24 hours from January 2008 to October 2012 will be evaluated for inclusion. Data was obtained from the MIMIC III Database, which is a multi-parameter intelligent monitoring, intensive care database. This open-access research database includes about 58000 hospital admissions for 38645 adult patients to medical or surgical intensive care units at Beth Israel Deaconess Medical. The primary endpoint is the rate of oversedation in obese patients versus non-obese patients as defined above. Secondary endpoints of this study will include time on ventilator, ICU and hospital length of stay, and mortality, as well as safety outcomes, such as rates of hypotension, bradycardia, and hypertriglyceridemia. Additional subgroup analyses will be performed evaluating BMI classes, different sedation goal ranges, and the impact of length of sedation (24 hours to ≤ 7 days or > 7 day). Appropriate statistical testing will be incorporated. **Results (preliminary):** From January 2008 to October 2012, 2195 patients received propofol for at least 24 hours. After excluding patients with confounding neurologic disease on admission, prior midazolam or lorazepam infusions, and multiple ICU stays, 998 unique patients were identified. Data analysis is ongoing. Final results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify characteristics of ICU sedatives that are beneficial to patient outcomes.
Discuss risks associated with propofol overexposure.

Self Assessment Questions:

Which of the following sedative traits is beneficial for most patients requiring ICU sedation?

- A: A long half-life which allows for the patient to remain sedated in or
- B: An agent that increases the likelihood that a patient will be deeply
- C: Low risk of accumulation in renal or hepatic impairment, allowing f
- D: Amnesic properties that will allow the patient to forget their stay in

Which of the following is a common side effect of propofol continuous infusion?

- A: Hypotension
- B: Pulmonary edema
- C: Hypertension
- D: Pancreatitis

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-636-L01-P

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

ASSESSING INTENDED OPIOID STORAGE AND DISPOSAL IN PATIENTS PRESCRIBED ACUTE OPIOID PAIN MANAGEMENT

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PURPOSE: An important source of diverted opioids are those which are confiscated from or provided by patients with valid opioid prescriptions. According to the Substance Abuse and Mental Health Services Administration, among persons aged 12 or older in 2012-2013 who used opioids non-medically in the past 12 months, 63.6% obtained the opioid from a friend or relative. This study will assess the intended storage and disposal of opioid medications in patients prescribed an opioid for acute pain management. **METHODS:** Patients prescribed 7 days or less of either codeine, hydrocodone, oxycodone or their combinations with acetaminophen or ibuprofen that can read and speak English, and have not received an opioid in the past 30 days from the pharmacy will be asked to participate at medication dispensing. Patient representatives picking up the prescription will be excluded. Investigators will explain the study and obtain patient consent to participate. The self-administered survey requests demographic information and inquires about patients' intended opioid storage and disposal. Participants will be provided an education leaflet on appropriate medication disposal. Surveys will be collected to obtain a 60% response rate, which is an approximate number of 160 participants. **RESULTS:** The study data will be analyzed using descriptive statistics. Analysis of intended opioid storage and disposal among patient demographic subgroups will be compared.

CONCLUSION/IMPLICATION: Identifying the acute pain management patient's intended opioid storage and disposal can help the pharmacist provide targeted education to patients with goal of preventing prescribed opioid diversions in the future.

Learning Objectives:

Discuss current trends in opioid prescribing and opioid diversion in the US

Describe patients' intent for storage and disposal of opioids prescribed for acute pain

Self Assessment Questions:

According to the National Survey on Drug Use 2016 what was the most commonly reported means for obtaining pain relievers for nonmedical use?

- A Free from friend/relative
- B: Bought/took from a friend /relative
- C: Bought from a drug dealer
- D: Prescription from a doctor

According to the systematic review of prescription opioid analgesics commonly unused after surgery done in 2017, what was the most frequently intended storage for prescribed opioid medications?

- A Medicine cabinet, locked
- B Medicine cabinet/other box, unlocked
- C Cupboard
- D Wardrobe

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-900-L05-P

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

EFFECTIVENESS OF ORAL FLUOROQUINOLONE STEP DOWN THERAPY VERSUS INTRAVENOUS ANTIBIOTICS FOR GRAM-NEGATIVE BACTEREMIA IN CANCER PATIENTS

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Purpose: Infections are significant causes of morbidity and mortality in cancer patients, who can be at an increased risk for this complication due to the malignancy itself and its associated treatment (including central venous catheters, chemotherapy-induced mucositis, and bacterial translocation). Gram-negative bacteremia is a commonly encountered complication in cancer patients, and those with uncomplicated bacteremia generally receive a 14-day course of intravenous (IV) antibiotics. However, limited data exists on whether cancer patients with gram-negative bacteremia may be safely transitioned to an oral (PO) antibiotic regimen. Therefore, the purpose of this study is to determine if transitioning to a PO fluoroquinolone (FQ) for the definitive treatment of gram-negative bacteremia is as effective as continuing IV therapy in cancer patients. **Methods:** This was a single-center, retrospective cohort study of adult cancer inpatients with culture-confirmed gram-negative bacteremia. A minimum of 72 hours of antibiotic treatment was required for inclusion. Exclusion criteria included documented FQ allergy, pathogen resistance to FQs, inadequate source control, endocarditis, meningitis, persistent bacteremia, persistent neutropenia, transition to hospice or comfort care, pregnancy, incarceration, or transition to a non-FQ PO antibiotic. All patients who were transitioned to a PO FQ within five days of their first positive blood culture were included in the IV-to-PO group, which was compared to those who continued IV therapy. The primary outcome of this study is the composite of 30-day recurrence, 30-day infection-related readmission, and inpatient mortality. Secondary analyses will further characterize the primary outcome based on FQ agent used, neutropenic status at the time of positive culture, bacteremia source, type of malignancy, bacteremia severity, and total duration of antibiotics. Secondary outcomes assessed include infection-related length of stay (LOS), hospital LOS, and adverse events, including Clostridium difficile infection and catheter-related complications. **Results/Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize risk factors for bacteremia unique to the cancer patient population

Select an appropriate duration for the treatment of uncomplicated gram negative bacteremia

Self Assessment Questions:

Which of the following chemotherapy adverse effects can contribute to a cancer patient's increased risk of gram negative bacteremia?

- A Nausea and vomiting
- B: Mucositis
- C: Peripheral neuropathy
- D: Alopecia

What antibiotic characteristic should be given the greatest consideration when transitioning from IV to PO therapy for gram negative bacteremia?

- A Cost
- B Dosing frequency
- C Elimination half-life
- D Oral bioavailability

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-637-L01-P

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

COMPARING RISK FACTORS AND TREATMENT SUCCESS ASSOCIATED WITH NAP-1 STRAIN AND TRADITIONAL CLOSTRIDIUM DIFFICILE INFECTIONS AT THE HUNTINGTON VA MEDICAL CENTER.

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Purpose of the Research: In light of the national initiative to reduce overprescribing of antibiotics and promoting antimicrobial stewardship, Clostridium difficile infections have become a focus of discussions in health care settings. Clostridium difficile can range from mild diarrhea to life threatening inflammation of the colon leading to toxic megacolon and sepsis. The North American pulsed field gel electrophoresis type 1 (NAP1) strain of Clostridium difficile has a genetic modification that enhances the production of toxin A and B, which leads to greater virulence and more severe disease. The purpose of this study is to identify patients demographics associated with treatment regimens, risk factors for recurrence, and detect treatment outcomes differences for patients who are positive for the NAP1 strain. This will be completed through a retrospective chart review of patients who have had the diagnosis of a Clostridium difficile infection since 2010 at the Huntington VA Medical Center. **Methods:** A retrospective chart review will be completed to evaluate Clostridium difficile treatment outcomes, recurrence rates, and identify risk factors in patients who developed Clostridium difficile infections at the Huntington VA Medical Center. One group will be individuals who had a non-NAP1 Clostridium difficile infection and the other group will be patients who were positive for the NAP1 strain of Clostridium difficile infection since 2010. A comparison between NAP1 strains and non-NAP1 strains will be evaluated to identify differences in patient demographics, antibiotic prescribing trends prior to and during the Clostridium infection, other non-antibiotic prescribed medications, and time of year of the infection. **Results:** Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review pharmacologic and non pharmacologic risk factors that are associated with Clostridium difficile infections and recurrences.

Identify current antibiotic treatment regimens that are utilized for the treatment of Clostridium difficile infections to identify differences in Clostridium difficile recurrences.

Self Assessment Questions:

Which of the following is a risk factor for Clostridium difficile infection?

- A BMI \geq 20 kg/m²
- B: Frequent use of antibiotics
- C: Age < 25 years old
- D: Frequent use of levothyroxine

Which strain is associated with emergence of hypervirulent Clostridium difficile infections and what antibiotic is commonly utilized for the treatment of Clostridium difficile infections?

- A 00093, Doxycycline IV
- B 027, Clindamycin PO
- C NAP1, Vancomycin PO
- D REA group B1, Vancomycin IV

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-827-L01-P

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

IMPLEMENTATION OF A VERTICAL ANTIMICROBIAL STEWARDSHIP INTERVENTION FOR PATIENTS COLONIZED WITH CLOSTRIDIUM DIFFICILE

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Purpose: Clostridium difficile remains a pathogen of importance as global infections steadily rise. While traditionally thought of as a nosocomial infection, C. difficile prevalence is increasing in the community. This may be due partly to asymptomatic gastrointestinal colonization. Disruption of the gut microbiome in colonized patients through use of antibiotics and acid suppressive therapy (AST) may lead to active colitis. In an effort to prevent progression to active disease, a novel vertical antimicrobial stewardship (AMS) intervention was initiated at our hospital. This study aims to describe our experience with this intervention. **Methods:** This single-center, descriptive study evaluated the impact of a vertical AMS intervention on 265 patients found to be colonized with C. difficile upon admission. Between May 1 and December 10, 2017, patients on 5 units were screened, with surveillance results reported to AMS pharmacists. Positive results prompted screening the patient's health record for potential antibiotic and AST de-escalation interventions daily until discharge. Patients with opportunities for de-escalation were staffed with an infectious diseases physician.

Results: Among 265 patients included, 193 (73%) received antibiotics and 190 (72%) received AST therapy. Twenty-three (70%) of 33 antibiotic interventions and 34 (69%) of 49 AST interventions were accepted. Fourteen (5%) patients developed active colitis (positive C. difficile toxin); eleven (79%) were receiving antibiotics and 6 (43%) AST. Antibiotic interventions were made on 2 of these patients with only one accepted. **Conclusion:** A large portion of patients found to be colonized with C. difficile received concomitant antibiotics and AST. Interventions were low, as many patients had other indications for antibiotics and AST. Despite this, a relatively few number of patients developed active colitis. While antibiotic use is common in patients with colitis, other factors may play a role in progression from colonization to colitis. Further research into these additional factors is needed.

Learning Objectives:

Explain the rationale for implementing a vertical antimicrobial stewardship bundle for patients colonized with Clostridium difficile.

Discuss the impact of a novel vertical antimicrobial stewardship intervention for patients colonized with Clostridium difficile and highlight its clinical role in guiding de-escalation of antibiotics and acid suppressive therapy.

Self Assessment Questions:

Which of the following is identified as a risk factor for Clostridium difficile infection?

- A Antihypertensive therapy
- B: Acid suppressive therapy
- C: Antiretroviral therapy
- D: Anticoagulation therapy

Which of the following interventions in this study is potentially associated with decreased progression of Clostridium difficile colonization to active colitis?

- A Antibiotic de-escalation
- B Proton pump inhibitor de-escalation
- C Histamine type-2 receptor antagonist discontinuation
- D Laxative discontinuation

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-638-L01-P

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

IDENTIFICATION AND IMPROVEMENT OF OPERATIONAL INEFFICIENCIES IN PHARMACIST-MANAGED ANTICOAGULATION CLINICS IN A FOUR HOSPITAL COMMUNITY HEALTH SYSTEM

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The demand for pharmacist-managed anticoagulation clinic services in the health system has increased over the last decade. The current clinic workflow does not support the increased patient volume and has resulted in overages of pharmacist-budgeted work hours. Workflow must be assessed to identify inefficiencies and implement changes to meet clinic demands. The primary project objective is to identify and improve areas of operational inefficiencies in the clinics. The secondary objective is to determine if improving operational inefficiencies decreases burnout among staff. Pharmacists in the health system's anticoagulation clinics complete all clinical and non-clinical tasks. A questionnaire was administered to clinic pharmacists to identify which inefficiencies are present in the current workflow. The top inefficiency reported was disruption of workflow due to telephone call volume. Retrospective telephone volume data identified that 60% of incoming and outgoing phone calls were for scheduling matters. Clinic staff completed a baseline validated clinician burnout survey to determine if burnout correlates with operational inefficiencies. Currently, anticoagulation clinic patients do not have access to appointment scheduling in the health system's online patient portal. Anticoagulation clinic patients will be offered access to online scheduling in hopes of reducing schedule-related telephone volume. Once implemented, call volume will be compared to baseline. Additionally, a weeklong pilot using a pharmacy resident-staffed call center will be completed. The call volume, type of calls, and the amount of time pharmacists stay after their scheduled shifts will be collected. The call center results will be evaluated to determine what workflow changes may be made. The clinician burnout survey will be re-administered to staff after the improvements in workflow are implemented and will be compared to baseline. No preliminary results are available.

Learning Objectives:

Discuss the potential solutions for reducing schedule-related phone calls in a pharmacist-managed clinic.

Describe how clinic operational inefficiencies could affect patient care.

Self Assessment Questions:

Which of the following are non-clinical tasks an ancillary staff member could be responsible for?

- A: Develop therapy plan
- B: Manage non-clinical phone calls
- C: Schedule patients' follow-up appointments
- D: Both B and C

Which of the following are potential outcomes of clinic operational inefficiencies?

- A: Increased staff overtime and burnout
- B: Increased job satisfaction
- C: Improved quality of patient care
- D: None of the above

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-828-L04-P

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

IMPLEMENTATION OF ELECTRONIC SYSTEMS FOR NON-STERILE COMPOUNDING OPERATIONS

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Purpose: At UW Health, non-sterile compounding is performed in a centralized services center to supply multiple inpatient and ambulatory pharmacies. The ordering, billing and documentation of the compounding was previously performed manually by pharmacy technicians. This project transitioned the manual operation to an electronic one, which included standardizing workflows, development of a compounding medication formulary and master formulation records compliant with best practice recommendations. New functionalities from the electronic medical record (EMR) were incorporated into the compounding procedure allowing for ingredient barcode scanning and electronic documentation. A web-based inventory management software was also implemented for ordering, billing and inventory control. The purpose of this project is to evaluate the impact electronic systems have on patient safety and operational efficiency. Methods: A pre-implementation process map of the non-sterile compounding workflow was created to identify areas of inefficiencies and error-prone processes. A post-implementation workflow was created to incorporate ingredient barcode scanning in the compounding process, electronic documentation of each preparation, and electronic ordering and billing of items. All master formulation records and labels were assessed and standardized to one format that fulfilled United States Pharmacopeia <795> recommendations and state law requirements. Oral liquid concentrations were assessed and changed to match recommendations from American Society of Health-System Pharmacists (ASHP). Medication formularies were consolidated into one and built into the EMR. Pre-implementation data was collected and will be compared alongside post-implementation data to analyze project impacts on efficiency and safety. Measures include time studies conducted through direct observations, quantity of products compliant with best practice recommendations, and number of drug concentrations matching national recommendations. Final results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the advantages and disadvantages of having master formulation records built into the EMR

Describe the challenges of standardizing workflows among different healthcare settings

Self Assessment Questions:

Which of the following is required on a non-sterile compounded item label per United States Pharmacopeia <795>?

- A: Medication brand name
- B: Storage container type
- C: Internal lot number
- D: Beyond use date

Which of the following is a benefit of having a single concentration and formulation for an oral compounded liquid?

- A: Accommodate different dosing needs with one drug concentration
- B: Remove risk of dispensing wrong concentration to patients
- C: Provide patients with different flavoring options
- D: None of the above

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-916-L07-P

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

ASSOCIATION BETWEEN TACROLIMUS CONCENTRATION/DOSE AND RENAL FUNCTION FOLLOWING CARDIAC TRANSPLANT

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Purpose: Tacrolimus (TAC) is highly effective at preventing rejection and prolonging graft function in heart transplant (HT) recipients. The nephrotoxic effect of TAC remains one of its most significant limitations. TAC induced nephrotoxicity is strongly associated with the concentration of TAC in whole blood; emerging data suggests that the rate of drug metabolism may also contribute. The ratio of TAC blood concentration to TAC dose (C/D ratio) has been shown to be a reliable marker for the rate of metabolism in renal transplant recipients, but has not been evaluated in HT recipients. **Methods:** A retrospective, single-center study was conducted on all adult HT recipients between 01/2008 and 09/2016. Multiorgan transplant recipients were excluded. Fast versus slow TAC metabolizers were characterized according to the C/D ratio, with fast metabolizers defined as C/D ratio of <1.09 and slow metabolizers defined as a C/D ratio of ≥ 1.09 . TAC dose, whole blood concentration, renal function, cardiac graft function, and liver function tests were evaluated at 1, 3, 6, 12, 24, and 36 months post-transplant. **Results:** A total of 135 patients were included in this study, n=56 in the fast TAC metabolizer group and n=79 in the slow TAC metabolizer group. Baseline characteristics did not differ between groups. Creatinine clearance (mL/min) did not differ between fast and slow TAC metabolizers: 69.1 vs. 62.1 (p=0.266), 60 vs 61.3 (p=0.82), 57.1 vs. 59.2 (p=0.776), 51.8 vs. 53.1 (p=0.828), 50 vs. 53.7 (p=0.63), 42.3 vs. 44 (p=0.864) at 1, 3, 6, 12, 24, and 36 months post-transplant, respectively. **Conclusion:** The C/D ratio is not a reliable marker for TAC metabolism as it relates to nephrotoxicity in HT patients. Larger, randomized trials are warranted to further evaluate TAC nephrotoxicity and to develop minimization strategies that do not comprise clinical efficacy.

Learning Objectives:

Discuss the benefits and adverse events related to tacrolimus use in cardiac transplant recipients.

Recognize potential markers that may predict tacrolimus induced nephrotoxicity.

Self Assessment Questions:

Which of the following are adverse events related to tacrolimus use in cardiac transplant patients?

- A: Nephrotoxicity
- B: Tremors
- C: Gynecomastia
- D: A and B

The tacrolimus C/D ratio has been validated as a marker for nephrotoxicity in which of the following patient populations?

- A: Lung transplant recipients
- B: Heart transplant recipients
- C: Kidney transplant recipients
- D: Pancreas transplant recipients

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-829-L01-P

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

EVALUATION OF NO-SHOWS IN PHARMACIST-RUN OUTPATIENT CLINICS

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Purpose: Cancellations and failed appointments can disrupt clinic operations, lead to loss of revenue and productivity, and result in patients not receiving necessary care. While reasons for no-shows have been evaluated through studies in physician-run primary care clinics, this information has not yet been explored in pharmacist-run clinics. By analyzing pharmacy clinics at the Saint Joseph Family Medicine Center, this study seeks to assess the reasons for missed appointments and whether pharmacy involvement affects a patient's decision to attend. **Methods:** This observational study utilizes telephone interviews of patients who miss or cancel pharmacist-run clinic appointments to determine potential causes and factors influencing their decision. Patients will be identified using NextGen scheduling reports. Patients will be contacted via telephone, asked for verbal consent, and then asked a series of scripted questions to determine the reason(s) they did not attend their appointment. Survey questions address social determinants of health, scheduling conflicts, appointment reminders, and perception of pharmacist involvement. If significant barriers to attending clinic appointments exist, the patient will be referred to an appropriate staff member such as the care coordinator. Survey responses will be recorded without patient identifiers and maintained confidentially. A copy of the consent form signed by the researcher will be mailed to participants after the survey is completed. **Results:** Preliminary results through January 26, 2017 include 25 completed telephone surveys which identified one or multiple reasons for cancelling or missing an appointment. 11 out of 25 patients cited forgetting the appointment, 6 patients had a schedule conflict, 4 lacked transportation, and 6 discussed other issues not falling into a particular category. Comprehensive results will be presented at the 2018 Great Lakes Pharmacy Residency Conference. **Conclusions:** Full data analysis and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify potential reasons why a patient may fail or cancel an outpatient clinic appointment.

Discuss strategies to improve no-shows and cancellations in the ambulatory care pharmacy setting.

Self Assessment Questions:

What are potential reasons for failed appointments reported in studies of physician-run primary care clinics?

- A: Lack of transportation
- B: Forgot the appointment
- C: Not able to leave work or school
- D: All of the above

Which reminder strategy is currently in place at the Family Medicine Center to help prevent patients from forgetting their appointment?

- A: Text message
- B: Phone call
- C: E-mail
- D: Mailed letter

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-830-L04-P

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

EVALUATING EMERGENCY AND HOSPITAL ADMISSIONS IN OUTPATIENT CHEMOTHERAPY PATIENTS FOR PREVENTABLE CONDITIONS

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Chemotherapy patients often experience side effects that can be prevented with medical intervention via prophylactic pharmacologic and non-pharmacologic regimens. The objective of this study is to determine which of ten preventable conditions are most likely to cause emergency department (ED) and hospital admissions in outpatient chemotherapy patients and evaluate medical interventions in these patients. This information will be used to design interventions to reduce these admissions. Patients will be included if they are outpatient chemotherapy patients who have received chemotherapy in the 30 days prior to presenting to the ED or hospitalization for ten preventable conditions (nausea, vomiting, dehydration, neutropenia, diarrhea, pain, emesis, pneumonia, fever, and sepsis) between October 2015 and June 2017, excluding leukemia diagnoses. This study will have two phases. Phase one will consist of determining the three most prevalent preventable conditions in patients admitted to the ED or hospitalized. Phase two will consist of conducting chart reviews on this group of patients to determine if medical interventions based on evidence based guidelines were made. Data collected will include patient age, gender, ethnicity, cancer type, treatment regimen, prophylactic medications, ER or hospital admittance, preventable condition documented, day of the week presented, and days between chemotherapy treatment and medical intervention. Outcomes will include presentation rates for preventable conditions, admission rates for various prophylactic regimens, time to medical intervention after chemotherapy, length of stay, day of admission, and chemotherapy regimen. Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the three most prevalent preventable conditions that outpatient oncology patients present with for medical intervention.

Identify ways pharmacists can intervene with oncology patients to potentially prevent patients from presenting for medical intervention within 30 days after outpatient chemotherapy.

Self Assessment Questions:

Literature shows that the most common reason oncology patients present to the ED is

- A: Pulmonary complications
- B: Cardiology complications
- C: Pain
- D: Gastrointestinal complications

According to Lash et al, up to ___% of chemotherapy patient hospital admissions are potentially preventable.

- A 23%
- B 36%
- C 56%
- D 78%

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-639-L01-P

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

DE NOVO HEPATOCELLULAR CARCINOMA (HCC) AND HCC RECURRENCE IN HEPATITIS C VIRUS PATIENTS TREATED WITH ORAL DIRECT-ACTING ANTIVIRAL AND INTERFERON-BASED REGIMENS

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Purpose: Opposing findings in the literature make it uncertain whether or not oral direct-acting antiviral (DAA) hepatitis C virus (HCV) treatment regimens are associated with an increased rate of de novo hepatocellular (HCC) or HCC recurrence compared to interferon-based HCV regimens. DAA treatment is associated with higher sustained virologic response (SVR) rates compared to interferon-based regimens. Patients who were treated with interferon-based regimens have longer follow-up time available as DAA treatment has been used in the last 4 years. These differences in patient cohorts make the risk of HCC unclear. The clinical benefits of SVR achieved with interferon-based regimens only apply to patients without cirrhosis or those with compensated cirrhosis, as interferon is not used for treatment of decompensated cirrhotics. However, DAA regimens are used to treat patients with decompensated cirrhosis; these patients have a higher risk of developing HCC compared to those without cirrhosis and those with compensated cirrhosis. The objective of this study is to assess de novo and recurrent HCC rates by HCV regimen type and assess any differences in rates by severity of liver disease in patients treated at the investigators' institution. Methods: Investigators performed a cohort study of patients who initiated HCV treatment with oral DAA- or interferon-based regimens under the care of the clinical pharmacist at University of Illinois Hospital and Health Sciences System from June 1, 2009 to April 1, 2017. De-identified data was collected in REDCap, including: age at HCV treatment initiation, gender, race/ethnicity, fibrosis score, Child Turcotte Pugh Class, and HCV and HCC treatment details. Authors evaluated the risk of HCC outcome between the two groups by using a time-to-event approach comparing the HCC event rates in the oral DAA-treated and interferon-treated groups. This study was approved by the Institutional Review Board. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the risk factors for the development of hepatocellular carcinoma (HCC)

Identify the prevalence of HCC development in cirrhotic hepatitis C virus (HCV) patients

Self Assessment Questions:

1. Which of the following conditions is the leading risk factor for the development of HCC in the United States?

- A: Alcoholic liver disease
- B: Hepatitis B virus
- C: Nonalcoholic fatty liver disease
- D: Hepatitis C virus

What percentage of cirrhotic HCV patients develop HCC annually?

- A 1-4%
- B 5-8%
- C 10-15%
- D 20-25%

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-640-L01-P

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

TIME TO ADMINISTRATION OF DEXTROSE-CONTAINING FLUIDS AND ANTIBIOTICS AFTER IMPLEMENTATION OF THE GOLDEN HOUR INITIATIVE AT A LEVEL III NEONATAL INTENSIVE CARE UNIT

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Purpose: The "golden hour" is a phrase utilized in emergency medicine and recently applied to the neonatal intensive care unit (NICU) that refers to a critical time period of a preterm neonate's life immediately following birth. During this period, stabilization of the neonate is critical and can have profound short- and long-term effects. At birth, premature neonates are at an increased risk of developing hypoglycemia and sepsis compared to term infants. Prolonged hypoglycemia is associated with neurodevelopmental delays, and sepsis can lead to complications such as septic shock and respiratory failure. The Golden Hour Initiative (GHI) is a quality initiative driven by The Illinois Perinatal Quality Collaborative (ILPQC) and includes all Level III NICUs in Illinois. One of the GHI aims is that 80% of all premature neonates will have intravenous access, intravenous fluids, and antibiotics infusing within one hour of NICU admission. Methods: This will be a retrospective chart review of patients born at less than 34 weeks gestational age (GA) between January 2014 and December 2016 at Northwestern Memorial Hospital (NMH). Patients born at 34 weeks GA or more, and those transferred from the post-partum unit or an outside hospital will be excluded. Collected data will include basic demographics, dextrose-containing orders, antibiotic orders, time of entered and approved orders, and time of administration of fluids and antibiotics. The primary endpoint is whether the GHI has a significant effect on time to administration of dextrose-containing fluids and antibiotics, if indicated, pre- vs. post- implementation in the NICU. The secondary endpoints are whether at least 80% of infants received dextrose fluids and/or antibiotics if indicated within one hour of birth, and if there was a significant change in time between order entry and pharmacist approval after the GHI implementation. Results/Conclusions: In progress.

Learning Objectives:

List at least two mechanisms of hypoglycemia in preterm neonates
Identify one risk factor associated with neonatal bacterial sepsis

Self Assessment Questions:

Which of the following is NOT an underlying mechanism of hypoglycemia in at-risk neonates that usually require intervention?

- A: Inadequate glycogen stores
- B: Excessive cortisol production
- C: Impaired glucose production
- D: Excessive insulin secretion

Which of the following risk factors for developing bacterial sepsis is associated specifically with preterm infants?

- A: Intrapartum maternal temperature $\geq 38^{\circ}\text{C}$ (100.4°F)
- B: Membrane rupture ≥ 18 hours
- C: Immature epithelial mucosal barrier
- D: Five minute Apgar score ≤ 6

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-831-L01-P

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

IMPLEMENTATION OF A TRANSITION OF CARE PROCESS FOR HIGH-CONCERN MEDICATIONS, UTILIZING PHARMACY TECHNICIAN STAFF, AT A MID-SIZE COMMUNITY HOSPITAL

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Purpose: The Joint Commission defines transitions of care (TOC) as the movement of patients between health care practitioners, settings and home as their condition and care needs change. When the TOC process is not effective, it may lead to poor outcomes including excess readmission rates. Hospital readmission rates are an important factor for Medicare payment from the Inpatient Prospective Payment System program of the Centers for Medicare and Medicaid. This payment is reduced if a hospital has an excess 30-day post-discharge readmission rate. Barriers to obtaining medications at discharge could influence these readmission rates. Studies have demonstrated that primary non-adherence (meaning the first prescription was never filled) is higher for non-formulary medications versus preferred medications and higher for lower-income areas versus higher-income areas. Franciscan Health Lafayette (FHL) utilizes a charity care program and a bedside medication delivery program to ease patient barriers to obtaining medications at discharge. Patients outside of these programs are not formally addressed at FHL. The pharmacy department at FHL has additional pharmacy technician hours. The objective of this study is to evaluate a new TOC process at FHL utilizing pharmacy technicians. Methods: This study is a process improvement initiative for the medication discharge process. This pilot focuses on 'high-concern' medications, or medication where consistent use is especially important or the medication is known to have a high-cost. Pharmacy technicians work with pharmacists to preemptively resolve three key barriers prior to discharge: encountering prior authorizations, unaffordable medications and medications unavailable at a patient's pharmacy. The primary endpoints of this study are the cost-savings for patients and a comparison 30-day all-cause readmission rate. Secondary outcomes include the time-savings for pharmacists due to technician involvement and barriers to the new process. Results/Conclusion: Final results and conclusions will be presented at the 2017 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize risks of unaffordable medications on patient compliance.
Identify current Centers for Medicare and Medicaid criteria for hospital Medicare reimbursement.

Self Assessment Questions:

Which of these is a medical condition assessed by CMS as a part of hospital Medicare reimbursement?

- A: Chronic Obstructive Pulmonary Disease (COPD)
- B: Meningitis
- C: Liver disease
- D: Chronic Kidney Disease (CKD)

According to the most recent National Center for Health Statistics survey (2013), what percentage of patients did not take a medication as prescribed in order to save money?

- A: Approximately 3% of patients
- B: Approximately 8% of patients
- C: Approximately 20% of patients
- D: Approximately 30% of patients

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-832-L04-P

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

WORKLOAD EVALUATION OF CLINICAL PHARMACISTS IN THE AMBULATORY CARE SETTING (WORK-AC)

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Purpose: Evaluation of the time required for individual workload activities and processes for the delivery of care by ambulatory clinical pharmacists is lacking. The primary objective of this study is to measure the time spent on daily activities that comprise the workload of a clinical pharmacist in an integrated ambulatory care setting. Secondary objectives include assessing differences in the distribution of workload based on subjects' score from the Tool for Assessing Ambulatory Care Pharmacist Practice (TAAPP) and identifying current inefficiencies in workflow and areas of opportunity to optimize clinical pharmacist-delivered patient care in the ambulatory care setting. **Methods:** This is a prospective, multicenter, ethnographic, observational study to be conducted at six multidisciplinary ambulatory care clinics. Study subjects will be clinical pharmacists employed in their current position for six months or more and will be observed for 3 nonconsecutive clinic workdays in which they are not responsible for trainees. Subjects will report their demographic and site operational information in addition to self-reported engagement in clinical practice activities by voluntary completion of the TAAPP 1-2 weeks prior to their first day of observation. Workload will be assessed by measuring time spent on daily clinical and operational activities through observation using a stopwatch and the Workload Activity Datasheet. Information regarding the amount of time allocated for each visit, visit type, number of disease states assessed and if clinical support staff assisted in any part of the visit will be collected. Subjects' completed TAAPP and related Workload Activity Datasheets for all observation days will be de-identified and matched by a random, unique, three-digit code corresponding to the geographic region of the study site. The primary outcome, which measures the distribution of time spent on daily activities, will be analyzed utilizing descriptive statistics. **Results:** Research is in progress. **Conclusions:** To be presented at the conference.

Learning Objectives:

Describe the findings from previous evaluations of clinical pharmacists' workload in the ambulatory care setting

Identify the limitations of previous research on ambulatory care clinical pharmacists' workload

Self Assessment Questions:

Which of the following statements is true regarding the findings from previous evaluations of clinical pharmacists' workload in the ambulatory care setting?

- A Survey tools used to assess clinical pharmacists' self-reported activities
- B Specific daily activities performed by clinical pharmacists in the ambulatory care setting
- C Direct observation was found to be the most reliable method to determine workload
- D Limited variability in scope of practice has inhibited the identification of workload

Which of the following is identified in the study by Westerhof et al. as a limitation to accurate evaluation of ambulatory care pharmacists' workload?

- A Not adjusting for number of years the subject has practiced at that site
- B Subjects' responsibility for pharmacy students and residents during observations
- C Not collecting the type of post-graduate training subjects had completed
- D Recording the intended visit length rather than actual length of individual visits

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-833-L04-P

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

EVALUATION OF PRE-OPERATIVE PREGABALIN AND CELECOXIB FOR IMPACT ON POST-PROCEDURAL PAIN MANAGEMENT FOLLOWING SELECTED PODIATRY SURGERIES

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Purpose: Determine if patients undergoing ankle replacement surgeries and ankle-hindfoot fusion surgeries receiving one time, pre-operative doses of celecoxib 400 mg and pregabalin 300 mg will require fewer opioids while maintaining similar levels of pain control post-surgery than patients receiving standard care. The primary objective of this study is to compare opioid administration (quantified in oral morphine-equivalents) in the first 48 hours following podiatry surgeries between patients receiving pre-operative celecoxib and pregabalin and patients receiving standard care. **Methods:** This study will be an observational, retrospective chart review. The analysis will include patients 18 years of age and older undergoing ankle replacement surgeries and ankle-hindfoot fusion surgeries at Gundersen Health System from January 1, 2012 to December 31, 2017. Patients taking chronic gabapentinoids or cyclooxygenase (COX)-2 inhibitors will be excluded from this study. Patients at Gundersen Health System receiving pre-operative doses of pregabalin and celecoxib will be compared to patients receiving the standard of care. Data will be collected surrounding the 48 hour post-operative period in each patient's chart. Baseline characteristics to be collected will include age, gender, surgery type, time and date of surgery, body mass index (BMI), and creatinine clearance. Patient reported numeric pain scores at 12, 24, and 48 hours post-surgery and total opioid usage reported in oral morphine-equivalents within the first 48 hours post-surgery will also be collected. Due to the limited number of these specific podiatry surgeries performed each year at Gundersen Health System, a sample size large enough to achieve power is unlikely to be reached. Descriptive statistics will be utilized in the likely event that achieving power is unobtainable. **Results:** Data collection is ongoing. Final results and conclusions will be presented at Great Lakes Pharmacy Conference in April 2018.

Learning Objectives:

Define the primary goal of using pre-operative multimodal analgesia in post-operative pain management

Recognize the mechanism in which multimodal analgesia strategies exhibit an opioid sparing effect in post-operative pain management

Self Assessment Questions:

The primary goal of using pre-operative multimodal analgesia for post-operative pain management includes which of the following?

- A Eliminate opioid requirements while maintaining similar levels of pain control
- B Eliminate opioid requirements and reduce patient-reported pain scores
- C Reduce opioid requirements while maintaining similar levels of pain control
- D Reduce opioid requirements and reduce patient-reported pain scores

Multimodal analgesia strategies exhibit an opioid sparing effect through which of the following mechanisms?

- A Enhance binding of opioids to mu-opioid receptor binding sites
- B Reduce renal elimination of opioids causing sustained opioid effect
- C Decrease opioid metabolism through inhibition of cytochrome P450
- D Utilize alternative mechanisms of action to act on different stages of pain

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-641-L01-P

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

REVIEW OF ENOXAPARIN DOSING REQUIREMENTS FOR VENOUS THROMBOEMBOLISM PROPHYLAXIS IN PEDIATRIC BURN PATIENTS

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Purpose: Rates of venous thromboembolism in pediatric patients are not well known, particularly in the pediatric burn population. Though there is lacking data, pediatric burn patients are classified as high-risk for VTE, and it is imperative to provide them with proper dosing of enoxaparin to target prophylactic anti-Xa levels. Due to physiologic changes in pediatric burn patients, including altered metabolism, fluid shifts, coagulopathies, surgical treatments, among other altered physiology; the enoxaparin dosing extrapolated from adult trauma populations may not be sufficient in the pediatric burn population. There are limited data available regarding the dosing of enoxaparin in pediatric burn patients, and the data that is available indicates that current dosing strategies may be under-dosing many pediatric burn patients. Our primary objective is to determine the enoxaparin dose required to achieve target prophylactic anti-Xa levels. Secondary objectives include analysis of the following: enoxaparin dose required to achieve first prophylactic anti-Xa level in relation to total body surface area (TBSA) of burn; enoxaparin dose required based on type or cause of burn injury; and enoxaparin dose required based on presence of inhalation injury, concomitant trauma, or comorbid conditions. **Methods:** The study design is a retrospective chart review in pediatric burn patients less than eighteen years of age who received enoxaparin and anti-Xa level monitoring between January 1, 2013 and July 1, 2017. Patients will be excluded if they did not receive prophylactic enoxaparin or expired prior to receiving enoxaparin and anti-Xa level monitoring. **Results & Conclusion:** Data collection is currently under way and final results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe physiologic factors that may contribute to enoxaparin dosing in pediatric burn patients

Recognize the purpose and common target range of anti-Xa level monitoring for venous thromboembolism prophylaxis in pediatric burn patients

Self Assessment Questions:

Which of the following physiologic changes that may alter enoxaparin dosing is not frequently found in pediatric burn patients?

- A: Hypervolemia
- B: Increased volume of distribution
- C: Massive fluid shifts
- D: Metabolic alterations

Which of the following is a common target anti-Xa level for VTE prophylaxis in pediatric burn patients?

- A: Less than 0.2 units/mL
- B: 0.2-0.6 units/mL
- C: 0.6-1 units/mL
- D: Greater than 1 unit/mL

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-642-L01-P

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

PREVALENCE AND PATTERNS OF CONTROLLED-SUBSTANCE DIVERSION BEHAVIORS BY HEALTHCARE WORKERS: SUGGESTIONS FOR IMPROVED SURVEILLANCE

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PURPOSE The opioid epidemic in America has become a significant public health concern with various potential drivers. There is a healthcare leadership obligation not only to foster effective and appropriate pain management strategies, but to serve as a primary gatekeeper for the appropriate use and control of these drugs. Healthcare facilities have an obligation to implement proper policies, procedures, and controls in order to help prevent controlled-substance (CS) diversion for personal use or sale within their communities. The primary objective of this project is to quantify the prevalence and identify possible predictors of CS diversion among healthcare workers (HCW). The results of the study will be used to recommend strategies for the improvement of CS diversion surveillance in order to help prevent it from occurring. **METHODS** The proposed study is a single-center case-control study to evaluate CS diversion among HCW. The study will compare HCW identified as known CS diverters (cases) versus those flagged for investigation without further proof of participating in diversion (controls). Descriptive and logistic regression analysis will be implemented to measure the associations between CS diversion and potential predictors, including: demographic, social, medication use, and behavioral related characteristics. Expected results include predictors of CS diversion in HCW and recommendations to improve CS diversion surveillance. **RESULTS/CONCLUSION** Data collection and analysis will commence pending IRB approval. Preliminary results and discussion will be presented at Great Lakes Pharmacy Resident Conference in April 2018.

Learning Objectives:

Identify common risk points where controlled-substance diversion may occur

Identify key principles in establishing a comprehensive controlled-substance diversion prevention program (CSDPP)

Self Assessment Questions:

Which of the following includes the most common risk points for controlled-substance diversion according to the American Society of Health-System Pharmacists (ASHP) report: Guidelines on Preventing Diversion

- A: Procurement, preparation and dispensing, administration, waste and removal
- B: Procurement, waste and removal, prescribing, administration, preparation and dispensing
- C: Procurement, waste and removal, verification, manufacturing, administration, waste and removal
- D: Procurement, verification, administration, waste and removal, preparation and dispensing

What are the key guiding principles when establishing a comprehensive CSDPP according to the American Society of Health-System Pharmacists (ASHP) report: Guidelines on Preventing Diversion of Controlled

- A: Collaborative approach, core administrative elements, standard procedures
- B: Collaborative approach, provider-level controls, core administrative elements
- C: Collaborative approach, accountability and responsibility, standard procedures
- D: Collaborative approach, accountability and responsibility, standard procedures

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-901-L05-P

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

EFFECT OF INITIATION OF PHARMACIST DRIVEN MRSA PCR TESTING ON DURATION OF ANTI-MRSA ANTIBIOTIC THERAPY

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Purpose: Empiric treatment for hospital-acquired or ventilator associated pneumonia includes coverage for methicillin-resistant *Staphylococcus aureus* (MRSA) with vancomycin or linezolid. However, less than 25% of pneumonia cases are caused by MRSA. Until recently, there was not a quick and easy way to determine if MRSA was present in patients. A new MRSA PCR nasal swab has been shown to quickly and accurately predict if MRSA is present in a given patient; sensitivity 100%, specificity 98%, positive predictive value 33%, negative predictive value 98%. The purpose of this study is to assess the effect initiation of MRSA PCR testing has on duration of antibiotic therapy at a tertiary care medical center. **Methods:** The study had two arms: patients on vancomycin or linezolid therapy for pneumonia prior to initiation of MRSA PCR screening and patients on vancomycin or linezolid therapy for pneumonia after pharmacist driven MRSA PCR testing. The control arm was previously the standard of care at Borgess. In the intervention arm, pharmacists ordered MRSA PCR screens and contacted providers with the results. Pharmacist ordering of the MRSA PCR screen began on November 9th, 2017 and retrospective data was collected on patients with vancomycin or linezolid therapy for pneumonia from November 1st, 2016 through January 31st 2017. Data for both arms was collected retrospectively through chart reviews. The primary outcome was to determine if a significant difference exists in the duration of vancomycin/linezolid therapy between patients without a MRSA PCR screen performed versus those with a completed MRSA PCR screen. **Results and Conclusions:** Data collection is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify patient factors that exclude them from receiving a MRSA PCR screen.

Discuss the potential benefit of having pharmacists order and follow up on MRSA PCR screens.

Self Assessment Questions:

Which of the following factors would exclude a patient from receiving a MRSA PCR screen?

- A Age > 50 years
- B: Tobacco Use
- C: Cavitory/necrotizing pneumonia
- D: Already received a dose of vancomycin

A patient's MRSA PCR screen comes back negative, but is currently receiving vancomycin. As a pharmacist, what should you recommend the provider do?

- A Discontinue the vancomycin due to the MRSA PCR screen's high
- B Continue the vancomycin due to the MRSA PCR screen not being
- C Discontinue the vancomycin after the patient receives two more dx
- D Continue the vancomycin since the patient received a dose of van

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-643-L01-P

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

FROM THE EMERGENCY DEPARTMENT TO THE PHARMACY: PATIENT WILLINGNESS TO OBTAIN NALOXONE FOR A HEROIN OVERDOSE AFTER DISCHARGE FROM THE EMERGENCY DEPARTMENT

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Purpose In 2012 our institution was first in Illinois to implement a hospital based naloxone prescription program. It has evolved to a team dynamic approach. Patients currently receive an emergency department (ED) prescription; the onsite outpatient pharmacy processes the prescription and then provides education on its use. The study objective was to determine if patients adhere to the process of obtaining naloxone for use in a heroin overdose. **Methods** All patients written a naloxone prescription during an ED visit were included. Patients were identified by an electronic data report generated from the electronic medical record (EMR) to capture all ED naloxone discharge prescriptions from January to August 2017. Demographics, ED diagnosis, and prescription information were recorded on an electronic data collection form. Prescription information includes: naloxone product written, other prescriptions written at discharge, if the prescription was brought to the onsite outpatient pharmacy, if naloxone training was completed, who received training. Training completion was verified by standardized documentation completed in the EMR by an outpatient pharmacist. The primary outcome was the comparison of total number of ED discharge naloxone prescriptions written to the number of naloxone products obtained from the pharmacy. The secondary outcome was the proportion of patients with an ED diagnosis of overdose that obtained naloxone versus other diagnoses. **Summary of results to support conclusion** Fifty-five unique encounters were identified receiving a naloxone prescription from the ED. The mean age of patients was 48 years old (SD 12) and 41 (74.5%) were male. Among the 55 naloxone prescriptions given, 14 (25.5%) prescriptions were documented as received at the outpatient pharmacy and ultimately 10 (18.2%) naloxone kits were obtained. Of the patients with a primary diagnosis of heroin overdose, 18.2% obtained naloxone compared to 18.2% of patients with an alternative diagnoses. **Conclusions**

Patient willingness to obtain naloxone after discharge from the ED with our current process is low.

Learning Objectives:

Identify the priority areas of the United States Department of Health and Human Services to combat opioid abuse

List the naloxone preparations that include labeling for layperson use

Self Assessment Questions:

Which of the following is a priority area of the United States Department of Health and Human Services to combat opioid abuse?

- A Extend jail time for drug conviction charges
- B: Expand the distribution and use of naloxone
- C: Re-classify opioid narcotics to schedule-I
- D: Limit education of opioid abuse to adolescents

Which of the following naloxone preparations includes labeling instructions for layperson use?

- A Traditional intramuscular
- B Intravenous
- C Auto-injector
- D Oral

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-834-L04-P

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

EVALUATION OF A STANDARDIZED OPIOID TOLERANT AND NAÏVE PAIN MANAGEMENT ORDER SET IN ADULT GENERAL MEDICINE PATIENTS

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Purpose: The Joint Commission announced implementation of new pain assessment and management standards that became effective January 1, 2018. Highlights of the new standards include identifying a leadership team responsible for pain management, promoting safe opioid use by identifying high-risk patients, and conducting performance improvement activities. Implementation of an opioid tolerant and naive order set is just one step in the quality improvement process. The order set, which was implemented in September 2016, must also be evaluated to assess its utilization and effects on current practice. **Methods:** The retrospective cohort study is approved by the Institutional Review Board. The opioid tolerant and naive order set utilized will be abstracted from the electronic medical record and will only include non-pregnant medical patients greater than 18 years of age. Data will be collected from March 1, 2016 to August 31, 2016 (pre-implementation) and again from March 1, 2017 to August 31, 2017 (post-implementation). Demographics such as age, gender, weight, length of stay, and opioid tolerance will be collected. The primary outcomes will be number of opiate doses given per 1000 patient days, average daily intravenous opioid administration for scheduled and as needed medications, and naloxone administration. Secondary outcomes will include average pain score and average daily dose of opioids in morphine milligram equivalents for scheduled and as needed medications. The study will also look at whether the correct opioid medication was given for the patient reported pain score based on the as needed indication. Preliminary data suggests a decrease in percentage of inpatients receiving opioids, as well as number of opioid doses per 1000 patient days. Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

Learning Objectives:

Discuss The Joint Commission's new pain assessment and management standards for all accredited hospitals.

Explain how utilization of a standardized pain management order set can improve opioid prescribing.

Self Assessment Questions:

According to The Joint Commission's new pain assessment and management standards, which of the following should be completed by all accredited hospitals?

- A: Collection and analysis of data on pain assessment to identify areas for improvement
- B: Facilitation of practitioner and pharmacist access to the Prescriber's Office
- C: Implementation of a leadership team responsible for safe opioid prescribing
- D: All of the above

Fill in the blank. Patients that are (blank) are at a higher risk for opioid-related adverse events?

- A: 18 to 25 years old
- B: Intubated
- C: Opioid tolerant
- D: Underweight or have a low body mass index

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-835-L04-P

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

USE OF CEPHALOSPORINS VS. TRIMETHOPRIM-SULFAMETHOXAZOLE OR CIPROFLOXACIN FOR PYELONEPHRITIS IN PATIENTS DISCHARGED FROM A COMMUNITY HOSPITAL EMERGENCY DEPARTMENT SETTING

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Purpose: The IDSA guidelines currently recommend treatment with ciprofloxacin or trimethoprim-sulfamethoxazole for pyelonephritis. *Escherichia coli*, the most common causal pathogen in community-acquired pyelonephritis, is becoming increasingly resistant to these agents. The purpose of this study was to assess treatment with ciprofloxacin or trimethoprim/sulfamethoxazole versus cephalosporins for pyelonephritis in discharged patients from a community hospital setting. **Methods:** A chart review was completed for adult female patients who received a prescription for a cephalosporin, ciprofloxacin or trimethoprim-sulfamethoxazole for the treatment of pyelonephritis within the network of IU Health system. The primary endpoint evaluated the failure rate of each treatment group. The secondary endpoint evaluated the difference between rates of resistance on culture and sensitivity reports for treatment groups. The Fisher's exact test was used to evaluate the primary endpoint for comparison between the groups with a p-value of <0.05 considered significant. The secondary endpoint was evaluated by a binary logistic generalized estimating equation. **Results:** A total of 55 patients in the cephalosporin group and 43 patients in the ciprofloxacin and trimethoprim/sulfamethoxazole group were reviewed. The primary endpoint occurred in 0% of the patients in the cephalosporin group and in 23.3% of the patients in the ciprofloxacin and trimethoprim/sulfamethoxazole group, p=0.004. Of the 98 urine samples collected, 71 samples were positive for pathogen growth. Upon evaluation of these isolates, 5.6% were resistant to cephalexin, 1.4% was resistant to cefdinir, 2.8% were resistant to ciprofloxacin and 22.5% were resistant to trimethoprim/sulfamethoxazole. Trimethoprim/sulfamethoxazole showed statistical significance for more bacterial resistance compared to the other agents, p=0.003. **Conclusion:** Failure of therapy for pyelonephritis occurred more often in the ciprofloxacin and trimethoprim/sulfamethoxazole than in the cephalosporin group. The findings in this study are most applicable to patients who are treated on an outpatient basis. A prospective, randomized clinical trial is necessary to confirm these results.

Learning Objectives:

Identify the most common pathogen in pyelonephritis

Indicate what oral therapy options are currently endorsed by the Infectious Disease Society of America (IDSA) for the treatment of pyelonephritis

Self Assessment Questions:

What is the most common pathogen in acute pyelonephritis?

- A: *P. aeruginosa*
- B: *S. aureus*
- C: *E. coli*
- D: *E. faecalis*

What treatment for pyelonephritis is recommended when local fluoroquinolone resistance to *E. coli* exceeds 10% according to the Infectious Disease Society of America (IDSA) guidelines?

- A: IV dose of ciprofloxacin, followed by a 7-day oral ciprofloxacin
- B: IV dose of ceftriaxone, followed by a 7-day course of ciprofloxacin
- C: IV dose of ceftriaxone, followed by a 10- to 14-day course of cefdinir
- D: Fosfomycin every 48 hours for 3 doses

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-644-L01-P

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

FACILITATORS AND BARRIERS TO IMPLEMENTING A DEPRESCRIBING SERVICE FOR OLDER ADULTS WITH TYPE 2 DIABETES

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Purpose: The purpose of this study is to complete a needs assessment for a pharmacist-led deprescribing service for older adults with Type 2 Diabetes (T2D) in a geriatric clinic by 1) quantifying the extent of polypharmacy among older adults with T2D and 2) identifying facilitators and barriers from the perspective of clinicians and administrators to implementing a deprescribing service. **Methods:** A mixed methods study design will be used. **Objective 1:** The extent of polypharmacy among older adults will be assessed through a retrospective chart review. Inclusion criteria are: age 65 years or greater, T2D diagnosis, and at least one visit at the geriatric clinic between January 2017 - December 2017. Descriptive statistics will be used to describe the relationship between polypharmacy (5 or more medications daily) or super-polypharmacy (20 or more daily medications) and age and race. Based on preliminary data, we estimate 952 T2D patients will be eligible the majority being female (60%) and over 40% aged 71-80 years old. **Objective 2:** Approximately 15 semi-structured interviews were conducted with administrators, physicians, nurse practitioners, pharmacists, and social workers associated with the geriatric clinic. A qualitative thematic analysis will be conducted using the Consolidated Framework for Implementation Research (CFIR) to identify and categorize themes around barriers and facilitators to deprescribing service implementation. This study's findings will be used to: 1) Identify older adults with T2D who would gain the most from a pharmacist led deprescribing service, based on the extent of polypharmacy observed, and 2) Inform the design, implementation, and evaluation of a deprescribing service protocol for the geriatric clinic. **Results and Conclusion:** Results and conclusion will be presented at Great Lakes Pharmacy Resident's Conference.

Learning Objectives:

Define polypharmacy and the effects on elderly patients with Type 2 Diabetes

Discuss the facilitators and barriers to implementing a deprescribing service for older adults with type 2 diabetes

Self Assessment Questions:

Literature typically defines polypharmacy as _____ and if not addressed could potentially cause _____ in elderly patients with Type 2 Diabetes?

- A > 5 medications, hypoglycemia
- B: > 10 medications, increased fall risk
- C: > 15 medications, hypotension
- D: > 20 medications, adverse drug reactions

Which of the following statements are true regarding implementation of a deprescribing service for older adults with type 2 diabetes?

- A Time is a facilitator
- B Decreased cost of medications is a facilitator
- C Potential to decrease side effects is a barrier
- D Decreased drug interactions is a barrier

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-836-L04-P

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

INSULIN TRANSITIONS OF CARE STANDARDIZATION

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Purpose: On average, 130 patients on insulin are discharged daily from UW Health – University Hospital. Approximately 10 patient safety events are reported every month associated with insulin dosing errors while a patient is admitted. Inconsistent documentation between care areas is one cause of error leading to these adverse drug events. The current documentation process for insulin varies between settings, disciplines, and providers. Additionally there is an inconsistent follow-up process post discharge for patients on insulin which has led to adverse drug events requiring emergency department visits or admissions due to complications. The purpose of this project is to implement a best practice process for insulin transitions of care through inpatient and outpatient documentation standardization and a pharmacist transition of care model in order to improve safety. **Methods:** The FOCUS-PDCA method was utilized to assess and standardize processes through an interprofessional, multi-site workgroup focusing on standardizing communication tools, electronic health record (EHR) documentation, and post-discharge follow-up for high risk patients. The process began by conducting a standardized current practices interview with select individuals from each of the care teams who document insulin in the EHR. The results of this interview were presented to the project workgroup as the current documentation state followed by an idealized design process to determine the best method for standardization.

Preliminary Results: The current practices interview was conducted with 12 individuals. On average, documentation was completed in 2.33 different locations with variations in type and level of documentation within each location [range 2-3]. The method for documentation decided upon was the creation of an insulin documentation form within the EHR that contains primarily discrete data in regards to type of insulin, route/method for dosing, and specific dose. **Conclusions:** The creation of a new insulin documentation form is necessary to provide standardized documentation for insulin dosing.

Learning Objectives:

Recognize the concerns associated with a lack of clear and standardized documentation process for a high risk medication.

Describe the process required to implement documentation standardization across a large academic medical network.

Self Assessment Questions:

1. Which of the following are opportunities for error associated with insulin?

- A Insulin taper regimens
- B: Medication list identifies insulin dose is different from the most recent
- C: New to insulin patient is discharged and no follow-up visit occurs
- D: All of the above

Which of the following is a key principle for documentation determined during idealized design?

- A Multiple locations in EHR
- B Accessible only by endocrine clinic staff
- C Viewable by the patient
- D Only able to be updated by advanced practice providers

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-902-L05-P

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

TIME TO POST-INTUBATION SEDATION INITIATION IN AN EMERGENCY DEPARTMENT AT A LARGE ACADEMIC MEDICAL CENTER

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Purpose: Rapid sequence intubation (RSI) is often used in emergency settings to secure a compromised airway and involves several pharmacological interventions including induction, paralysis, and post-intubation sedation. The need for post-intubation sedation is important to assess, especially when the duration of a paralytic agent is longer than the induction agent utilized. This can lead to discomfort, stress, and other health consequences for the patient. Pharmacists have become more active in emergency medicine through participation in emergency department admissions and patient care, including RSI. This study is seeking to determine if pharmacist presence has an impact on the timing of post-intubation sedation in the Indiana University Health Methodist Hospital Emergency Department. **Methods:** This is an IRB approved retrospective chart review from January 1 through October 5, 2017. Patients were included if they were at least eighteen years old and received either rocuronium or succinylcholine as part of RSI while in the emergency department. The primary endpoint is time to first sedative administration within six hours of paralytic administration when a pharmacist is present versus absent. Secondary endpoints include time to first sedative and analgesic administration within six hours after rocuronium versus succinylcholine and incidence of hypotension. Continuous data will be analyzed using either a two-sample unpaired t-test or Mann-Whitney U. Nominal data will be analyzed using Fisher's exact or chi squared. **Results:** Data collection is ongoing. **Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference 2018.

Learning Objectives:

Discuss the duration of action for medications used in RSI care.
Recognize the pharmacokinetic differences between rocuronium and succinylcholine.

Self Assessment Questions:

Which of the following agents used in RSI care has the shortest duration of action?

- A Etomidate
- B: Ketamine
- C: Lorazepam
- D: Midazolam

Which of the following statements is true regarding the paralytic agents rocuronium and succinylcholine?

- A Succinylcholine is a nondepolarizing neuromuscular channel block
- B Succinylcholine is a depolarizing neuromuscular channel blocker
- C Rocuronium is a depolarizing neuromuscular channel blocker with
- D Rocuronium is a nondepolarizing neuromuscular channel blocker

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-645-L01-P

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

EVALUATING THE EFFECTS OF DEXMEDETOMIDINE IN ADDITION TO A STANDARD BENZODIAZEPINE PROTOCOL IN PATIENTS WITH ALCOHOL WITHDRAWAL ADMITTED TO THE INTENSIVE CARE UNIT

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Purpose: Alcohol withdrawal develops upon abrupt discontinuation of alcohol exposure. Severe withdrawal may include development of agitation, seizures, and delirium tremens. Patients experiencing alcohol withdrawal symptoms are frequently monitored using the Clinical Institute Withdrawal Assessment for Alcohol, revised (CIWA-Ar) scale. This scale is utilized to rank alcohol withdrawal severity. The World Health Organization recommends benzodiazepines as the mainstay of alcohol withdrawal treatment. Occasionally, benzodiazepines do not provide adequate symptom relief and patients need additional sedation. The purpose of this study is to compare clinical outcomes between those who receive benzodiazepines alone and those who receive benzodiazepines and dexmedetomidine for alcohol withdrawal.

Methods: This single-center retrospective chart review has been approved by the local Institutional Review Board. Patients admitted to any intensive care unit (ICU) between July 1, 2012 and July 31, 2017 with a diagnosis of alcohol withdrawal syndrome or delirium tremens and initiated on the CIWA protocol will be included. Data will be collected and reviewed based on two groups: those who received benzodiazepines utilizing the CIWA-Ar protocol compared to those who received benzodiazepines utilizing the CIWA-Ar protocol with the addition of dexmedetomidine. Patients will be excluded based on age less than 18 or greater than 89 years, currently pregnant or breastfeeding, those with known allergies to the study medications, or fewer than five CIWA-Ar scores documented. The primary outcome being evaluated is the time to achieve CIWA-Ar score of less than 16 during ICU stay. Secondary outcomes include maximum change in CIWA-Ar score, time to achievement of CIWA-Ar score less than 9, hospital and ICU length of stay, average Richmond Agitation-Sedation Scale (RASS) score, incidence of delirium tremens, and total cost. Safety endpoints include hypotension, bradycardia, respiratory depression, and incidence of intubation. **Summary of Results & Conclusions Reached:** To be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Outline pathophysiology and possible pharmacological options for the management of acute alcohol withdrawal.
Describe clinical outcomes between those who receive benzodiazepines alone and those who receive benzodiazepines and dexmedetomidine for alcohol withdrawal in the intensive care unit.

Self Assessment Questions:

Abrupt discontinuation of alcohol exposure in patients with chronic alcohol abuse results in over-activation of the n-methyl-d-aspartate (NMDA) pathways and downregulation of the gamma-aminobutyric ac

- A Benzodiazepines
- B: Dexmedetomidine
- C: Ketamine
- D: Quetiapine

Which of the following medications utilized for management of alcohol withdrawal have the potential of causing respiratory depression?

- A Benzodiazepines
- B Dexmedetomidine
- C Propofol
- D A&c

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-646-L01-P

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

ASSESSING THE SAFETY OF DUAL ALPHA-1 ANTAGONIST THERAPY IN COMORBID BENIGN PROSTATIC HYPERPLASIA AND POST-TRAUMATIC STRESS DISORDER AT A VETERANS AFFAIRS MEDICAL CENTER

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Purpose: Older male Veterans are uniquely susceptible to experiencing comorbid post-traumatic stress disorder and benign prostatic hyperplasia due to the nature of their service and age. Treatment of nighttime disturbances with prazosin, while simultaneously using another alpha-1 antagonist to manage lower urinary tract symptoms, predisposes Veterans to hypotensive adverse events. Few studies have evaluated safety outcomes following use of dual alpha-1 antagonists, particularly uroselective vs. nonselective agents in conjunction with prazosin. This study aims to assess prescribing practice and adverse events related to dual alpha-1 antagonist use in a Veterans Affairs medical center to positively impact patient safety. **Methods:** This study was a quality improvement project with the intent to improve patient safety and guide appropriate prescribing practice at Richard L. Roudebush VA Medical Center. A retrospective chart review was conducted for male Veterans, who received treatment with prazosin for PTSD-associated nighttime disturbances and at least one other alpha-1 antagonist from July 1, 2012 to June 30, 2017. Patients were excluded if they received care from a non-VA provider, were lost to follow up after being prescribed a second alpha-1 antagonist during inpatient treatment or were treated for PTSD outside of the VA mental health clinic. Pertinent patient demographic information was collected in addition to prazosin dose, dose and indication of second alpha-1 antagonist, duration and discontinuation of dual therapy, documented falls and hypotension attributed to alpha-1 antagonist use, concomitant hypotension-inducing medications, and medication refills. Veterans were stratified into two groups: non-selective alpha-1 antagonist plus prazosin or a uroselective alpha-1 antagonist plus prazosin. Therapy discontinuation due to hypotensive adverse events was used to evaluate safety and tolerability. Secondary measures will assess hypotensive side effects and fall rates. All patient data was deidentified and remain confidential. **Results and Conclusions:** Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the use of prazosin for the management of nighttime associated symptoms in patients with Post-traumatic Stress Disorder.

Identify potential adverse outcomes in patients receiving dual alpha-1 antagonist therapy with prazosin and a second agent for management of lower urinary tract symptoms.

Self Assessment Questions:

Which of the following qualities of prazosin makes its use preferential to other alpha-1 antagonists for the management of nighttime disturbances in PTSD:

- A Stronger affinity to the alpha-1a receptor
- B: Relative lipophilicity and the ability to cross the blood-brain barrier
- C: Once daily dosing and increased patient compliance
- D: Endorsement of use by the American Urologic Association

Tamsulosin is considered "uroselective" due to its ability to selectively bind and inhibit which receptor:

- A Alpha-1a receptors found in the central nervous system
- B Alpha-2 receptors found in the urinary tract
- C Alpha-1a receptors found in the urinary tract
- D Beta-2 receptors found in the urinary tract

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-903-L05-P

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

THERAPEUTIC USE OF GRANULOCYTE-COLONY STIMULATING FACTORS (G-CSF) IN THE TREATMENT OF CHEMOTHERAPY-INDUCED FEBRILE NEUTROPENIA

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Purpose: Febrile neutropenia in cancer patients should be considered a medical emergency, prompting rapid evaluation and administration of empiric broad-spectrum antibiotics. In this patient population with established febrile neutropenia, the role of G-CSF is less certain. Meta-analyses and individual studies have found that the addition of G-CSF to antibiotics resulted in shorter hospitalizations, shorter duration of neutropenia and fever, and/or shorter duration of antibiotic therapy. The objective of this study is to describe the common prognostic risk factors among those patients with a shorter antibiotic duration and hospital length of stay to determine which patients at OhioHealth would experience the greatest clinical benefit and treatment cost-effectiveness from therapeutic G-CSF. **Methods:** This study has been submitted and approved by the institutional review board. It is a retrospective, multi-site chart review of cancer patients age 18 years or older with chemotherapy induced febrile neutropenia (CIFN) who received at least one dose of G-CSF (filgrastim, filgrastim-sndz, tbo-filgrastim) during an inpatient admission from February 1, 2015 through December 31, 2017. Patients are excluded if G-CSF was given for a prophylactic indication or for patients with neutropenia caused by reasons other than chemotherapy. Demographics, treatment data, and clinical risk factors will be collected and statistically analyzed to describe the common prognostic clinical risk factors in CIFN patients who receive therapeutic G-CSF. This information will be used to determine which patients may benefit the most from the addition of G-CSF to antibiotics, with respect to antibiotic duration and hospital length of stay. **Results/Conclusions:** Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the rationale for using myeloid growth factors in the treatment of established febrile neutropenia

List risk factors for infection-related complications or poor clinical outcomes in febrile neutropenic patients who have not received prophylactic G-CSF

Self Assessment Questions:

Which of the following benefits have not been associated with the therapeutic use of G-CSF for the treatment of febrile neutropenia?

- A G-CSF improves overall survival
- B: G-CSF decreases hospital length of stay
- C: G-CSF decreases length of neutropenia
- D: G-CSF decreases antibiotic duration

According to the NCCN Guidelines, which of the following is a risk factor for poor clinical outcomes in patients with febrile neutropenia who have not received prophylactic G-CSF?

- A Metastatic cancer
- B ANC <500/mcL
- C Severe mucositis
- D Age >65 years

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-647-L01-P

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

IMPACT OF CLOSTRIDIUM DIFFICILE TESTING ALGORITHM

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Purpose: Clostridium difficile (C. difficile) was listed as an urgent threat in 2013 by the Centers for Disease Control and Prevention (CDC) in a report with the top drug-resistant threats to the United States. According to the Infectious Disease Society of America (IDSA) Guidelines for C. difficile, testing should be limited to patients who are symptomatic. Unnecessary testing can result in detecting C. difficile in patients who are asymptomatic carriers and could lead to unwarranted treatment. The purpose of this project is to analyze the impact of a C. difficile testing algorithm implemented at SSM Health St. Mary's Hospital.

Methods: In May 2016, SSM Health St. Mary's Hospital implemented a preferred C. difficile testing that included first using the C. difficile GDH antigen/Toxin A&B test, then a C. difficile PCR if the results of the first test were inconclusive. At the same time, a C. difficile testing algorithm was also implemented to help providers decide whether ordering a C. difficile test was appropriate; however, it was not mandatory for providers to answer the questions until April 2017. Rates of C. difficile, number of C. difficile tests, and use of oral vancomycin were analyzed at three different time points: March 2016 – April 2016, May 2016 – March 2017, and April 2017 – October 2017. Patients were included for retrospective chart review if they had a C. difficile test in July 2017. Data collection included antibiotic use within the last 60 days, laxative use, proton pump inhibitor use, C. difficile treatment if applicable, whether the correct test was ordered, and if the provider ordered the test according to the algorithm recommendation. **Results/Conclusion:** Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the advantages and disadvantages of the different types of Clostridium difficile tests.
Identify three risk factors for Clostridium difficile infection.

Self Assessment Questions:

- 1) What is the treatment for patients with initial mild to moderate Clostridium difficile according to IDSA guidelines?
- A: Vancomycin 125 mg PO QID
 - B: Vancomycin 500 mg PO QID
 - C: Metronidazole 500 mg PO TID
 - D: Metronidazole 250 mg PO TID

Which of the following antibiotics is associated with higher rates of Clostridium difficile?

- A: Amoxicillin
- B: Clindamycin
- C: Azithromycin
- D: Sulfamethoxazole/trimethoprim

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-648-L01-P

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

AUTOMATED MEDICATION ADHERENCE PACKAGING SYSTEM: IMPLEMENTATION AND EVALUATION OF NEW TECHNOLOGY AND WORKFLOWS WITHIN A HEALTH-SYSTEM COMMUNITY PHARMACY

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Purpose: The purpose of this project was to improve the operational efficiency of medication adherence packaging by implementing hardware and software to support medication adherence packaging workflows within a community pharmacy. **Methods:** A process map for the previous medication box packaging process was created through direct observation to evaluate existing workflows. Pharmacist and technician self-reported time studies were performed over a 45 day period to measure the active and passive time requirements of the existing process. To determine the necessary medication inventory for the new technology, an analysis was performed utilizing prescription fill data from the previous year. Pertinent policies and procedures were updated to reflect changes to the process due to the implementation of new technology. A go live date was established with the vendor to ensure that installation, training, and support would be provided for the transition. Communication and new workflow implementation planning was achieved through bi-monthly team meetings with all impacted pharmacists and technicians. Additionally, individual training on the software and hardware operation was conducted by a vendor representative with each team member. The primary investigator, ambulatory informatics analyst, and pharmacy manager dedicated on-site support-time to facilitate the transition to the new workflow. Impacted patients were educated on the change through written communication and by pharmacy technicians over the phone. Following implementation, the staff utilizing the technology worked with the primary investigator to identify and correct issues in the new workflows. Post implementation time studies were performed to measure the active and passive time required for medication adherence packaging. An analysis of the findings from the pre and post implementation time studies was performed to compare the time requirements for the workflows and to predict required staffing levels based on patient volume. **Results & Conclusions:** To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

State the necessary steps that must be considered when implementing an automated medication adherence packaging system in a community pharmacy
Describe the benefits of utilizing technology to grow capacity for medication adherence packaging services in a community pharmacy

Self Assessment Questions:

1. What factors must be considered when outlining and evaluating the workload of medication adherence packaging services?
- A: A. Patient volume
 - B: B. Number of tablets per prescription filled
 - C: C. Current workflows
 - D: D. All of the above
2. Which of the following has the largest impact on automated medication adherence technology workflows?
- A: A. Physical restrictions
 - B: B. Interface with pharmacy management software
 - C: C. Patient preference
 - D: D. All of the above

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-837-L04-P

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

DILUTED SINGLE-SYRINGE ADMINISTRATION OF ADENOSINE FOR THE RAPID CONVERSION OF SUPRAVENTRICULAR TACHYCARDIA IN THE EMERGENCY DEPARTMENT: A PROSPECTIVE OBSERVATIONAL STUDY

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Purpose: Supraventricular tachycardias (SVT) are a variety of rhythm disturbances that require immediate medical attention in symptomatic patients. There are approximately 50,000 emergency room visits per year due to SVT. Management of SVT includes the use of both nonpharmacologic and pharmacologic treatments such as vagal maneuvers and administration of adenosine as the treatments of choice. Adenosine has a relatively short half-life of less than 10 seconds. As a result, the administration technique that offers the most rapid delivery to its site of action is of interest. Historically, adenosine has been administered via a two-syringe method. This method utilized a syringe of adenosine is rapidly bolused and followed by a 20mL flush of normal saline. However, this two-syringe method is more technically difficult to perform. More recently, some clinicians have adopted the practice of administering adenosine in a single syringe mixed with 15 mL of normal saline. Thus - eliminating the need for a large flush and the challenging administration technique. It is the purpose of this study is to evaluate the efficacy between single syringe and two syringe administration techniques of adenosine for the rapid conversion of supraventricular tachycardia to normal sinus rhythm. **Methods:** A prospective observational study of adult patients presenting to the Emergency Department (ED) with SVT at Advocate Christ Medical Center was conducted. Patients were eligible for inclusion if they were: >18 years of age and presented to the ED with stable narrow-complex regular rhythm tachycardia requiring adenosine administration. Patients were excluded if they had a past medical history of bronchospasms or were hemodynamically unstable (SBP < 90 mmHg). The study took place from November 1, 2016 to March 31, of 2018. **Results/Conclusions:** Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

List pharmacologic and non-pharmacologic treatment options for the treatment of SVT

Describe the pharmacokinetic considerations of adenosine administration in the setting of SVT

Self Assessment Questions:

Which of the following is neither a pharmacologic or nonpharmacologic treatment option for supraventricular tachycardia (SVT)?

- A Rapid administration of adenosine 6mg
- B: Rapid administration of adenosine 12mg after a failed 6mg dose
- C: Vagal maneuvers (e.g. cold ice-water on face, forceful expiration)
- D: Aspirin 325mg administered immediately upon recognition of symptoms

Which of the following describes a pharmacokinetic consideration while administering adenosine?

- A Adenosine is a prodrug and must be rapidly administered to ensure
- B The half-life of adenosine is relatively short ($T_{1/2} < 10$ seconds) and
- C Rapid administration via a single syringe avoids the production of
- D Slower administration in the form of a continuous infusion would a

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-649-L01-P

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

OPIOID BEST PRACTICES GAP ANALYSIS IN A FOUR-HOSPITAL COMMUNITY HEALTH SYSTEM

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Purpose: Opioids alleviate pain by binding to opioid receptors, which are densely concentrated in the brain. Areas where these opioid receptors reside include the amygdala, where pain-induced emotional responses are formulated. In addition, opioid receptors exist in the ventral tegmental area and nucleus accumbens, these sections of the brain are where perception of pleasure and well-being exist. Therefore, patients receiving opioid therapy not only experience a decrease in pain, but also the sense of euphoria. Unfortunately, these effects of opioids are addictive and require increasing doses of opioids to maintain the same effects. As doses of opioids increase the risk of respiratory depression rises. With 33,091 reported opioid associated deaths in 2015, the CDC, American Society of Anesthesiologists, American Pain Society, and the American Society of Regional Anesthesia and Pain Medicine have disseminated recommendations for health systems to ensure safe use of opioids. The purpose of this project is to conduct a gap analysis of opioid best practices to ensure this community health system is striving towards opioid best practices. **Method:** A preliminary gap analysis has been performed by pharmacy personnel derived from the Opioid Adverse Drug Event Prevention Gap Analysis by the Minnesota Hospital Association. This gap analysis was performed to determine which recommendations the health system currently follows and to determine what changes could be implemented in order to strive towards opioid best practice recommendations. Upon consensus with a multidisciplinary team on the current opioid practice state of the health system, an action plan will be developed to address areas of non-compliance. This project is a quality improvement project and is therefore exempt from review by the Institutional Review Board. **Results and conclusion:** Analysis of the adherence to standards is currently in progress. Final conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss best practices around pain management in the acute setting

Describe the methods that can be employed by a health system to ensure opioid prescribing best practices are utilized

Self Assessment Questions:

What areas are assessed when performing a gap analysis on opioid best practices?

- A Current policy, patient satisfaction survey results, medication storage
- B: Patient satisfaction survey results, medication storage, healthcare
- C: Medication storage, healthcare staff education, employee satisfaction
- D: Medication storage, current policy, healthcare staff education

Which of the following patients would be the best candidate for starting with low-dose opioid therapy when opioid therapy is warranted?

- A 60 year old male with history of lung cancer on chronic opioid therapy
- B 54 year old female with no significant medical history with post-operative
- C 30 year old female history of type 2 diabetes, obesity, and sleep apnea
- D 59 year old male with history of benign prostatic hyperplasia and g

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-838-L04-P

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

RETROSPECTIVE INSTITUTIONAL ASSESSMENT OF VANCOMYCIN DOSING PROTOCOL ON THE ATTAINMENT OF GOAL SERUM TROUGH CONCENTRATIONS IN THE PEDIATRIC SETTING

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Purpose: The primary objective of this study is to determine the clinical efficacy of our institution's vancomycin collaborative practice agreement on goal serum trough concentrations in the pediatric population. Currently, patients receive starting doses of 20 milligrams/kilogram/dose every eight hours. Previous studies have shown this dose achieved goal trough concentrations (10 -20 micrograms/liter) in 37% of patients. Secondary analyses will be conducted to examine vancomycin dosing variations in age groups and BMI-for-age percentiles. Currently, there is little evidence regarding effective doses in these subgroups. This study will help optimize vancomycin dosing. **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 from a children's hospital in central Illinois. Data will be collected from September 1, 2012 to September 1, 2017. Patients will be included if they were between the ages of 31 days and 18 years, received vancomycin per pharmacy dosing recommendations, and had at least one serum trough concentration recorded at the time of the encounter. Patients will be excluded if they were in the NICU at time of trough draw received vancomycin for procedural prophylaxis, received doses recommended by non-pharmacy personnel, or were pregnant during their hospital encounter. The primary outcome will be dose at target trough concentration, which will be determined by comparing the initial dose of vancomycin to the dose that obtained goal trough levels. Secondary outcomes will include the duration of vancomycin exposure (time to de-escalation/discontinuation), frequency of dosing, frequency of trough achievement with 1st dose, serum creatinine and urine output changes, and frequency of acute kidney injury under dosing protocol.

Results: In process Conclusion: In process

Learning Objectives:

Describe the current dosing recommendation for vancomycin in the pediatric patient population and the rationale behind this recommendation.

Discuss pharmacokinetic alterations that may occur due to variations in age and body weight.

Self Assessment Questions:

According to current literature, what dosing of vancomycin is suggested to correlate with and AUC/MIC > 400?

- A 80 mg/kg/day
- B: 45 mg/kg/day
- C: 60 mg/kg/day
- D: 100 mg/kg/day

What two pharmacokinetic parameters are most likely to be affected by an excess of adipose tissue?

- A Ka & Kel
- B Vd & Cl
- C Ka & Vd
- D Ka & Cl

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-839-L01-P

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

FAILURE MODE AND EFFECTS ANALYSIS OF ANTICOAGULANT MEDICATIONS DURING TRANSITIONS OF CARE

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Purpose: Anticoagulant medications are used in the treatment of conditions such as deep vein thrombosis (DVT), pulmonary embolism, and in the prevention of stroke in patients with atrial fibrillation and heart valve implants. Anticoagulant medications such as warfarin require close monitoring, and rely on patient adherence to complicated dosing regimens. Anticoagulants are considered high-alert medications by the Institute of Safe Medication Practices, as they have the potential for more harm than other medications when involved in errors. Direct oral anticoagulant medications (DOACs) such as apixaban require minimal therapeutic drug level monitoring but are still high-alert medications with unique dosing regimens and drug interactions. Transitions of care introduce the potential for medication errors and miscommunication to occur between providers and patients, which may result in negative outcomes such as readmission to the hospital. Admissions to the hospital, transfer between hospital units, or the discharge of patients to home or skilled facilities are examples of transitions of care where errors may occur. Conducting a failure mode and effects analysis (FMEA) will evaluate current management of anticoagulant medications during transitions of care, identify potential lapses in care, and lead to the implementation of practices that improve patient outcomes.

Methods: A FMEA will be conducted on potential failure modes involving anticoagulant medications during transitions of care. Anticoagulant medications such as vitamin K antagonists, injectables, and DOACs used for treatment of venous thromboembolism (VTE) or stroke prevention in the acute care setting will be included in the scope of the FMEA. A multidisciplinary team involving physicians, pharmacists, nursing, social work and care planners will be involved in reviewing current workflow and conducting a hazard analysis of failure modes identified. **Results/Conclusions:** Final recommendations and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe a failure mode and effects analysis.

Identify potential failure modes for anticoagulant medications during transitions of care to improve patient safety

Self Assessment Questions:

What is a failure modes and effects analysis (FMEA)?

- A A problem solving method that identifies the root cause of a problem
- B: A process of evaluating and improving the medication use process
- C: A structured way of identifying and addressing potential problems
- D: A systematic approach to improving efficiency, effectiveness, performance

A patient is hospitalized for an acute DVT and discharged on a direct acting oral anticoagulant medication (DOAC). What is a potential failure mode in this scenario?

- A Discharge medication reconciliation was performed to assess for correct medication
- B Patient is educated on potential adverse effects of the medication
- C Patient's prescription is sent to the pharmacy but the DOAC is not
- D A summary of the hospitalization is sent to the patient's outpatient

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-904-L05-P

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

GYNECOLOGIC ONCOLOGY GROUP (GOG) VERSUS NON-GOG BASED CALVERT FORMULA CARBOPLATIN DOSING IN PATIENTS WITH A BMI GREATER THAN 25 KG/M²

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Purpose: Chemotherapy for gynecologic malignancies includes platinum agents. The Calvert formula is used to calculate carboplatin doses. GOG recommends use of Cockcroft-Gault (CG) equation for creatinine clearance (CrCl) estimation with adjustment to utilize a minimum SCr of 0.7 mg/dL and either, actual body weight (BW) for body mass index (BMI) < 25 kg/m², or adjusted BW for BMI ≥ 25 kg/m². This conflicts with the ASCO guideline for chemotherapy dosing in obese patients, which recommends use of actual BW regardless of BMI. A 2017 study proposed a new mathematical model for CrCl estimation, which demonstrated superior accuracy compared to the CG equation. At the University of Cincinnati Medical Center, practice variation exists for carboplatin dosing in gynecologic cancers. **Methods:** This retrospective study included female patients with gynecologic malignancies who received at least three cycles of carboplatin chemotherapy. The primary outcome is to characterize progression free survival (PFS) among BMI categories ≥ 25 kg/m² with carboplatin dose calculated by GOG versus non-GOG Calvert formula. Secondary outcomes include time to normalization of cancer antigen 125 (CA125), incidence of treatment toxicities, and comparison of carboplatin dose utilizing various CrCl estimations. **Results:** Ovarian cancer was the most common diagnosis (43%) with GOG-based Calvert formula carboplatin dose (64%). Median PFS among BMI categories ≥ 25 kg/m² was improved for the non-GOG (78 months; 95% CI, 52 – 78) compared to the GOG group (46 months; 95% CI, 35 – 57; p = 0.86). Similar rates of CA125 normalization after three (25% versus 32%; p = 0.74) and six (35% versus 41%; p = 0.82) cycles were observed among groups. Comparison of carboplatin dose difference greater than 10% for non-GOG versus GOG and Janowitz CrCl estimations was 63% and 38% respectively and 46% for GOG versus Janowitz among patients with a BMI greater than 25 kg/m².

Learning Objectives:

Review gynecologic malignancies and primary chemotherapy treatment
Explain the Calvert formula for carboplatin dosing and limitations of creatinine clearance models for renal function estimation

Self Assessment Questions:

Primary treatment for advanced stage gynecologic malignancies includes which of the following?

- A: Surgery alone
- B: Radiation alone
- C: Surgery plus chemoradiation
- D: Chemotherapy alone

The FDA recommends that glomerular filtration rate (GFR) should be capped at a creatinine clearance of what when calculating a carboplatin dose?

- A: 150 mL/min
- B: 125 mL/min
- C: 100 mL/min
- D: GFR cap is not recommended

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-650-L01-P

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

IMPACT OF A PHARMACIST DRIVEN PENICILLIN ALLERGY SKIN TESTING PROTOCOL ON ANTIMICROBIAL STEWARDSHIP IN A TERTIARY CARE HOSPITAL

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Background/Purpose: Approximately 10 percent of hospitalized patients report having a penicillin allergy, of those only about 10 percent have a true IgE mediated hypersensitivity. Patients with a reported penicillin allergy have a higher incidence of C. diff, MRSA, VRE, and deviation from the standard of care. Allergies to antibiotics in general are associated with antimicrobial resistance, increased hospital length of stay, and ICU admissions. To combat these issues in the inpatient setting many hospitals perform penicillin skin tests on patients who likely experienced an IgE mediated non-anaphylactic reaction or an unknown reaction to a penicillin antibiotic. These tests have a negative predictive value of 97-99%. The objective of this study is to determine the impact of a pharmacist driven penicillin allergy skin test protocol on antimicrobial stewardship. **Methods:** Phase one of the study will be a retrospective chart review of patients receiving penicillin allergy skin testing from December 1, 2016 through May 31, 2017. The data collected includes allergy reported and reaction if known, outcome of the penicillin skin test, adverse effects of the penicillin skin test, antibiotic before and after the penicillin skin test, and adverse effects from the antibiotics. The second phase of the study is a prospective evaluation of patients with penicillin allergy skin testing ordered starting November 3, 2017. The data collected will include all the data collected in phase one and number of tests ordered but not performed due to pharmacy intervention and aztreonam usage. Patients with an ordered penicillin skin test will be included. **Results/Conclusions:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the process of performing a penicillin skin test
Identify clinical and financial disadvantages associated with reported penicillin allergies

Self Assessment Questions:

Which of the following is used as the positive control reagent for a penicillin skin test?

- A: Sodium chloride
- B: Histamine
- C: PenG
- D: Benzylpenicilloyl polysine

Patients with a reported penicillin allergy have a higher incidence of which of the following infections?

- A: Hospital associated pneumonia
- B: Urinary tract infection
- C: Clostridium difficile
- D: Skin and soft tissue infection

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-840-L04-P

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

EVALUATION OF MANAGEMENT OF COPD IN PATIENTS WITH FREQUENT HOSPITAL READMISSIONS AT THE HUNTINGTON, WV VA MEDICAL CENTER

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Purpose of the Research: Acute exacerbations of chronic obstructive pulmonary disease (COPD) are a leading cause of hospital admissions and readmissions at the Huntington, WV VA Medical Center (HVAMC). According to the Centers for Disease Control and Prevention, COPD is a leading cause of death in the United States, and results in increased morbidity and reduced quality of life. The purpose of this study is to evaluate medication therapy for patients with a diagnosis of COPD and frequent readmissions to determine if medication therapy is being optimized for these patients based on the documented stage of COPD. Through a retrospective chart review, medication therapy pre and post discharge will be assessed for appropriateness based on each patient's stage of COPD as described in the COPD GOLD Guidelines.

Methods: A retrospective chart review will be conducted in order to evaluate medication therapy pre and post discharge for patients with COPD exacerbations. Specific events for evaluation include: active medication lists pre and post discharge, pulmonary function tests, vaccination history (influenza and pneumonia), smoking history, problem list, and follow-up plan post-discharge. **Results:** Data is currently being collected and analyzed. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review recommendations from the 2018 Global Initiative for Chronic Obstructive Lung Disease (GOLD) Guidelines for the Management of COPD.

Identify appropriate medication therapy for patients with frequent hospital readmissions due to COPD exacerbations.

Self Assessment Questions:

According to the 2018 GOLD Guidelines for the Management of COPD, which of the following is appropriate treatment for patients with COPD characterized as Grade B with persistent symptoms?

- A: Tiotropium
- B: Formoterol
- C: Budesonide/Formoterol
- D: Formoterol plus Tiotropium

According to the 2018 GOLD Guidelines for the Management of COPD, which of the following statements is true?

- A: Inhaled corticosteroids should be used as monotherapy for treatment
- B: Inhaled corticosteroids have demonstrated an increased risk of pneumonia
- C: Roflumilast should be avoided in patients with chronic bronchitis.
- D: Roflumilast works via direct bronchodilator activity.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-841-L01-P

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

VALIDATION OF AN ARGATROBAN DOSING PROTOCOL IN AN ACADEMIC MEDICAL CENTER: A RETROSPECTIVE, MULTI-CENTER, COHORT STUDY

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Heparin-induced thrombocytopenia (HIT) is the most common type of drug-induced thrombocytopenia. Direct thrombin inhibition with argatroban serves as treatment for patients with HIT. Controversy exists regarding initial dosing requirements necessary to achieve therapeutic activated partial thromboplastin times (aPTTs). Critically ill patients have been shown to have decreased dose requirements, resulting in the development of an institutional protocol with initial argatroban doses of either 0.5 mcg/kg/min or 1 mcg/kg/min in critically ill and non-critically ill patients, respectively. The primary objective was to validate the institutional dosing protocol through assessing its ability to obtain target aPTTs in critically ill and non-critically ill patients. Outcomes include the comparison of proportion of patients that attain a goal aPTT level between 45 and 75 seconds at 24 hours, identification of independent predictors of dosing failure, assessment of safety outcomes, and validation of previously developed dosing requirement equation in critically ill patients based on Sequential Organ Failure Assessment (SOFA) scores. This retrospective, multi-center, cohort study included 90 adult patients who received argatroban for at least 24 hours, 44 following both dosing and titration adjustments per protocol with the remaining 46 following titration adjustments only. Data points collected include: initiation dose and time, proportion of therapeutic aPTTs, time to therapeutic aPTT, SOFA score, baseline albumin, daily INR, ejection fraction, morbidity endpoints (including bleeding events) and thrombus formation/extension. Time to therapeutic aPTT was defined as the time (in hours) after initiation of infusion in which the first therapeutic aPTT reading was achieved. Major bleeding was defined as a hemoglobin drop ≥ 2 g/dL requiring transfusion of ≥ 2 units packed red blood cells or an intracranial or retroperitoneal bleed. Univariate and multivariate linear regression models will be used to assess a priori variables identified as an association with or an independent predictor of failure to achieve goal aPTTs. Data collection and analysis are ongoing.

Learning Objectives:

Review efficacy of protocols in argatroban dosing

Identify argatroban dosing requirements in varying severities of illness

Self Assessment Questions:

Which of the following cytokines is released during platelet activation, resulting in clot formation, platelet consumption, and ultimately thrombocytopenia in a patient with HIT?

- A: IgG
- B: Platelet Factor 4
- C: Fibrinogen
- D: Platelet-derived growth factor

Which of the following components, included in the SOFA score calculation, is a known variable requiring dose-reduced argatroban per package insert?

- A: Serum creatinine
- B: Platelet count
- C: Hepatic dysfunction
- D: MAP/vasopressor requirement

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-651-L01-P

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

EVALUATION OF AN EMERGENCY DEPARTMENT ELECTRONIC SEPSIS-SCREENING TOOL: A RETROSPECTIVE STUDY

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Purpose: The timing of antibiotic administration is a key element when treating sepsis. Delaying antibiotic administration has a profound impact on mortality. Several methods have been proposed to help increase compliance and improve sepsis outcomes including screening tools, electronic alerts, education sessions and sepsis response teams. The purpose of this study is to evaluate the use of an electronic sepsis-screening tool within the emergency department and its impact on time to antibiotic administration, nursing endorsement, and the tool's ability to identify patients with sepsis. **Methods:** A retrospective chart review will be conducted after the implementation of an electronic sepsis-screening tool on patients who presented to the Jewish Hospital emergency department and diagnosed with sepsis, severe sepsis, or septic shock within 72 hours of admission. Data will be collected from July 2016 to December 2016 for the control group and July 2017 to December 2017 for the intervention group. Time to antibiotic administration, nursing satisfaction with the electronic sepsis-screening tool, and the ability of the electronic sepsis-screening tool to appropriately identify patients with sepsis will be examined. Two data groups will be formed to compare the time to antibiotic administration prior to the implementation of the electronic sepsis-screening tool and time to antibiotic administration after the implementation of the electronic tool. **Results/Conclusions:** Data collection is in progress. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Discuss the criteria for sepsis and the guideline recommended treatment algorithm for sepsis.

Describe the potential benefit of using an electronic sepsis alert tool in the emergency department.

Self Assessment Questions:

According to the Sep-1 bundle, antibiotics should be administered within _____ hour(s).

- A One Hour
- B: Two Hours
- C: Three Hours
- D: Four Hours

Which of the following would be an appropriate fluid to administer if sepsis or septic shock is suspected?

- A Normal saline
- B Albumin
- C Lactated ringers
- D Both A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-842-L04-P

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

IDENTIFICATION AND INCIDENCE OF MEDICATIONS CONTRIBUTING TO STROKE MIMICS

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Purpose: Acute Ischemic Stroke (AIS) is the fifth leading cause of death in the United States. Accurate and prompt diagnosis is crucial in the treatment of stroke. AIS commonly may present as acute onset weakness in the face and limbs, speech disturbances, and/or visual field defects. The heterogeneity of these symptoms can be misinterpreted. These symptoms can present themselves as AIS, when they may be classified as stroke mimics. Common stroke mimics include seizures, hypoglycemia, migraines, encephalopathy, and/or medications, though little is known about which medications are commonly implicated as a cause of stroke mimic. The purpose of this study is to compare and characterize the differences in medication present in stroke mimics and AIS patients. **Methods:** This single center, retrospective chart review that was conducted at Loyola University Medical Center included patients ≥ 18 years old for whom a stroke code was activated between June 1, 2016 to June 30, 2017. The primary endpoint was frequency of medications present in stroke mimic patients compared to AIS patients. Secondary endpoints included frequency of each stroke mimic classification, hospital length of stay, disposition at discharge, and mortality. Descriptive statistics were used to assess baseline characteristics. Continuous parametric data and nonparametric data was analyzed using a t-test and a Mann-Whitney U test, respectively. Categorical data was assessed using a chi square or Fisher's exact test. This study was approved by the Institutional Review Board. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify different symptoms associated with each stroke mimic category. Describe the potential barriers to evaluation of ischemic strokes by ruling out stroke mimics.

Self Assessment Questions:

Which of the following is NOT a type of stroke mimic?

- A Hypoglycemia
- B: Seizure
- C: Heart Failure
- D: Migraine

You are a pharmacist evaluating a patient during a stroke code. Which of the following medications could mimic a common stroke symptom of decreased level of consciousness?

- A Gabapentin
- B Metformin
- C Diphenhydramine
- D A and C

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-652-L01-P

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

SAFETY OF INTRAMUSCULAR KETAMINE FOR ACUTE AGITATION IN THE EMERGENCY DEPARTMENT

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Purpose: Control of patients presenting with acute violent agitation in the emergency department (ED) can present a danger to themselves and/or healthcare personnel. Traditional first line medications have limitations such as slow onset, respiratory depression, and variability in response. An ideal agent has a quick onset of action when given intramuscularly (IM), a low risk of respiratory depression, and achieves a calming effect without oversedation. Ketamine, a dissociative sedative, is being utilized more frequently as a first line agent for the acutely agitated violent patient but there is minimal evidence evaluating the safety of ketamine for this indication. The purpose of this study was to evaluate the safety of IM ketamine use in acute agitation in the ED. **Methods:** This is a single center, multi-campus, retrospective cohort study including patients ≥ 18 years old who received at least one dose of IM ketamine in the ED for acute agitation from January 1, 2012 to August 30, 2017. **Exclusion criteria** included IM or intravenous antipsychotics (haloperidol, olanzapine, ziprasidone, chlorpromazine) or benzodiazepines (midazolam, lorazepam) for acute agitation < 30 minutes prior to ketamine administration, pregnant, or incarcerated. The primary outcome of this study was to evaluate the safety of IM ketamine in acute agitation defined as the number of interventions needed to maintain oxygen saturation $>94\%$ such as intubation, oral or nasal airway placement, and use of supplemental oxygen. Secondary outcomes include time to arousal, total single dose of intramuscular ketamine associated with adverse events, and use of rescue medication after ketamine administration. Descriptive statistics were used to evaluate results. **Results and conclusion:** Data collection is ongoing and final results will be presented at the 2016 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review management techniques and common medications for the acutely agitated ED patient

Discuss the safety of intramuscular ketamine for acute agitation

Self Assessment Questions:

Which of the following should be considered first line for patients presenting to the emergency department with acute agitation?

- A: Verbal de-escalation
- B: Mechanical restraint
- C: Chemical sedation
- D: None of the above

What is the correct dosing range for intramuscular ketamine in acute agitation?

- A: 1-2 mg/kg
- B: 3-5 mg/kg
- C: 0.1-0.3 mg/kg
- D: 0.5-1 mg/kg

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-653-L01-P

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

COMPARISON OF IMMUNOTHERAPY RESPONSE RATES IN NON-SMALL CELL LUNG CANCER (NSCLC) FOLLOWING PLATINUM-BASED CHEMOTHERAPY

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Purpose: Immunotherapy is a new treatment modality available in the treatment of NSCLC with promising results. Three agents (nivolumab, pembrolizumab, and atezolizumab) are currently FDA-approved for the treatment NSCLC following platinum-based chemotherapy. While all of these immunotherapy agents have demonstrated superior outcomes and tolerability when compared to docetaxel, these agents have not yet been compared to one another in a clinical setting. This study will directly compare response rates between immunotherapy agents available in the Michigan Medicine population and identify predictive factors of efficacy. **Methods:** This single-center retrospective cohort study is approved by the Institutional Review Board at Michigan Medicine. Patients treated with nivolumab, pembrolizumab, or atezolizumab between March 1, 2015 through July 31, 2017 were identified through electronic chemotherapy order history, and the electronic medical record was used to collect outcomes and baseline characteristics data. Patients were included if they were 18 years of age or older with documented stage IV or recurrent NSCLC that progressed during or after platinum-based doublet chemotherapy. Patients were excluded they received prior treatment with immune-stimulatory antitumor agents or were diagnosed with malignancies other than NSCLC within the previous five years, except those with negligible risk of metastasis or death and treated with curative intent. The primary endpoint is objective response rate, defined as a confirmed complete or partial response, according to oncologist assessment. Secondary endpoints include median overall survival, progression free survival, duration of response, and treatment-related adverse events. Data collected includes but is not limited to patient demographics, smoking history, disease stage, tumor histology, presence of targetable mutations, level of PD-L1 expression, prior treatment, and best response to prior treatment. **Results and conclusions:** Final results will be presented at the Great Lakes Residency Conference.

Learning Objectives:

Identify recommended treatment options for advanced NSCLC

Describe the mechanism of PD-1 and PD-L1 inhibitors in NSCLC

Self Assessment Questions:

Which of the following is a recommended treatment strategy for untreated, stage IV NSCLC?

- A: Targeted therapy
- B: Platinum-based chemotherapy
- C: Immunotherapy
- D: All of the above

In NSCLC, the use of PD-1 and PD-L1 inhibitors inhibit deactivation of _____, leading to increased tumor cell death.

- A: T-cells
- B: B-cells
- C: Macrophages
- D: Neutrophils

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-654-L01-P

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

PREVALENCE OF PROSTATE CANCER IN PATIENTS WITH AND WITHOUT FINASTERIDE AT THE JESSE BROWN VA MEDICAL CENTER

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Purpose: Prostate cancer is the most common non-dermatologic cancer in men in the United States. The 2003 landmark Prostate Cancer Prevention Trial (PCPT) demonstrated that treatment with finasteride in men was associated with a lower risk of prostate cancer, but more high-grade disease compared to placebo. A 2013 long-term survival analysis of patients in the PCPT found no statistically significant differences in 10 or 15-year overall survival or survival after prostate cancer diagnosis between the finasteride-treated men and placebo. Men comprise over 90% of the U.S. veteran population and over 70% of these men are 50 years or older. Veterans represent an ideal patient population when studying diseases that primarily affect men of older age, e.g. prostate cancer. To date, there are currently no studies that attempt to validate findings of the PCPT in the veteran population. The aim of this study is to determine the prevalence of prostate cancer in patients with and without finasteride. **Methods:** This study will be a retrospective, electronic chart review of prostate needle biopsies performed between January 1, 2010 and January 1, 2015 at the Jesse Brown VA Medical Center. Approximately 4,000 charts will be reviewed during this study. Patients who meet inclusion criteria will be stratified into one of the following four study groups: (1) prostate cancer + finasteride (2) prostate cancer + no finasteride (3) no prostate cancer + finasteride (4) no prostate cancer + no finasteride. The primary endpoint of this study is the prevalence of prostate cancer in patients with and without finasteride. Secondary endpoints of this study include number of months on finasteride at time of prostate needle biopsy, agent orange exposure, and prostate size between study groups. **Results/Conclusion:** Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the major findings of the 2003 Prostate Cancer Prevention Trial.
Explain the findings of the 2013 long-term survival analysis of the Prostate Cancer Prevention Trial.

Self Assessment Questions:

The 2003 Prostate Cancer Prevention Trial showed that compared to placebo, treatment with finasteride was associated with which of the following?

- A: Low-grade disease and lower risk of prostate cancer
- B: High-grade disease and lower risk of prostate cancer
- C: High-grade disease and higher risk of prostate cancer
- D: Low-grade disease and higher risk of prostate cancer

An 18-year follow-up survival analysis of participants in the Prostate Cancer Prevention Trial showed that compared to placebo, treatment with finasteride was associated with which of the following?

- A: Improved 10-year overall survival
- B: Improved 15-year overall survival
- C: Improved 10-year and 15-year overall survival
- D: No significant between-group differences in 10 or 15-year overall survival

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-655-L01-P

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

POSTGRADUATE YEAR TWO RESIDENCY PROGRAM EVALUATION IN AMBULATORY CARE WITH THE TOOL FOR ASSESSING AMBULATORY CARE PHARMACIST PRACTICE (THE REPEAT STUDY)

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Purpose: The expansion of clinical pharmacist involvement in ambulatory care settings requires the consistent delivery of pharmacist services through a standardized Patient Care Process. This expansion combined with a growing emphasis placed on advanced training in preparation for employment in this specialty area contribute to a need to define, assess and stratify the scope of clinical pharmacists' patient care activities among Postgraduate Year 2 (PGY2) Ambulatory Care Residency Program clinic training sites. This study's primary objective is to describe the landscape of patient care activities provided within environments for training among PGY2 Ambulatory Care Residency Programs. Secondly, this study aims to describe the variability in the elements described in the Joint Commission of Pharmacy Practitioners (JCPP) Pharmacists' Patient Care Process (PPCP) and the American Society of Health-System Pharmacists' (ASHP) PGY2 Ambulatory Care Pharmacy Residency Competency Area R1: Patient Care. **Methods:**

In this national, descriptive, cross-sectional study, the Tool for Assessing Ambulatory Care Pharmacist Practice (TAAPP) will be utilized to collect information regarding resident engagement in elements of the PPCP. The TAAPP is a valid and reliable questionnaire designed in alignment with the five domains of the PPCP. The demographic assessment questions and TAAPP questionnaire will be disseminated electronically to PGY2 Ambulatory Care Residency Program Directors (RPDs) meeting inclusion. RPDs will be requested to complete the provided questionnaire and further disseminate the questionnaire to two preceptors of required rotations and all current 2017-2018 residents of the respective program. The goal sample size is completion of 234 questionnaires from a possible total sample size of 595. Descriptive statistics and Kruskal-Wallis statistical analysis will be utilized in assessing questionnaire data. The a priori level of significance will be set at 0.05. **Results:** Research is in progress and results will be presented at the conference. **Conclusion:** To be presented at the conference

Learning Objectives:

Describe the purpose of postgraduate residency training as defined by the American Society of Health-System Pharmacists (ASHP) and the American College of Clinical Pharmacy (ACCP)
Identify the need to define, assess and stratify the scope of clinical pharmacists' patient care activities among Postgraduate Year 2 Ambulatory Care Residency Programs

Self Assessment Questions:

What is an outlined purpose for completing postgraduate pharmacy residency training as defined by ASHP and ACCP?

- A: To fulfill prerequisites for a desired specialty employment opportunity
- B: To satisfy expectations of mentors/peers
- C: To expand knowledge and skills to face challenges of a complex health system
- D: To distinguish yourself in experience from another pharmacist

Which of the following best provides reason to assess patient care activities among PGY2 Ambulatory Care Residency Program learning environments?

- A: Due to expanding clinical pharmacist involvement in Ambulatory Care
- B: Due to requirement for a standardized Patient Care Process
- C: Due to the growing emphasis placed on advanced training
- D: All of the Above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-843-L04-P

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

THE IMPACT OF THE DISPENSARY OF HOPE ON PATIENT MEDICATION ACCESS

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Purpose: The Dispensary of Hope (DOH) is a national medication supplier that increases medication accessibility for low income, uninsured patients through the use of charitable clinics and pharmacies. To qualify for DOH medication, patients must be between the ages of 18-64, have a household income at or below 200% of the Federal Poverty Guidelines, and lack pharmaceutical insurance. Current studies have consistently shown that improving medication access and medication adherence can reduce the cost of healthcare and improve patient health. The purpose of this study was to improve medication access at the St. Vincent Joshua Max Simon Primary Care Center's DOH location site by designing and implementing a standardized operating procedure (SOP) for patients utilizing the DOH. The primary objective was to describe the impact of the SOP on number of patients served and number of prescriptions dispensed before and after implementation. Secondary outcomes included: assessment of patient medication adherence, number of hospitalizations within 30 days of DOH enrollment, and percentage of total medications filled by the DOH after process implementation. **Methods:** This Institutional Review Board-waived project was a retrospective analysis of patients enrolled in the DOH. Two patient groups were evaluated. Patient information was collected from June 25, 2017 to September 23, 2017 for patients enrolled prior to implementation of the SOP. Post-implementation data were collected from September 24, 2017 to December 30, 2017. Data collected include: number of patients served and numbers of prescriptions dispensed for both groups, and post-implementation assessment of patient medication adherence, number of patient hospital admissions within the 30 days after DOH enrollment, and proportion of total patient medications supplied by the DOH. **Results and Conclusions:** Data collection is ongoing. Results and conclusions will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the national Dispensary of Hope (DOH) medication access program.

Describe the new standardized operating procedure implemented at St. Vincent and the potential impact this process will have on patient care.

Self Assessment Questions:

Who can donate medications to the Dispensary of Hope?

- A: Physician offices, manufacturers, distributors
- B: Hospitals, physician offices, distributors
- C: Hospitals, manufacturers, distributors
- D: Community pharmacies, physician offices, and hospitals

What role will pharmacy students have in the new standardized operating procedure?

- A: Determine independently what medications the DOH can supply.
- B: Complete a medication reconciliation for DOH patients
- C: Order DOH medications
- D: Fill all DOH medications

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-844-L04-P

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

EVALUATION OF ACE INHIBITOR/ARB AND BETA-BLOCKER REINITIATION POST-HOSPITALIZATION FOR ACUTE DECOMPENSATED HEART FAILURE

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Purpose: Angiotensin converting enzyme inhibitors/angiotensin receptor blockers (ACEi/ARBs) and beta-blockers might be held for safety concerns during acute decompensated heart failure (ADHF). The purpose of this study was to: (1) determine the time to reinitiation; (2) compare 30 and 90 day same-hospital readmission and mortality; (3) determine whether target doses were achieved; and (4) determine whether rationale for discontinuation was appropriately documented.

Methods: This was a single-center, retrospective chart review of patients admitted for ADHF in 2016 at a 396-bed community hospital. Patients included were >18 or older, admitted for ADHF, ejection fraction of <40%, and had ACEi/ARB or beta-blocker discontinued. **Results:** Out of 355 patients screened, 22 patients had an ACEi/ARB and 1 had a beta-blocker discontinued at discharge. Reasons for exclusion were ejection fraction >40% (n=149), no ACEi/ARB on admission (n=103), and beta-blocker not discontinued (n=118). Six patients (27.3%) patients had their ACEi/ARB reinitiated after hospitalization with the median time to reinitiation of 6 days (IQR: 8-39). At 90 days post-hospitalization 5 out of 6 patients were at <50% of target dose. There were no 90-day readmissions or mortality in the group re-initiated on ACEi/ARB but 6 patients were hospitalized and 6 died in the group not reinitiated on ACEi/ARB (p=0.109). Only 10 (45.5%) patients had a documented reason for discontinuation of the medication in the discharge summary. The reasons for discontinuation were acute kidney injury 9 (40.1%) and hypotension 5 (22.7%). **Conclusion:** Post-hospitalization of ADHF, there was a low incidence of ACEi/ARB reinitiation and achievement of >50% of the target dose. Furthermore, there was numerically higher incidences of mortality and re-hospitalizations at 90-days in patients without ACEi/ARB reinitiation. Poor documentation could be one factor; however, the results indicate an opportunity for pharmacist to become more involved in the patient care process for treatment of heart failure.

Learning Objectives:

Discuss recommended practices regarding ACEi/ARB and BB discontinuation during acute decompensated heart failure.

Describe outcomes associated with patients who were discontinued on their ACEi/ARB in the present study.

Self Assessment Questions:

Which of the following statements is true about ACEi/ARB in treatment of ADHF?

- A: During ADHF, ACE/ARB should never be held and continued indefinitely
- B: During ADHF, ACEi/ARB should always be held regardless of heart failure severity
- C: During ADHF, ACEi/ARB should only be held if there is a contraindication
- D: During ADHF, ACE/ARB should only be held when there is hemodynamic instability

Which of the following was true about patients with ADHF who had their ACEi/ARB discontinued?

- A: After reinitiation of the ACEi/ARB, they were titrated to >75% of the target dose
- B: There were higher rates of hospitalizations and mortality in patients not reinitiated on ACEi/ARB
- C: There was a low rate of < 30% of patients who were reinitiated on ACEi/ARB
- D: There was consistently good documentation on why ACEi/ARB were discontinued

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-656-L01-P

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

COMPARISON OF VANCOMYCIN PHARMACOKINETICS IN CYSTIC FIBROSIS PATIENTS PRE AND POST-LUNG TRANSPLANT

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Purpose: Bacterial infections are common in cystic fibrosis due to colonization of the lungs. *Staphylococcus aureus* is the pathogen most frequently cultured from pediatric cystic fibrosis patients and remains common throughout adulthood, second only to *Pseudomonas aeruginosa*. Systemic antimicrobials are required for treatment of acute exacerbations, and vancomycin is often utilized for coverage of MRSA. Only two studies to date have investigated differences in pharmacokinetic parameters of vancomycin in cystic fibrosis patients compared to healthy patients, and results of these studies were conflicting. Additionally, tobramycin, also commonly used in cystic fibrosis patients, has demonstrated significant differences in pharmacokinetic parameters in post-transplant cystic fibrosis patients compared to pre-transplant. To date, no similar studies have been done with vancomycin. Thus, this study addresses a gap in knowledge and relates to the larger issue of appropriate management of vancomycin in this patient population. **Methods:** This is a multi-center, retrospective review of patients with cystic fibrosis that received a lung transplant between from 2007 to 2016 at six major academic medical centers throughout the United States. To be included, patients must have received vancomycin prior to lung transplant and 30 days to one year after transplant with at least one level pre and post-transplant and documented administration and collection times. The primary endpoint is elimination rate constant, which is calculated using a standardized formula in order to reduce the effect of practice differences between sites. The secondary endpoint is factors associated with a change in elimination rate constant, which includes patient demographics, time since transplant, and concomitant nephrotoxic medications. Patients serve as their own control such that post-transplant elimination rate constant is expressed as a percentage of pre-transplant elimination rate constant. **Results and Conclusion:** Data collection and analysis is ongoing. Full results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify how pharmacokinetics of vancomycin change in cystic fibrosis patients post-lung transplant
Discuss the effects that optimization of vancomycin management in cystic fibrosis patients post-lung transplant can have

Self Assessment Questions:

Which of the following best describes how vancomycin pharmacokinetic parameters change in cystic fibrosis patients post-lung transplant?

- A Increased elimination rate constant
- B: Increased volume of distribution
- C: Decreased elimination rate constant
- D: Decreased half-life

Which of the following best describes the rationale for increased consideration when administering vancomycin to a cystic fibrosis patient post-lung transplant?

- A Appropriate vancomycin dosing can reduce cost to the hospital/health system
- B The risk of nephrotoxicity increases due to concurrent nephrotoxic medications
- C The risk of red man's syndrome due to vancomycin increases post-transplant
- D There is not a need for increased consideration in this specific patient population

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-657-L01-P

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

THE IMPLEMENTATION OF AN ADULT CODE SEPSIS PROTOCOL AND ITS EFFECT ON SEP-1 BUNDLE PERFECT SCORE ATTAINMENT

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Purpose: Sepsis and septic shock are considered medical emergencies that require a coordinated effort among healthcare providers. Early recognition and prompt initiation of early, goal-directed therapy are necessary to improve sepsis-related outcomes. The Centers for Medicare and Medicaid Services (CMS), in collaboration with the Surviving Sepsis Campaign, adopted the SEP-1 core measure to improve overall rates of compliance with evidence-based treatment bundles. The primary objective of this study was to determine the impact of an Adult Code Sepsis Policy on the rate of SEP-1 bundle compliance in patients presenting to the emergency department (ED) with severe sepsis or septic shock. Previous studies have validated the utilization of a sepsis response team for improvement in compliance with protocol driven care and mortality. This is the first study to examine this approach in the emergency department using CMS-defined criteria. **Methods:** This is a retrospective, observational cohort study included adults (≥ 18 years of age) who presented to the ED between January 1, 2017 and December 31, 2017 with severe sepsis or septic shock, as defined by CMS. Patients included in the study were divided into two groups based on triage before or after implementation of the Emergency Department Adult Code Sepsis Protocol. Exclusion criteria included repeat emergency department visits, code sepsis inappropriately initiated upon review, death within 48 hours of presentation, or "non-response" by the code sepsis team. The primary endpoint of the study was perfect score attainment of all SEP-1 bundle elements. Secondary endpoints included inpatient all-cause mortality, inpatient and ICU length-of-stay, time to appropriate empiric antibiotics, time to effective antimicrobial therapy, and total hospital cost per case.

Learning Objectives:

Identify the 3 and 6 hour SEP-1 bundle elements

Describe how sepsis is identified according to the Centers for Medicare and Medicaid Services criteria

Self Assessment Questions:

Which of the following is one of the 3-hour SEP-1 bundle elements?

- A Obtain an initial lactic acid level
- B: Administer vasopressors if indicated for persistent hypotension after fluid resuscitation
- C: Draw an initial procalcitonin level
- D: Calculate a qSOFA score

Which of the following MOST accurately describes septic shock as identified by CMS?

- A qSOFA greater than or equal to 2
- B Severe Sepsis AND Temperature greater than or equal to 103 degrees Fahrenheit
- C Severe Sepsis AND Lactic acid greater than or equal to 4 OR persistent hypotension
- D Severe Sepsis AND at least 2 forms of acute organ dysfunction

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-658-L01-P

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

OUTPATIENT INFUSION PROCESS REDESIGN: TRANSITIONING SERVICES THROUGH SYSTEM INTEGRATION

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BACKGROUND. UW Health currently administers outpatient non-oncology infusions at three infusion centers across Madison. Within each site there were noted differences in terms of patient access, workflow design, and day to day operations, with no defined workflow to triage patient volume between locations. Opportunities to align both fiscal and clinical order review to ensure appropriateness of medication use prior to administration was also identified. Recently, UWH acquired a new infusion center through integration with a local community health-system. Through this integration there were identified goals to redesign infusion services, reduce variation and, optimize workflow while standardizing practice for outpatient infusion services. **METHODS.** To achieve this goal, a stakeholder team was created to further explore infusion clinic operations, pharmacy operations, and business strategy. Within the realm of pharmacy operations, a baseline assessment was conducted to compare current variability in fiscal and clinical order review between and within each institution. Additionally, an assessment of drug cost and revenue implications was completed to understand the financial impact of transitioning different patient groups.

Based on this assessment, the long term site of infusion was determined by practice specialty. Patients that would need to change their current location of infusion were then identified. A timeline was then set up to outline the transition of patient group by specialty.

Throughout each transitioning specialty, the pharmacy stakeholder team developed a model to support changes in each institution regarding inventory management, medication preparation, medication order entry, clinical review, prior authorization review, and impact on drug cost and revenue. Additionally, we identified strategies to mitigate differences in IV pump configuration, EHR records, as well as practice protocols and guidelines. **RESULTS.** An optimized transition plan was developed and implemented. Patients and services are being successfully transitioned

Learning Objectives:

Describe key considerations in evaluating and planning the transition of infusion pharmacy services to a new institution.

Identify inter-professional players to engage when transitioning infusion service locations.

Self Assessment Questions:

Which of the following groups should be engaged in the transition of infusion pharmacy services to a new institution?

- A Pharmacy operations
- B: Pharmacy and therapeutics committee
- C: Pharmacy supply chain
- D: All of the above

When transitioning infusion service locations, clear and consistent communication with which of the following is key?

- A Senior health system leadership
- B Front-line pharmacy and nursing staff
- C Patients
- D All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-845-L04-P

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

IMPROVING TRANSITIONS OF CARE FOR HIGH RISK VETERANS THROUGH PHARMACIST TO PHARMACIST HANDOFF AT A VETERANS AFFAIRS MEDICAL CENTER

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Purpose: An estimated 20% of patients experience an adverse event in the peri-discharge period when discharging to the community. Two-thirds of these events are medication-related, thus demonstrating an opportunity for pharmacist intervention and impact. At the Richard L. Roudebush VAMC, acute care pharmacist involvement in the discharge process includes medication reconciliation and bedside medication counseling for all patients. Ambulatory care pharmacists in the primary care teams utilize a report of all discharged patients within the clinic and identify patients who may benefit from additional follow-up. There are currently no formal transitions of care processes in place for these groups to communicate on high risk patients. The purpose of this project is to design a transitions of care program to identify veterans at need and create a process for targeted medication related follow-up.

Methods: Patients with a LACE score ≥ 10 , CAN score ≥ 90 , or those deemed high risk for readmission or adverse outcomes by the acute care pharmacist will be eligible for this study. Patients who are eligible must discharge to a community setting and have primary care established at the Richard L. Roudebush VAMC to be included. Once identified, these patients will be entered into a transitions of care database by the acute care pharmacist. An ambulatory care pharmacist will review then contact the patient via phone within one week of discharge. Pharmacist interventions at the time of follow-up will be broad and include medication reconciliation in addition to other findings communicated by the acute care pharmacist. Appropriate documentation will be completed in the Computerized Patient Record System (CPRS) after each visit. Data collection will include background information, time to follow-up, interventions, emergency department visits, and hospital admissions after discharge. **Preliminary Results:** Results to be presented at Great Lakes Pharmacy Resident Conference. **Conclusion:** Conclusions to be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the role of risk assessment scores in identifying high risk patients

Identify areas for pharmacist impact in transitions of care

Self Assessment Questions:

Which score has been shown to estimate the probability of hospital readmission in the Veteran population?

- A LACE
- B: Curb-65
- C: Can
- D: Hospital

Which of the following has shown the greatest impact on patient outcomes?

- A Patient-centered interventions
- B Inpatient medication counseling
- C Outpatient medication counseling
- D Medication reconciliation

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-846-L04-P

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

EVALUATION OF DISCHARGE ANTIMICROBIAL PRESCRIBING IN POST-SURGICAL PATIENTS AT A COMMUNITY HOSPITAL

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Purpose: Quality assurance initiatives seeking to improve the safety and healthcare outcomes of surgical patients have been a priority for national, state, and institutional organizations alike for over a decade. Despite evidence suggesting that postoperative antimicrobial administration is not necessary for most procedures, we have observed a number of cases where postoperative prophylaxis has been continued for longer than twenty-four hours at our institution. The purpose of this observational cohort study is to retrospectively analyze the appropriateness of discharge antimicrobial prescribing in post-surgical patients at a community hospital and examine the effect of prolonged prophylaxis on patient outcomes. **Methods:** This study is approved by the Institutional Review Board. Adults at least 18 years of age discharged from Franciscan Health Hammond or Franciscan Health Dyer following an outpatient surgical procedure from January 1, 2016, through December 31, 2016 are eligible for inclusion. Surgical services will be limited to ENT, urology, podiatry, orthopedics, or general surgery. Pre-built electronic health record (EHR) reports will be used to identify patients and determine 90-day readmission rates. Using retrospective chart review, data will be collected on the following: patient demographics, comorbid conditions, surgery service, type and duration of surgical procedure, prescribing physician, drug, dose, route, frequency, and duration of the discharge antimicrobial prescribed, as well as subsequent readmission diagnosis. Causes of readmission will be analyzed for trends in occurrence of surgical site infection (SSI), Clostridium difficile infection, and any infection due to multi-drug resistant organisms (MDRO). **Results/Conclusion:** Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

List the goals and objectives of the Surgical Care Improvement Project (SCIP)

Review the appropriate use of postoperative antimicrobials for surgical site infection prophylaxis

Self Assessment Questions:

All of the following statements from the SCIP Guidelines are true EXCEPT:

- A Postoperative antimicrobials are not necessary for most procedures
- B: Broad-spectrum antimicrobial agents result in lower rates of postoperative infections
- C: Predominant pathogens causing SSIs after clean procedures are : MSSA, MRSA, and Pseudomonas
- D: If antimicrobial prophylaxis is continued postoperatively, the duration should be 24-48 hours

Which of the following is the most appropriate duration for postoperative antibiotics following a clean, uncomplicated left total knee replacement?

- A 24 hours
- B 36 hours
- C 48 hours
- D 72 hours

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-659-L01-P

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

PRIMARY CARE INITIATIVE (PCI) – COLLABORATIVE CHRONIC DISEASE MANAGEMENT WITH PHARMACIST-LED VISITS

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Purpose: The Health Resource and Services Administration estimates a shortage of 20,400 primary care physicians (PCPs) by 2020. Even with deployment of nurse practitioners and physician assistants the shortage is still predicted to be at least 6,400 FTEs nationwide, and exacerbated in rural areas like Green County, Wisconsin. The purpose of this project is to develop and implement a pharmacist-led collaborative service to increase access in primary care. We will improve access to PCPs by transferring appointments for chronic disease medication management from physicians to Pharmacotherapists, thereby decreasing emergency department utilization for primary care issues, improving outcomes, and increasing revenue to SSM-Monroe Clinic. **Methods:** There are two phases to this project. Phase I involved service development and took place between June 2017 and November 2017. During this phase, we selected collaborating physicians and identified qualified patients based on pre-determined inclusion and exclusion criteria. We predicted financial viability by calculating anticipated revenue changes, and anticipated access improvements by predicting changes in time to third-available PCP appointment. Phase II involves service implementation and will take place from November 2017 to November 2018. We contact patients that meet criteria and offer to reschedule their appointment with a Pharmacist. The Pharmacist utilizes collaborative practice agreements to adjust medications and order labs. Pharmacist appointments are longer than our physician colleagues, allowing comprehensive disease state and medication education. Patients eligible for pharmacist-led Medicare Annual Wellness Visits and Comprehensive Medication Reviews are also identified during these visits. Success will be evaluated with pre- and post-implementation surveys, analysis of access improvement and health outcomes, and valuation of financial viability. **Results:** Phase 1: Ten of 17 PCPs are enrolled in the PCI program. Based on our financial model, Pharmacist visits can accommodate 75 PCI patients per week, resulting in \$862,806 in revenue and \$411,418 annual profit.

Phase 2: TBD
Conclusions: TBD

Learning Objectives:

Recognize three ways pharmacists can fill the void created by the primary care physician shortage

Identify two ways that access to primary care can be assessed in an objective manner

Self Assessment Questions:

How can pharmacists help resolve the primary care physician shortage?

- A Improve access to care by seeing primary care patients for chronic conditions
- B: Utilize collaborative practice agreements to prescribe and/or adjust medications
- C: Complete Medicare Annual Wellness Visits (MAWVs) for eligible patients
- D: All of the above

How can you objectively measure whether or not access to care is improved for a primary care physician?

- A A change in time to first available appointment for the physician
- B A change in time to third available appointment for the physician
- C Total number of patients seen by the primary care physician and pharmacist
- D More than one of these answers are correct

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-847-L04-P

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

PROGRESSION-FREE SURVIVAL FOR REAL-WORLD USE OF PALBOCICLIB IN HORMONE RECEPTOR-POSITIVE METASTATIC BREAST CANCER

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Palbociclib is a first-in-class cyclin-dependent kinase 4/6 inhibitor indicated for first and second-line treatment of hormone receptor (HR) positive, human epidermal growth factor 2 (HER-2) negative metastatic breast cancer. Addition of palbociclib to standard-of-care endocrine therapy significantly improved median progression-free survival (PFS) with neutropenia being the dose-limiting toxicity in the PALOMA trials. A safety analysis of PALOMA-3 confirmed that palbociclib dose reductions due to neutropenia did not adversely affect PFS in the second-line setting, but no data has been published addressing this issue in the first line setting. The primary objective of this study is to determine the real-world PFS of palbociclib in combination with an aromatase inhibitor in the first-line metastatic setting. Secondary objectives include determining PFS based on palbociclib dose level, time to first dose reduction, time to treatment failure and safety. This study is an institutional review board approved single-center, retrospective cohort study. Patients were included if the following criteria were met: postmenopausal (natural or pharmacologic), female, age 18 to 89 years old, received palbociclib with an aromatase inhibitor for first-line treatment of HR-positive, HER-2 negative advanced breast cancer between February 2015 and July 2017. Exclusion criteria included: males, prisoners, prior chemotherapy or endocrine therapy for metastatic disease, and patients initiated on palbociclib at a reduced dose. Kaplan Meier methods will be used to describe PFS and time to treatment failure. The remaining secondary outcomes will be analyzed by descriptive statistics. Palbociclib-related adverse events will be reported using the Common Terminology Criteria for Adverse Events (CTCAE) version 4.0. Data collection is currently ongoing. Results will be presented at the 2018 Great Lakes Pharmacy Residency Conference. These results will provide relevant information regarding real-world PFS and the impact of palbociclib dose-reductions on PFS for patients receiving palbociclib and an aromatase inhibitor for first-line treatment of metastatic breast cancer.

Learning Objectives:

Review the current literature regarding the efficacy of palbociclib in combination with letrozole for first and second-line treatment of HR-positive, HER2 negative metastatic breast cancer

Discuss FDA-approved dose reductions for palbociclib

Self Assessment Questions:

Patient AB presents to have labs drawn prior to cycle 4 of palbociclib and fortunately has not experienced any grade 3 or 4 toxicity with cycles 1 through 3. The package insert for palbociclib recomme

- A ANC 1000-1500 cells/mm³
- B: ANC 500-1000 cells/mm³
- C: Platelets 50-100,000/microL
- D: ANC <500 cells/mm³

According to the detailed safety analysis of the PALOMA-3 trial, which baseline characteristic was noted by the authors to be associated with more episodes of neutropenia?

- A Post-menopausal status
- B Age > 60
- C Low baseline ANC
- D Prior adjuvant or neoadjuvant chemotherapy

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-660-L01-P

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

PHARMACISTS INTERVENTION ON THE PREVENTION AND TREATMENT OF DELIRIUM IN THE INTENSIVE CARE UNIT

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Purpose: Delirium has been associated with increased length of stay, increased cost of care, and increased mortality. On average, a patient stayed 14 extra days, paid an extra \$2500, and had increased mortality ranging from 22% to 76%. According to the 2013 Society of Critical Care Medicine guidelines for pain, agitation, and delirium (PAD), performing early mobilization for adult ICU patients will help reduce delirium incidence and duration. The Mayo Clinic suggests promoting sleep hygiene (i.e., noise level, lighting, proper sleep schedule), helping the patient remain well oriented (i.e., time and day), providing visual and hearing aids, and preventing further health complications. Currently there is no standard treatment regimen proven to be effective for decreasing delirium duration and the PAD guidelines have no recommendation for the use of antipsychotics to reduce duration. Our objective is to determine the incidence and length of delirium after the implementation of a prevention protocol and delirium treatment order set in the intensive care unit (ICU). Methods: Prior to the implementation of the delirium order set, data was collected to determine a baseline incidence of delirium in the ICU. Data collected included CAM-ICU score, risk factors, risk factor score, onset of delirium, length of delirium, specific medications, RASS score, and admitting diagnosis. Every newly admitted patient was evaluated on day one, three, seven, ten, and fourteen for four weeks. Following the initial data collection, the delirium treatment order set and prevention measures were implemented. After two weeks of implementation the same data was collected. In addition, prevention measures utilized by nursing staff and medications utilized from the order set were collected. Results and Conclusion: Data collection and analysis is ongoing, Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize a patient at risk of developing delirium

Name medications that can predispose patients to delirium

Self Assessment Questions:

Which of the following risk factors will predispose a patient to develop delirium?

- A Age < 65 years
- B: No hearing or visual impairments
- C: History of dementia
- D: No difficulties ambulating

What medication could predispose a patient to delirium?

- A Apixaban
- B Zolpidem
- C Simvastatin
- D Clopidogrel

Q1 Answer: C Q2 Answer: B

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

COMPARISON OF DVT/PE PROPHYLACTIC MEASURES POST-CORONARY ARTERY BYPASS GRAFT

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Purpose: The ideal practice of implementing venous thromboembolism (VTE) prophylaxis post-coronary artery bypass grafting (CABG) remains unclear. Prolonged immobilization, surgical and past medical history of myocardial infarction, heart failure, hyperlipidemia, and obesity present significant thrombotic risks. However, the large doses of intraoperative heparin administered, and post-operative conditions such as platelet dysfunction, thrombocytopenia, and hemodilution, may complicate a clinician's decision to initiate prophylaxis. Previous reports indicate rates of VTE in this population as low as 0.8 to 1.1%, which have been contrasted by more recent evidence, demonstrating that 13% of patients receiving VTE prophylaxis still developed silent VTE, confirmed via radiographic surveillance. The primary objective is to evaluate the impact of mechanical versus chemical VTE prophylaxis in post CABG patients in terms of VTE rates, major bleeding, length of stay, and 30-day readmission. **Methods:** This is a single-center, retrospective, matched cohort study including patients >18 years who underwent CABG from January 1, 2013 to September 30, 2017 and received either chemical, mechanical, or no prophylactic measures post-operatively. Patients with history of VTE within 3 months, active cancer, early post-operative bleeding, oral anticoagulation, or concurrent valve surgery were excluded. Patients will be divided into the following treatment arms: subcutaneous heparin, subcutaneous enoxaparin, mechanical compression devices only, or no measures at all post-operatively. Cohorts will then be analyzed in a matched fashion to describe the incidence of VTE and major bleeding, as well as length of stay and readmission rates among prophylactic interventions. **Results and Conclusions:** Data collection and analysis are ongoing. Preliminary results and conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Discuss the current disparity in primary literature, as well as practice patterns, regarding initiation of prophylactic anticoagulation in patients post-coronary artery bypass graft surgery

Recognize the factors to be considered when implementing prophylactic anticoagulation post-coronary artery bypass graft surgery

Self Assessment Questions:

Which of the following contribute to varying practices in anticoagulation post-coronary artery bypass graft surgery?

- A: National guidelines provide clear guidance of its management
- B: Limited primary literature describing risks of bleeding in this patient
- C: Limited factors contributing to thrombosis risk in this patient
- D: Mechanical measures have been shown to be more efficacious than

Which of the following represent a bleeding concern in patients who are post-coronary artery bypass graft surgery?

- A: Large intraoperative heparin doses
- B: Obesity
- C: Post-operative immobility
- D: Vein harvesting trauma

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-662-L01-P

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

STANDARD- VERSUS LOW-DOSE VALGANCICLOVIR FOR CYTOMEGALOVIRUS PROPHYLAXIS IN INTERMEDIATE-RISK KIDNEY TRANSPLANT RECIPIENTS

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Background: Cytomegalovirus (CMV) disease is associated with graft rejection and graft loss among kidney transplant recipients. Due to the considerable risk to transplant outcomes, CMV prophylaxis with valganciclovir (VGC) is commonly utilized according to risk level. Risk level is determined by comparing donor and recipient CMV exposure through the presence of immunoglobulins. Intermediate risk is defined as CMV seropositive transplant recipients (R+), regardless of donor serostatus. Although guidelines recommend VGC 900 mg daily for cytomegalovirus (CMV) prophylaxis in solid organ transplant patients, multiple centers have reported clinical success, reduced side effects, and cost savings using VGC 450 mg daily in kidney transplant patients. Evidence is lacking regarding the optimal dose and duration of prophylaxis in intermediate-risk kidney transplant recipients. **Methods:** This single-center, retrospective, quasi-experimental study compared the efficacy and safety of VGC 900 mg versus 450 mg daily (adjusted for renal function) for 6 months for CMV prophylaxis in intermediate risk kidney transplant recipients. Patients were divided into low- and standard-dose groups based on institution protocol according to their creatinine clearance and VGC dose. Adult patients were included if they were seropositive for CMV and received a kidney transplant from January 1st, 2014 to May 31st, 2017. Patients were excluded if they received a multi-organ transplant (except kidney-pancreas) or did not follow up at the study institution. Data was collected for 1 year post-transplant. The primary outcome was CMV disease, defined as requiring treatment for CMV with VGC or ganciclovir. Secondary outcomes included: neutropenia, treatment of rejection, ganciclovir-resistant infection, and graft loss. Continuous, non-normal data were compared using Mann Whitney U test. Dichotomous data were compared using Chi-squared test. **Results and Conclusions:** Will be presented at the Great Lakes Conference

Learning Objectives:

Recognize kidney transplant patients at low-, intermediate-, or high-risk for CMV disease.

Identify risk factors for CMV disease.

Self Assessment Questions:

SH is a 30-year-old female in your unit who is post-op day 1 following a kidney transplant. Her lab results prior to transplant show that she is positive for CMV IgG. How would you classify her risk?

- A: Low-risk
- B: Intermediate-risk
- C: High-risk
- D: Unable to determine

Which of the following is a risk factor for CMV disease?

- A: Renal failure
- B: Travel to endemic area
- C: Immunosuppression
- D: Obesity

Q1 Answer: B Q2 Answer: C

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PREDICTORS AND COMPLICATIONS OF HYPERCHLOREMIA IN INTRACEREBRAL HEMORRHAGE PATIENTS

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Purpose: Intracerebral hemorrhage (ICH) causes 15% of strokes annually in the United States and is associated with an in-hospital mortality rate of 30%. Chloride-containing fluids are a common cause of hyperchloremia, and data from numerous critically ill populations indicate that hyperchloremia is associated with adverse sequelae including metabolic acidosis, acute kidney injury (AKI), prolonged length of stay (LOS), and in-hospital mortality. Neurocritical care patients may be disproportionately affected by hyperchloremia due to administration of hypertonic saline; however, this association may not rely solely on chloride exposure. The existing evidence related to the impact of hyperchloremia is likely confounded by different patient populations, differing definitions of hyperchloremia, and time frames studied. Therefore, the primary objective of this study is to quantify the rate of hyperchloremia in ICH patients and determine risk factors independently associated with the development of hyperchloremia. **Methods:** A multicenter, retrospective case-control study was conducted in patients 18 to 89 years old discharged between October 2011 and August 2017 with a diagnosis of ICH and a minimum LOS of seven days. The following patients were excluded: pregnant, incarcerated, past medical history of end-stage renal disease or serum creatinine > 2 mg/dL on admission, transition to palliative/comfort care within 48 hours of admission, anticoagulant-induced ICH other than warfarin, warfarin-induced ICH who did not achieve INR ≤ 1.4 within 12 hours from admission, and ICH diagnosis secondary to trauma, surgery, or hemorrhagic conversion of acute ischemic stroke. A stepwise multiple logistic regression model will be used to identify predictors of hyperchloremia between those who are hyperchloremic (≥ 115 mmol/L) vs non-hyperchloremic (< 115 mmol/L) during the first five days of admission. Secondary outcomes include hospital and ICU LOS, incidence of AKI within seven days of hospitalization, and in-hospital mortality. **Results/Conclusions:** Data analysis is being conducted and results will be presented.

Learning Objectives:

Recall adverse sequelae associated with the development of hyperchloremia.

Identify factors that may predispose patients to developing hyperchloremia.

Self Assessment Questions:

Which of the following adverse sequelae has been associated with the development of hyperchloremia in critically ill patients?

- A Acute kidney injury
- B: Increased hospital length of stay
- C: Increased in-hospital mortality
- D: All of the above

Which of the following factors may be a predictor of hyperchloremia?

- A Administration of chloride-containing fluids
- B Method of hypertonic saline administration (continuous infusion vs
- C Baseline serum creatinine
- D All of the above

Q1 Answer: D Q2 Answer: D

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EFFICACY OF INTRAVENOUS TRANEXAMIC ACID FOR THE TREATMENT OF POSTPARTUM HEMORRHAGE: A THREE-PHASE STUDY

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Purpose: Postpartum hemorrhage (PPH) is defined as a blood loss of greater than 500 milliliters after vaginal delivery or 1000 milliliters after caesarean section. Blood transfusions account for a majority of maternal morbidity in the United States (US) and PPH was the fourth leading cause of pregnancy-related deaths in the US. In a multi-regional study, Shakur et al. found that tranexamic acid (TXA) significantly reduced the risk of PPH-related death. The objectives of this study are to determine if TXA administration reduces postpartum blood use, use of uterotonics other than oxytocin, and transfusions. **Methods:** The Institutional Review Board approved this study. In phase one, retrospective review of electronic medical records was conducted from November 2016 to April 2017 to identify patients who required uterotonics other than oxytocin and transfusion. A PPH treatment protocol including TXA was initiated in November 2017. In phase two, data collected will be compared with phase one data and analyzed for protocol compliance. The Chi-squared test will be used for categorical variables and the Student's t-test will be used for numerical variables. Prior to phase three data collection beginning in February 2018, an in-service will be provided to providers to enhance protocol compliance. Patients at least 18 years of age diagnosed with PPH, who received a transfusion or were identified on the TXA order report are included. Patients with contraindications to TXA are excluded. **Results and conclusions:** In phase one, 63 patients were included. The mean quantified blood loss for vaginal deliveries (n=31) and cesarean deliveries (n=32) was 868 milliliters and 1216 milliliters, respectively. A total of 34 patients received transfusion with 14 of those patients receiving transfusion with at least one uterotonic. Final results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the results of the World Maternal Antifibrinolytic (WOMAN) trial
Identify the potential limitations of using tranexamic acid for postpartum hemorrhage

Self Assessment Questions:

Which of the following statements regarding the World Maternal Antifibrinolytic (WOMAN) trial is correct?

- A The composite primary endpoint of death from all-causes or hyster
- B: Hysterectomy was reduced with tranexamic acid
- C: Death due to bleeding was significantly reduced in women given tr
- D: Early administration of tranexamic acid, within 3 hours of birth, did

Which of the following is a contraindication for receiving tranexamic acid injection?

- A Eclampsia
- B Active intravascular clotting
- C Renal insufficiency
- D Hepatic disease

Q1 Answer: C Q2 Answer: B

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EVALUATION OF MULTI-DRUG RESISTANT PATHOGENS IN A CRITICALLY ILL TRAUMA POPULATION

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Purpose: The increasing incidence of drug resistant organisms is a growing healthcare concern and is particularly concerning in intensive care units (ICUs). Clinicians are challenged with choosing effective initial empiric therapy in the setting of increased resistance rates. Identifying risk factors associated with multi-drug resistant (MDR) organism growth could affect empiric antimicrobial therapy selection. Previous studies have identified risk factors of MDR pathogen growth in critically ill patients in medical and surgical ICUs. However, to date, no studies have evaluated risk factors of MDR organism growth in trauma patients. This study aims to identify the incidence and risk factors of MDR organism growth in this population. **Methods:** This institutional review board approved retrospective cohort evaluated adult trauma patients from January 1, 2016 to August 31, 2017 who were admitted to an ICU. The patient list was obtained via the institution's trauma registry. Patients were included if they were admitted to an ICU for a minimum of 24 hours and cultured during their hospital course. Exclusion criteria included cultures drawn less than 48 hours after admission and cultures with no susceptibility data reported. The primary endpoint is the incidence of MDR organism growth. Secondary endpoints include the incidence of extensively-drug resistant (XDR) organism growth, the incidence of pan-drug resistant (PDR) organism growth, and the association of risk factors with MDR organism growth in this population. Organism growth was identified via microbiological results of blood, body fluid, respiratory urine, and wound cultures. Antibiotic resistance was determined according to susceptibility data from the microbiology lab. Risk factors that were assessed include comorbidities, recent hospitalization or MDR organism growth, inpatient antibiotic administration, ICU length of stay, surgical intervention, and type and severity of trauma.

Results/Conclusion: Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review published literature evaluating empiric antimicrobial therapy selection and risk factors for multi-drug resistant organism growth in critically ill patients.

Identify risk factors that may be associated with multi-drug resistant organism growth in critically ill trauma patients.

Self Assessment Questions:

In a study by Zilberberg and colleagues, which of the following was shown to be the best predictor of hospital death in patients with gram-negative severe sepsis or septic shock?

- A Lack of initially appropriate antibiotic therapy
- B: Multi-drug resistant organism growth
- C: Increased age
- D: Initial treatment with broad-spectrum antibiotics

Which of the following has been identified in previous studies as a risk factor of multi-drug resistant organism growth?

- A Use of any antibiotics within previous 6 months
- B Severe traumatic injury
- C End-stage renal disease with hemodialysis
- D ICU length of stay of more than 24 hours

Q1 Answer: A Q2 Answer: C

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NAFCILLIN VERSUS CEFAZOLIN FOR THE TREATMENT OF METHICILLIN-SUSCEPTIBLE STAPHYLOCOCCUS AUREUS BACTEREMIA

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Purpose: Antistaphylococcal penicillins (nafcillin, oxacillin, or cloxacillin) are currently recommended as first-line treatment for methicillin-susceptible *Staphylococcus aureus* (MSSA) bacteremia. First-generation cephalosporins, primarily cefazolin, are supported as alternative therapy by clinical outcomes. Cefazolin offers several advantages over penicillins including ease of administration with less frequent dosing intervals, lower sodium and volume loads, improved tolerability, and decreased comparative inpatient cost. While clinical outcomes do not differ, in vitro data supports that type A beta-lactamase has high affinity for hydrolysis of cefazolin. This is of greater clinical concern in MSSA infections with high cefazolin minimum inhibitory concentrations (MIC) and those infections with high bacterial burden. Increasing prevalence of deep-seated infections, such as endocarditis, and the complications of high-grade and prolonged bacteremia warrant investigation of microbiologic clearance of MSSA bacteremia treated with nafcillin compared to cefazolin, which is the primary objective of this study. A secondary aim is identification of risk factors for inpatient antimicrobial treatment failure. **Methods:** This retrospective study will include hospitalized patients 18 years and older with MSSA bacteremia. Any patients with polymicrobial infections, relapse of MSSA infection, pregnancy, or leaving UC Health facility prior to culture clearance will be excluded. The study will compare two patient groups: definitive treatment with cefazolin, and definitive treatment with nafcillin. The primary endpoint is time to microbiologic clearance. Multivariate logistic regression will be performed to identify risk factors for inpatient treatment failure based on univariate analysis and pre-defined variables. **Results:** Data collection and analysis are currently ongoing.

Learning Objectives:

Recall resistance mechanisms of MSSA to cephalosporins

Review the clinical outcomes in the literature comparing penicillins to cephalosporins

Self Assessment Questions:

Which statement best describes the concern with the use of cefazolin for the treatment of MSSA bacteremia if the *Staphylococcus aureus* strain produces type A beta-lactamase?

- A The MSSA will be resistant in vitro but will be susceptible at the low
- B: The susceptibility testing will accurately reflect in vivo response
- C: The MSSA will be susceptible in vitro but will be resistant at the high
- D: The beta-lactamase production will not affect treatment with cefazolin

Which of the following is the most accurate interpretation of the clinical outcomes comparing anti-staphylococcal penicillins to cefazolin in the treatment of MSSA bacteremia?

- A Mortality rate is higher in patients treated with cefazolin
- B The incidence of treatment failure is higher in patients treated with nafcillin
- C Differences in clinical cure between nafcillin and cefazolin has not been found
- D No differences have been found in clinical outcomes

Q1 Answer: C Q2 Answer: D

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Activity Type: Knowledge-based Contact Hours: 0.5
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ASSESSMENT OF PAIN MANAGEMENT WITH ROPIVACAINE DELIVERED VIA AN ELASTOMERIC PUMP FOLLOWING BOWEL AND SHOULDER SURGERY

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Purpose: Pain management after surgical procedures typically involves the use of opioid medications. Opioids are associated with many side effects and non-opioid medications are often used adjunctively to mitigate these effects. One example is the delivery of a local anesthetic at or near a surgical site via an elastomeric pump. In studies of knee and hip arthroplasties, these pumps have shown significant decreases in postoperative pain scores and narcotic use when compared to narcotic use alone. Currently at Owensboro Health Regional Hospital postoperative elastomeric pump use is inconsistent. The purpose of this study is to evaluate opioid use and postoperative pain management in patients after bowel or shoulder surgery who received ropivacaine via an elastomeric pump compared to patients without ropivacaine pumps. Primary outcomes will include total opioid use and average daily pain scores 24 hours post operation. Secondary outcomes include total opioid use and average daily pain scores at 48, 72, and 96 hours post operation, number of pain scores recorded daily, and frequency of opioid induced adverse reactions. **Methods:** This Institutional Review Board exempt study will consist of a retrospective chart review including patients 18 years and older who underwent bowel or shoulder surgery between January 1, 2015 to September 1, 2017. This study will exclude prisoners; pregnant patients; patients with a known severe hypersensitivity to local anesthetic or implanted pain pump. Demographic information to be collected includes age, sex, body mass index, length of stay, renal function, and opioid use prior to surgery. Key data points will include amount of opioid and non-opioid medications used, total amount of ropivacaine administered, postoperative pain scores, naloxone administration, respiratory rate, and time to first bowel movement post operation. **Results/Conclusions:** Data collection and analysis are ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain ropivacaine pharmacology and its role in pain management
Describe the effects of local anesthesia delivered via an elastomeric pump on postoperative pain management

Self Assessment Questions:

Which of the following is an appropriate dosing regimen for ropivacaine when used for postoperative pain management via peripheral nerve block?

- A: 15 to 20 mL of 1 % solution
- B: 15 to 30 mL of 0.5% solution
- C: Continuous infusion 5-10 mL/hour of 1% solution
- D: Continuous infusion 5-14 mL/hour of 0.2% solution

Studies using local anesthesia via elastomeric pump for postoperative pain management have shown which of the following benefits compared to opioid use?

- A: Increased length of hospital stay
- B: No adjunctive opioid use
- C: Lower pain scores
- D: Less sedation and more constipation

Q1 Answer: D Q2 Answer: C

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COMPARISON OF THE SAFETY OF RIVAROXABAN AND APIXABAN IN THE TREATMENT OF VENOUS THROMBOEMBOLISM AND NONVALVULAR ATRIAL FIBRILLATION

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Purpose: Venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), has an estimated annual incidence of 1 to 2 cases per 1,000 persons in the United States. Atrial fibrillation affects between 2.7 and 6.1 million people in the United States and accounts for approximately 15% of strokes in persons of all ages. While anticoagulation is crucial for the treatment and prevention of arterial and venous thromboembolic diseases, bleeding remains a major complication and limitation. Anticoagulation therapy has evolved with the FDA approval of direct oral anticoagulants (DOACs), such as rivaroxaban and apixaban. Due to the absence of direct comparisons between DOACs and the lack of convincing evidence of a superior DOAC, current guidelines have no preference for one DOAC over another in the treatment of VTE and stroke prevention. The purpose of this study is to compare the safety of rivaroxaban and apixaban in the treatment and prevention of venous and arterial thromboembolic diseases in the JBVAMC patient population to improve the safety of DOAC use at JBVAMC and guide patient specific selection of rivaroxaban and apixaban in the treatment of VTE and/or atrial fibrillation. **Methods:** This study will be a retrospective, electronic chart review of patients at JBVAMC with established VTE and atrial fibrillation who were newly started on rivaroxaban or apixaban therapy during the period between September 1, 2010 and March 31, 2017. The primary endpoint of the study is to compare the safety of rivaroxaban and apixaban on the composite endpoint of major and clinically relevant non-major bleeding. Secondary endpoints will include major bleeding and clinically relevant non-major bleeding. Subgroup analyses, including VTE recurrence and stroke occurrence, will be evaluated to compare the efficacy of rivaroxaban and apixaban. **Results:** Results and conclusion will be presented at the 2018 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the preferred anticoagulation therapy for venous thromboembolism in patients without cancer.
Recognize the appropriate anticoagulation therapy for stroke prevention in patients with nonvalvular atrial fibrillation, according to patient specific stroke risk factors.

Self Assessment Questions:

According to the current CHEST guidelines, which of the following is true regarding the treatment and prevention of VTE in patients without cancer?

- A: The use of vitamin K antagonists is recommended over direct acting
- B: The use of direct acting oral anticoagulants is recommended over
- C: The use of low molecular weight heparin is recommended over direct
- D: The use of low molecular weight heparin is recommended over vitamin

According to the ACC/AHA/HRS guidelines, which of the following is appropriate regarding anticoagulation therapy for stroke prevention in patients with a prior stroke, transient ischemic attack, or CH

- A: Only warfarin
- B: Only dabigatran, rivaroxaban, or apixaban
- C: Only rivaroxaban or apixaban
- D: Warfarin, dabigatran, rivaroxaban, or apixaban

Q1 Answer: B Q2 Answer: D

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DESCRIBING THE POTENTIAL IMPACT OF A PHARMACIST-DRIVEN PROTOCOL TO PREVENT FEBRILE NEUTROPENIA

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Purpose: Febrile neutropenia (FN) is a known complication of many chemotherapy regimens. Patients with FN often require hospitalization and additional supportive care resulting in increased cost of care and risk of poor outcomes. Diagnosis with FN may also result in reduced doses or dose delays in chemotherapy, which negatively affects clinical outcomes. However, prophylaxis against FN is possible with the use of granulocyte-colony stimulating factors (G-CSF). Patients who receive chemotherapy regimens associated with a low risk of FN are generally not indicated to receive prophylaxis with G-CSF, while patients who receive chemotherapy regimens associated with a high risk of FN generally have G-CSF prophylaxis built into the treatment plans. However, when patients receive chemotherapy regimens associated with intermediate risk of FN, the decision to use G-CSF should be based on the patients' comorbidity-related risk factors, patient-related risk factors, and treatment-related risk factors. A pharmacist-driven assessment tool was developed to identify patients for whom G-CSF is indicated. The purpose of this study is to describe the potential impact of the pharmacist-driven protocol. **Methods:** This IRB-approved retrospective chart review will assess patients admitted between 11/20/2015 and 11/19/2017 with FN-associated diagnosis. Additional inclusion criteria are ≥ 18 years of age, diagnosis with a solid tumor carcinoma, and receiving treatment with intravenous chemotherapy. The primary end point of the study is to determine the percentage of patients who would qualify for G-CSF through the pharmacist-driven assessment tool. The secondary endpoints include identifying predominant risk factors and treatments that are most commonly associated with FN-related hospitalization.

Learning Objectives:

Describe the negative clinical impact of febrile neutropenia
Identify the importance of identifying patients on regimens associated with an intermediate risk of FN

Self Assessment Questions:

Which of the following is a potential complication of FN?

- A: Malignant hyperthermia
- B: Increased incidence of liver metastases
- C: Hospitalization requiring supportive care
- D: Hyperglycemia

Why is it important to identify patients on chemotherapy regimens associated with an intermediate risk of FN?

- A: To reduce the incidence of recurrent malignancies
- B: To determine if the patient qualifies for prophylactic G-CSF to reduce FN risk
- C: To reduce the costs associated with chemotherapy regimens
- D: To identify patients who require dose reductions and dose delays

Q1 Answer: C Q2 Answer: B

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IMPACT OF PHARMACY DRIVEN PATIENT AND NURSING EDUCATION ON OPIOID THERAPY OUTCOMES IN PATIENTS AFTER JOINT REPLACEMENT SURGERY

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Purpose: Evaluate the relationship between pharmacy driven patient and nursing education on opioid therapy after joint replacement surgery on opioid and non-opioid medication use, ambulation markers, rate of opioid related adverse events, patients' understanding of opioid medication therapy, and 30-day readmission rate. **Methods:** Study was approved by the Institutional Review Board. The following data was collected after retrospective chart review of patients who underwent total knee arthroplasty or total hip arthroplasty at Vista Medical Center East starting on September 1, 2017 for a total duration of eight weeks: age, gender, height, weight, serum creatinine, allergies, type of surgery, length of procedure, average pain scores in the first 12, 24, 48 and 72 hours post-surgery, nerve block during surgery, type of anesthesia, total number of opioid and non-opioid analgesics used on post-operative day 1, 2, 3, naloxone use, antiemetic medication use, total length of stay, discharge location, ambulation and level of assistance on post-operative days 1, 2, 3, and 30-day readmission rate. Patient education handouts on pain management and opioid use, nursing education materials and patient counseling are to be implemented starting February 1, 2018 for a total duration of eight weeks. The interventions will be conducted and documented in patient's chart by pharmacy resident or pharmacy student under resident's supervision. The data collected prior and post implemented interventions will be compared. Patient's inclusion criteria: ≥ 18 years old and underwent total knee arthroplasty or total hip arthroplasty at Vista Medical Center East during the selected time period. Patient's exclusion criteria: < 18 years old and did not undergo total knee arthroplasty or total hip arthroplasty at Vista Medical Center East during the selected time period. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patient populations at risk for opioid-induced adverse events
Discuss implications of long-term opioid use in chronic, non-cancer pain treatment

Self Assessment Questions:

What are some common early opioid withdrawal symptoms?

- A: Stomach cramps, nausea, anxiety, fast heart rate, increased blood pressure
- B: Dizziness, somnolence and bradycardia
- C: Rash, dry skin and tissue necrosis
- D: Dry eyes, hypotension and constipation

The following is true about the long-term use of opioids in chronic, non-cancer pain treatment:

- A: Extensive evidence shows no possible harms of opioids
- B: According to CDC Guideline for Prescribing Opioids for Chronic Pain, long-term use of opioids is not recommended for chronic pain
- C: Current evidence supports long-term use of opioids for pain reduction
- D: Very few studies have been conducted that assess opioid use for chronic pain

Q1 Answer: A Q2 Answer: D

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OPTIMIZING A VITALS DOCUMENTATION TOOL AT A FOUR HOSPITAL COMMUNITY HEALTH SYSTEM

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Purpose: The Leapfrog Group is a nonprofit organization that provides information about hospital safety and quality to its stakeholders. The organization assesses hospitals through the Leapfrog Hospital Survey which is completed by 1,800 hospitals in the United States annually. Topics within the survey include inpatient care, medication safety, maternity care, infections, and injuries. One element of the medication safety section is related to how thoroughly barcode medication administration (BCMA) is implemented. One of the decision support elements required to achieve full compliance with this section of the survey includes vital sign checking. The purpose of this project is to more broadly implement the vital signs check feature in the electronic health record (EHR) to ensure continued safe medication practices at this community health system. **Methods:** Internal institutional guidelines were reviewed to identify medications requiring vitals documentation prior to dose administration. A multidisciplinary task force collaborated to determine the focus of the project. The EHR functionality will be implemented to facilitate documentation of vitals prior to administration. Training of nursing staff and implementation of the modified medication administration workflow will be conducted at each of the four hospital sites. The impact of this EHR functionality on compliance with documentation guidelines will be measured by analyzing pre-implementation and post-implementation vitals documentation. **Results and conclusion:** Implementation of the vitals documentation feature is currently in progress. Final conclusions will be presented at the Great Lakes Pharmacy Conference.

Learning Objectives:

Review the purpose of the Leapfrog Group survey.

Describe the vitals documentation tool used to support nursing staff during medication administration.

Self Assessment Questions:

What is the main objective of the Leapfrog Group survey?

- A: Determines Medicare and Medicaid reimbursement
- B: Allows patients to make more informed decisions regarding their health
- C: Assists health systems with patient retention
- D: Establishes medical and pharmacy residencies at certain hospitals

What information is included in the medication administration record (MAR) documentation feature that was implemented at the four hospitals within this health system?

- A: Height & weight
- B: Medication allergies
- C: Vitals
- D: Primary care provider

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-905-L05-P

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

EFFECT OF A PHARMACIST-DRIVEN PROTOCOL ON DURATION OF VANCOMYCIN THERAPY FOR SUSPECTED METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS PNEUMONIA

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Purpose: The 2016 Infectious Diseases Society of America guidelines recommend empiric coverage for methicillin-resistant *Staphylococcus aureus* (MRSA) in the treatment of pneumonia for high risk patients. While empiric coverage is warranted with an anti-MRSA agent such as vancomycin, appropriate de-escalation should occur in accordance with antimicrobial stewardship initiatives. Nasal screening with polymerase chain reaction (PCR) has been shown to have high negative predictive value for ruling out MRSA in the lower respiratory tract. This study will investigate the effects of a pharmacist-driven nasal MRSA PCR-based de-escalation protocol on the duration of vancomycin therapy for treatment of pneumonia. **Methods:** A pharmacist-driven nasal MRSA PCR protocol was approved by the Pharmacy and Therapeutics committee. The protocol enables pharmacists to order nasal MRSA PCR testing for select patients to facilitate de-escalation of vancomycin. A retrospective chart review will be conducted, based on monthly utilization reports generated three months before and after protocol implementation. Adult patients initiated on vancomycin therapy for the treatment of suspected MRSA pneumonia will be identified and analyzed. Data collection includes: age, gender, baseline creatinine clearance, immune function status, previous hospitalization(s), antibiotic use, and history of MRSA. If available, respiratory culture results will be collected. Study endpoints include duration of vancomycin therapy and number of vancomycin doses given pre- and post- implementation. Secondary endpoints include: incidence of acute kidney injury during admission, hospital length of stay, and in-hospital mortality. Finally, a cost comparison will be performed to determine potential drug cost savings of PCR testing through de-escalation of intravenous vancomycin therapy. **Results:** Data collection and analysis is in progress. The results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the clinical utility of the nasal MRSA PCR test in appropriate de-escalation of vancomycin for pneumonia.

Review indications for empiric anti-MRSA therapy in the setting of lower respiratory tract infections.

Self Assessment Questions:

Which of the following statements is correct? The nasal MRSA PCR test has a:

- A: High negative predictive value
- B: High positive predictive value
- C: Low sensitivity and specificity
- D: Low negative predictive value

Which of the following is an indication for empiric anti-MRSA therapy in the treatment of HAP or VAP?

- A: <10% institutional incidence of MRSA among *Staphylococcus aureus*
- B: Intravenous antibiotic exposure within the past 90 days
- C: Concurrent complicated urinary tract infection
- D: Uncontrolled diabetes

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-671-L01-P

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

IMPLEMENTATION OF GUIDED PRESCRIBING COMPUTERIZED PHYSICIAN ORDER ENTRY (CPOE) CHANGES FOR PATIENTS 65 YEARS AND OLDER

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Purpose: Older adults (65 years and older) experience four times as many preventable adverse drug events (ADEs) than do younger patients in inpatient settings due to age-related differences in physiology and a high prescription rate. A new approach to improve medication safety in this patient population is guided prescribing, which is a medication decision support system that promotes age-adjusted doses and frequencies. Using guided prescribing within a computerized physician order entry (CPOE) system has been shown to effectively influence physicians' prescribing behaviors, optimize clinical practice and reduce ADEs. The purpose of this study was to design CPOE changes to encourage ordering of age-appropriate dosing and frequency for patients 65 years and older. **Methods:** In February 2017, the order entry screens of 14 high-risk medications listed in the Beers Criteria were modified for patients 65 years and older. We retrospectively reviewed all of the inpatient orders of those 14 medications prescribed for patients 65 years and older during a six-month pre-implementation period and a six-month post-implementation period. The primary outcome was dosing agreement with the new CPOE changes. Statistical analysis was conducted using Chi-square analysis. **Results:** The dosing agreement in the post-implementation period (85.2%, 1109/1302 orders) increased compared to the pre-implementation period (82.5%, 1229/1489 orders); difference was statistically significant ($p=0.04$). When analyzing 14 medications individually, the implementation of CPOE changes led to a statistically significant improvement in dosing agreement for cyclobenzaprine in the post-implementation period (77.3%, 58/75 orders), compared to the pre-implementation period (55.2%, 53/96 orders); $p=0.002$. Change in dosing agreement for the remaining 13 medications individually did not reach statistical significance. **Conclusion:** The implementation of CPOE changes increased age appropriate high-risk medication prescribing for older adult patients in the inpatient setting. Additional order entry changes should be implemented for other potentially inappropriate medications and in other settings of care.

Learning Objectives:

Describe computerized physician order entry guided prescribing
Recognize the benefits of using computerized physician order entry guided prescribing

Self Assessment Questions:

Which of the following statements are true regarding computerized physician order entry guided prescribing?

- A: One of the methods to implement computerized physician order entry
- B: The main purpose of developing of developing computerized physician order entry
- C: The main purpose of developing computerized physician order entry
- D: Both A and C

What are the potential benefits of using computerized physician order entry guided prescribing?

- A: Influence prescribing behaviors
- B: Optimize clinical practice
- C: Reduce adverse drug events
- D: All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-906-L05-P

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

LIPOSOMAL BUPIVACAINE: FRIEND OR FOE IN KIDNEY DONATION?

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Background: Post-operative pain and concerns for opioid dependence are disincentives to living kidney donation (LKD). While liposomal bupivacaine (LB) utilization in LKD post-operative care has shown faster reduction in pain scores and lower overall pain scores, the efficacy data remains variable. Therefore, we evaluated the efficacy of a LB-containing versus non-LB-containing pain control regimen in LKD at our transplant center. **Methods:** A retrospective review of LKD with complete electronic medical records was conducted between January 2013 and August 2015. Primary endpoints were pain scores (PS) and change in PS at various time points (first PS, PS at 4, 8, 12, 16, 20, 24, 48 and 72 hours, last PS prior to discharge, and minimum and maximum PS). Secondary endpoints were opioid use in intravenous morphine equivalents (IV ME), length of stay (LOS), and adverse effects (AE) from opioid therapy. **Results:** Of 117 patients who met criteria, 62 patients received LB and 55 patients received a non-LB regimen. The median reported PS and change in PS were comparable between groups except for minimum PS (0 [range 0-2] vs. 0 [range 0-4], $p=0.02$). The LB group received less oxycodone (median 10 mg IV ME [range 5-20] vs. 15 mg IV ME [range 10-15]; $p=0.01$) and hydrocodone-acetaminophen (6.7 mg IV ME [range 3.3-6.7] vs. 13.3 mg IV ME [range 10-20], $p=0.04$) within the first 24 hours, while the overall post-operative opioid use (30.8 mg IV ME [range 1.0-142.2] vs. 24 mg IV ME [range 0-138.8]; $p=0.85$) was no different. The median LOS and AEs between the LB and non-LB groups were not significant. **Conclusion:** Liposomal bupivacaine in multimodal pain management is shown to reduce the use of opioids in the first 24 hours following living kidney donation despite similar post-operative pain outcomes.

Learning Objectives:

Describe the role of anesthetic agents in multimodal pain management following living kidney donation.

Identify the potential benefits of incorporating a post-operative multimodal analgesic approach in patient outcomes.

Self Assessment Questions:

Local anesthetic agents prevent the propagation of a pain signal by:

- A: Inhibiting prostaglandin synthesis
- B: Binding to mu-opioid receptors
- C: Inactivating neuronal voltage-gated sodium channels
- D: All of the above

Potential benefit(s) to using a post-operative multimodal analgesic approach include:

- A: Reduction in total use of opioid therapy
- B: Reduction in reported pain scores
- C: Improvement in patient satisfaction with donation process
- D: All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-672-L01-P

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

DETERMINING THE EFFECTIVENESS OF A ONE-ON-ONE HAART EDUCATION AND ADHERENCE MONITORING PROGRAM IN A CHAIN COMMUNITY PHARMACY-PILOT STUDY

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Objectives: To determine the effectiveness of a one-on-one, tailored, Highly Active Antiretroviral Therapy (HAART) education and adherence monitoring program in achieving a 95% or greater adherence rate, clinical outcome measures, and patient-rated effectiveness. **Methods:** The Far Southside Adherence Project is a prospective, single site, pilot study, conducted at a chain community pharmacy in Chicago's Roseland community. Enrollees included are 18 years of age or older, naïve to HAART, or restarting after a lapse of greater than three months. Participants engage in nine, one-on-one contacts: three education sessions, two follow-up sessions, two reminder telephone calls, and two refill readiness calls. Topics covered: treatment readiness, tailored disease and medication education, barriers to adherence, side effects, adherence tools, food safety, and nutrition. Adherence is measured at each encounter by questionnaire and calculated at weeks nine and thirteen by the Proportion of Days Covered (PDC). Clinical outcomes collected during week one: A1C, total cholesterol, LDL, HDL, triglycerides, blood glucose, blood pressure, weight, and biometric impedance assay (BIA). Repeated at week five: blood pressure, weight and BIA. All clinical measures are reevaluated, and a program evaluation is administered, at week thirteen. Descriptive statistics will be utilized to analyze the data. **Results:** In progress.

Implications/Conclusions: This program maximizes on the accessibility of the chain community pharmacy and the expertise of the pharmacist to serve as a readily available resource, reinforce patient education about medications and disease state, closely monitor the emergence of side effects and/or toxicities, and provide prompt adherence monitoring and support. The program evaluation and PDC indicate how effectively the model enables patients to self-assess for new or developing barriers to adherence; anticipate, alleviate, and avoid toxicities; evaluate the impact of diet, nutrition, and exercise on overall well-being; and, in the final analysis, empowers them in achieving a 95% or greater adherence rate.

Learning Objectives:

Recognize the clinical importance of a 95% adherence rate to HAART therapy.

Identify barriers to HAART treatment success that are alleviated by community pharmacy partnership with the patient and provider.

Self Assessment Questions:

The benchmark adherence rate for HAART therapy was identified in a landmark study of Protease Inhibitors, which showed that patients who achieved 95% or greater adherence:

- A: Were more likely to maintain lifelong adherence to treatment.
- B: Were less likely to die of co-morbid conditions of cancer, cardiovascular disease, and HIV.
- C: Virtually eliminated their risk of opportunistic infections or death from HIV.
- D: Were considered virally undetectable and, therefore, unable to transmit HIV.

Which of the following barriers to treatment success can be directly mitigated by community pharmacy partnership with the patient and provider?

- A: homelessness, poverty, and lack of transportation
- B: treatment failure, despite consistent adherence, due to drug/drug interactions
- C: lack of persistence, due to depression, stigma and isolation related to HIV
- D: limited efficacy of currently available drug therapy options

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-18-679-L02-P

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

EVALUATING THE EFFICACY OF A NEWLY IMPLEMENTED OPIOID ALERT

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Purpose: As of 7/1/2017, Senate Enrolled Act 226 (SEA 226) took effect in Indiana limiting opioid prescriptions to a maximum of a 7 day supply to patients under the age of 18 or opioid naïve adults. This limitation does not apply to cancer patients, palliative care, medication-assisted treatment for a substance use disorder or cases where opioids are the only treatment option. An exemption reason must be documented in the patient's medical record if the aforementioned day supply limit is exceeded. On 7/13/2017, Indiana University Health implemented a discern alert to help prescribers comply with SEA 226. The alert prompted the prescriber if more than a 7 day supply of an opioid was issued to opioid naïve adult patients or those under the age of 18. An override reason was required for exemptions. **Method:** The study is a interventional retrospective study with 2-week control (07/01/2017 - 07/13/2017) and an intervention phase (8/22/2017 - 9/22/2017). This study will evaluate the efficacy of the implemented opioid alert and examine the prescribing patterns before and after the intervention. Findings of this study will identify opportunities to optimize system performance and reinforce prescribing compliance. All patients receiving opioid prescriptions within the designated time frame will be considered for the study. Patients will be grouped based on different SEA 226 criteria to calculate various measures. Summary statistics including frequency distribution for categorical variables and means and standard deviations for continuous variables will be reported. The alert's sensitivity and specificity will be calculated as well as compliance and prescribing patterns, before and after the alert implementation, will be compared. **Results/Conclusions:** Data analysis is ongoing and will be presented at GLPRC.

Learning Objectives:

Describe Senate Enrolled Act 226.

List exemptions for prescribing more than 7 days supply of opioids.

Self Assessment Questions:

Senate Enrolled Act 226 (SEA 226) limits opioid prescriptions to patients under the age of 18 or opioid naïve adults to a maximum of a ____ day supply:

- A: 3
- B: 5
- C: 7
- D: 10

If the day supply limit is exceeded, an acceptable exemption reason is a(n):

- A: Cancer patient
- B: Patient with severe pain
- C: 18 years old patient who never received opioids
- D: 2 years old patient

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-18-682-L03-P

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

CLINICAL OUTCOMES OF DAPTOMYCIN DOSING IN OBESE PATIENTS: A COMPARISON OF ACTUAL, IDEAL, AND ADJUSTED BODY WEIGHT

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More than one third of the United States population suffers from obesity. Obese patients are often excluded from clinical trials; therefore application of weight-based dosing strategies can be unclear. Obesity has a wide range of effects on the pharmacokinetics and pharmacodynamics of drugs, including changes in volume of distribution, renal excretion, hepatic metabolism, and protein binding. The purpose of this study is to determine if there is a difference in clinical outcomes for obese patients receiving daptomycin dosed using actual, ideal, or adjusted body weight. This research is a multi-center, retrospective, observational cohort study. Patients who received daptomycin between February 2014 and November 2017 will be identified through medication charges. Patients will be assigned a study number and will be evaluated for inclusion in this study through a random number generator. Patients who are obese (defined as a body mass index [BMI] greater than or equal to 30 kg/m²) and who received greater than or equal to 3 days of daptomycin therapy will be included in this study. Exclusion criteria includes patients with a BMI less than 30 kg/m², age less than 18 years old, orders for daptomycin in a non-weight-based manner, or if the patient has already been included in the study. The primary objective of this study is to determine the rate of clinical success in obese patients receiving daptomycin dosed using actual, ideal, or adjusted body weight. Information to determine outcomes will be retrieved from progress notes and evaluation of pertinent lab values in the medical record. Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the effects obesity has on the pharmacokinetics of drug disposition in the body.

Discuss the current literature regarding daptomycin dosing in obese patients using ideal body weight, adjusted body weight, or actual body weight.

Self Assessment Questions:

Data from the pharmacokinetic study by Dvorchik and Damphousse suggests that the absolute volume of distribution of daptomycin in morbidly obese individuals is increased by approximately ____ compare

- A: 25%
- B: 37%
- C: 55%
- D: 83%

If a drug has marked uptake into adipose tissue, which of the following parameters will be similar between obese and non-obese subjects?

- A: Absolute volume of distribution (Vd)
- B: Vd normalized to ideal body weight (Vd/IBW)
- C: Vd normalized to adjusted body weight (Vd/AdjBW)
- D: Vd normalized to actual body weight (Vd/ABW)

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-673-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
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PREDICTING BLEEDING AND THROMBOSIS COMPLICATIONS IN PATIENTS WITH CONTINUOUS FLOW LEFT VENTRICULAR ASSIST DEVICES

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Purpose: Although left ventricular assist device (LVAD) therapy has been proven to relieve heart failure symptoms and improve survival, their use is also associated with complications, including thrombotic and bleeding events as well as infections. A variety of factors contribute to these patients' risk of bleeding and thrombosis; however, it is unclear how these factors are associated to the overall incidence of bleeding and thrombosis events. Previous landmark risk stratification tools have been utilized in other disease states to better estimate the risk of bleeding and thrombosis with and without anticoagulation, including the HAS-BLED, HEMORR2HAGES, CHADS2 and CHA2DS2-VASC models. The study objective is to evaluate the predictive value of current risk models for bleeding and thrombosis complications in patients with an LVAD. Study Methods: This was an IRB-approved, retrospective, single-center analysis of patients implanted with a continuous-flow LVAD from July 2011 to June 2016. All patients who received an LVAD within this time frame are eligible for inclusion. Exclusion criteria were defined as patients with a known clotting disorder, less than 18 years of age, pregnancy, and prisoners. The primary endpoint was the incidence of bleeding or thrombosis events. Bleeding events included gastrointestinal bleeding, intracranial bleeding, and other non-surgical bleeding. Perioperative bleeding (within 48 hours of implantation) was excluded from the analysis. Thrombosis events were defined by pump thrombosis, ischemic stroke, and/or systemic emboli. Baseline risk model scores were calculated with the CHADS2, CHA2DS2-VASC, HAS-BLED, and HEMORR2HAGES models. Chi-square and student's t-test were used to measure baseline differences. A cox proportional hazards model was used to compare the incidence of bleeding and thrombosis events among groups. Results and Conclusion: Data analysis is ongoing. A total of 129 patients underwent LVAD implantation within the study time period. The results and conclusions will be presented at the 2018 Great Lakes Residency Conference.

Learning Objectives:

Review common complications associated with implantable mechanical circulatory support devices.

Identify changes in physiology that place patients with implantable mechanical circulatory support devices at a higher risk for bleeding and thrombosis complications.

Self Assessment Questions:

1. What complication represents the leading cause of death in patients with implantable mechanical circulatory support?

- A: Gastrointestinal Bleed
- B: Pump Thrombosis
- C: Stroke
- D: Infection

1. Which of the following contribute to aberrations in coagulation in patients with implantable mechanical circulatory support? I. Increased shear stress and hemolysis leading to platelet activation,

- A: I only
- B: II only
- C: I and III
- D: I, II, and III

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-674-L01-P

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ROLE OF A PHARMACIST IN A CRITICAL CARE RECOVERY CLINIC

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Improvements in the care of the critically ill patients with resultant decreased mortality have led to an increased number of intensive care unit (ICU) survivors. Despite improved mortality, complications secondary to the ICU stay have increased. Complications include post-traumatic stress disorder, depression, neuromyopathy, and cognitive impairment – all characteristics encompassed by post-intensive care syndrome, an adverse consequence associated with decreased quality of life. To improve the care of this population following an ICU stay, the Pulmonary/Critical Care and Geriatrics division at the Indiana University School of Medicine introduced the Critical Care Recovery Center (CCRC), which is a collaborative, interdisciplinary outpatient clinic at Eskenazi Health (EH) focused on post-ICU complications of ICU survivors. The interdisciplinary team consists of a nurse, critical care physician, critical care pharmacist, social worker, medical assistant, and psychometrician, with additional support service provided by physical therapy, neuropsychology, and psychiatry. The role of the pharmacist in the CCRC is to conduct patient interviews at each visit to review the patient's medication list and perform medication reconciliation. During this interview, the pharmacist evaluates the medication list for therapeutic duplications, agents without indication, ensures dose optimization, addresses any noncompliance issues, screens for adverse effects, and provides medication education. The objective of this study is to describe the role of the critical care clinical pharmacist in the EH CCRC. This retrospective chart review includes all patients seen at the CCRC between 2/1/17 through 1/31/18. The primary outcome was to quantify the number of pharmacist interventions per visit. Secondary outcomes included identifying patients who required the largest number of pharmacy interventions, determining common barriers to medication adherence, and classifying common drug-related problems. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define post-intensive care syndrome
Identify risk factors for post-intensive care syndrome

Self Assessment Questions:

Which of the following definitions for post-intensive care syndrome is correct?

- A: Acute and chronic psychological effects of critical illness on the patient
- B: New or worsening impairment in physical, cognitive, or mental health
- C: Disorder that develops in some people who have experienced a stressful event
- D: Feeling of worry, nervousness, or unease typically about an imminent event

Which of the following place ICU patients at an increased risk for the development of post-intensive care syndrome?

- A: Early mobility
- B: Light levels of sedation
- C: Delirium
- D: Early weaning of mechanical ventilation

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-18-675-L01-P

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

THE CLINICAL IMPACT OF A PHARMACIST DRIVEN MEDICATION INITIATION PROTOCOL FOR BOARDED PSYCHIATRIC PATIENTS IN THE EMERGENCY DEPARTMENT

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Purpose: Upon presenting to the emergency department, many psychiatric patients awaiting medical clearance to an inpatient psychiatric institution remain in the emergency department for an extended period of time. These patients may not be started on scheduled antipsychotic medication regimens and as a result, may exhibit aggressive, psychotic, or violent behavior. It is unclear whether initiating a scheduled medication regimen will reduce the number of escalations of aggressive or violent behavior or decrease the need for physical or chemical restraints. The primary objective of this study is to determine if a pharmacist driven intervention of restarting or initiating appropriate antipsychotic medications in boarded emergency department patients will have an impact on the number of rescue antipsychotic, benzodiazepine, or ketamine doses required for aggressive, psychotic, or violent behavior. The results of this study could potentially give providers a clearer understanding of the importance of scheduling antipsychotic medications in psychiatric patients as well as demonstrate the benefits of pharmacists in the emergency department.

Methods: This study is a before-and-after study to measure the effectiveness of a pharmacist-driven intervention in the Sparrow Hospital and Sparrow St. Lawrence Hospital emergency departments. Data will be retrospectively collected for patients boarded in the emergency department for greater than twenty-four hours requiring rescue doses of antipsychotics, benzodiazepines, or ketamine for episodes of aggressive, psychotic, or violent behavior. In addition, emergency department pharmacists will attempt to initiate scheduled psychiatric medication in these patients. Data will then be collected to determine whether the initiation of a scheduled antipsychotic regimen can reduce the number of aggressive, psychotic, or violent episodes. The primary measure of this study is the average hourly number of rescue doses given to patients awaiting inpatient psychiatric placement for the duration of their emergency department stay. Results and conclusions: Data collection and analysis is ongoing.

Learning Objectives:

Describe the patient population for whom initiating a scheduled antipsychotic medication regimen in the emergency department may be beneficial.

Discuss the risks of using rescue medications only as needed for aggressive, psychotic, or violent behavior boarded emergency department patients awaiting inpatient psychiatric placement.

Self Assessment Questions:

Which of the following statements is true?

- A: Home antipsychotic medication regimens should be held for the duration of the patient's stay
- B: Home antipsychotic medication regimens should be restarted as soon as the patient is able to take oral medications
- C: The use of antipsychotics, benzodiazepines, and ketamine should be avoided in boarded patients
- D: Physical restraints should be used in calm patients who have a history of aggression

What is the primary goal of initiating scheduled antipsychotics in emergency department patients awaiting involuntary psychiatric placement?

- A: To reduce the amount of psychiatric medications and therefore reduce costs
- B: To exempt the patient from requiring one-to-one supervision, allow them to be in a group setting
- C: To fulfill requirements mandated by the psychiatric facility before placement
- D: To reduce the number of aggressive, psychotic, or violent episodes

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-676-L01-P

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

IMPLEMENTATION OF A KETAMINE ORDER SET FOR THE TREATMENT OF PAIN IN A COMMUNITY HOSPITAL EMERGENCY DEPARTMENT

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Purpose: Pain is a common symptom of many patients presenting to the emergency department (ED) with as many as 42% of visits being attributed to painful conditions. Prescribing of sub-dissociative dosed ketamine for pain management has recently increased given its analgesic effect with minimal effects on a patient's hemodynamics, respiratory drive, and consciousness. However, with intravenous push administration unreality and sedation may be seen after administration. In a recent trial, these adverse effects were decreased using short infusions. The main purpose of this study is to determine if implementing a ketamine short infusion order set can decrease the risk of adverse effects. **Methods:** This study has been approved by the Institutional Review Board. A retrospective chart review was conducted using electronic medical records to identify patients who visited the ED and were given ketamine for the treatment of pain from January 1, 2017, to September 1, 2017. A new ketamine short infusion was developed and a post-implementation chart review will be conducted to evaluate the safety and efficacy of the orders. Patients receiving ketamine for indications other than pain and patients less than 18 years of age will be excluded. The primary outcome is the adherence to the ketamine order set for the treatment of pain. The secondary outcomes include the comparison of patients treated using short infusion to IV push administration in regards to dosing, adverse effects, improvement of pain and time to return to the ED. The following data will be collected: age, gender, dose, weight, adverse effects, and pain score. All data will be recorded without patient identifiers. The results of this review will be used to provide education to ED staff and update the order set if necessary. **Results:** Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the appropriate use of ketamine for treatment of acute pain in the emergency department

Identify patient characteristics where ketamine would not be recommended in the treatment of pain

Self Assessment Questions:

Which of the following patient characteristics allows for the safe use of ketamine for the treatment of pain in the ED?

- A: Blood pressure of 200/110 mmHg
- B: Pregnancy
- C: Pain Score of 10
- D: Schizophrenia

MS (weight 100 kg) presents to the emergency department for acute lower back pain. Which of the following ketamine orders would be best for the safe and effective treatment of pain?

- A: Ketamine 20 mg IVP over 3 minutes
- B: Ketamine 50 mg IVPB in 100 mL 0.9% sodium chloride over 20 m
- C: Ketamine 30 mg IVP over 5 minutes
- D: Ketamine 30 mg IVPB in 100 mL 0.9% sodium chloride over 15 m

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-18-849-L01-P

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