Purpose: Sepsis incidence is on the rise, responsible for approximately one million hospitalizations in the United States each year and was the eleventh leading cause of death in 2011. The Surviving Sepsis Campaign (SSC) was published in 2004 with the aim of decreasing mortality associated with sepsis by 25% in 5 years. Their efforts have included publishing updated guidelines and “bundles” of care to help guide healthcare providers in the treatment of a sepsis patient. The SSC bundles have been described as central in their sepsis improvement efforts. Early bundle recommendations by the SSC have been surrounded by criticism regarding their ethics, bundle adherence, and outcome data. However, the recently published 2012 bundles are free from ethical controversy and provide a more defined set of recommendations compared to previous publications. The purpose of this study is to evaluate outcomes associated with the 2012 bundle adherence in emergency department patients.

Methods: This is a single-center, investigator-initiated, retrospective chart review. Adult patients admitted to the University of Cincinnati Medical Center Emergency Department from February 2013-October 2013 who meet the Society of Critical Care Medicine and American College of Chest Physicians definition of sepsis, severe sepsis, or septic shock will be included. The first aim will be to evaluate the rate of adherence to the SSC 2012 bundle updates. Patients will then be separated into tertiles based on percent adherent to the SSC 2012 bundle items and incidence of in-hospital mortality between groups will be evaluated. Other aims include publishing updated guidelines and “bundles” of care to help guide healthcare providers in the treatment of a sepsis patient. The SSC bundles have been described as central in their sepsis improvement efforts. Early bundle recommendations by the SSC have been surrounded by criticism regarding their ethics, bundle adherence, and outcome data. However, the recently published 2012 bundles are free from ethical controversy and provide a more defined set of recommendations compared to previous publications. The purpose of this study is to evaluate outcomes associated with the 2012 bundle adherence in emergency department patients.

Results: Data collection and analysis are on-going.

Learning Objectives:
Discuss the controversy surrounding previous publications of the Surviving Sepsis Campaign guidelines and bundles.
Identify key differences between the 2010 and 2012 Surviving Sepsis Campaign bundles.

Self Assessment Questions:
1. Which Surviving Sepsis Campaign Guideline component has been shown to improve mortality outcomes in patients with severe sepsis?
   A. Fluid boluses of 30ml/kg for hypotension
   B. Timing of antibiotics
   C. Use of norepinephrine as a first line vasopressor
   D. The use of activated protein C

2. Which adverse event was significantly different between dopamine and norepinephrine when used as a first-line vasopressor in shock patients?
   A. Skin ischemia
   B. Myocardial infarction
   C. Arterial occlusion
   D. Arrhythmias

Q1 Answer: B  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-484-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
A MULTI-CENTER EVALUATION OF INPATIENT CARBIDOPA/LEVODOPA THERAPY IN PATIENTS WITH PARKINSONS DISEASE (PD)

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Purpose: Best practice recommendations advise that anti-Parkinson medications be administered according to the patients home schedule when patients are admitted to the hospital. The National Parkinson Foundation estimates that up to 75% of PD patients do not receive appropriate drug therapy during inpatient stays. This study seeks to assess the contribution of medication reconciliation to therapy and patient outcomes in hospitalized patients with PD who received oral carbidopa-levodopa. Methods: Six months of oral carbidopa-levodopa administration charges from five community hospitals in central Ohio were captured. Retrospective chart review of identified patients were conducted. Demographic and clinical data extracted from patient charts include gender, age, co-morbid conditions, neurology/gerontology consult, length of stay, and primary admitting diagnosis. A panel of pharmacists will independently assess accuracy of appropriate medication use, deviation from home medication schedule, and any possible complications that arose from the medication reconciliation process. Data will then be used to determine whether these patients received carbidopa-levodopa according to their home schedules. Those that did will be compared to those who did not. Additionally, data regarding contraindicated medication use (i.e. haloperidol) will also be recorded. Data regarding PD sequelae will be recorded and compared between the two groups. Data: Pending Conclusion: Pending

Learning Objectives:
Recall co-morbid conditions that place PD patients at risk
State sequelae associated with inappropriate PD therapy

Self Assessment Questions:
What is a co-morbidity that place PD patients at increase risk of adverse events?
A: Sleep deficiency
B: Hypertension
C: Hypercholesterolemia
D: Diabetes

Which of the following is a sequelae directly related to inappropriate PD therapy?
A: Sleepiness
B: Drowsiness
C: Rigidity
D: Pulmonary Embolism

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-931-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5

INVESTIGATING HEART FAILURE READMISSIONS AFTER IMPLEMENTATION OF A PHARMACIST DRIVEN MEDICATION MANAGEMENT PROGRAM IN A HEART FAILURE CLINIC

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Purpose: Heart Failure is a leading cause of hospital readmissions throughout the United States. At SWG, the current all cause readmission rate goal of 17.5% has not yet been achieved. Noncompliance with medication regimen, sodium and/or fluid restriction, account for approximately 48% of readmissions of HF patients at SWG. This study will assess whether a pharmacist presence in the HF clinic will impact HF all cause readmission rates and patient satisfaction with medication education and treatment. Objectives: (1) Assess the HF all cause 30 day readmission rates at SWG after implementation of a pharmacist driven medication management program in a HF clinic. (2) Investigate patient satisfaction of medication regimen and treatment plan.

Methods: A prospective, single-blinded, randomized, placebo controlled trial will assess patients in the HF Clinic at SWG. Institutional Review Board approval has been achieved by Case Western Reserve University Hospital. Patients will be randomized to the standard of care group or pharmacist intervention group. Both groups will be given an 8 question baseline survey after informed consent is granted. The pharmacist intervention group will receive a customized, monthly, laminated medication compliance calendar with education materials provided by the pharmacist upon the first meeting. This group will also receive counseling on HF medications. The standard of care group will not have interaction with the pharmacist, with the exception of survey administration. The 8 question survey will be repeated upon study cessation to both groups. Chi-squared test will be used to assess readmission rates. Mann-Whitney U, Student t-test(s), and Chi-squared test will be used respectively to assess differences in patient satisfaction surveys from baseline to study cessation in study arms. Results: Benefits of a pharmacist presents in a HF clinic on all cause readmission rates and patient satisfaction to be concluded at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Discuss patient risk factors that lead to heart failure exacerbations and readmissions
Identify which medications can reduce morbidity versus mortality in heart failure patient populations

Self Assessment Questions:
Which of the following patient risk factors may lead to potential heart failure exacerbations?
A: Use of NSAIDs
B: Medication noncompliance
C: Diet noncompliance
D: All of the above

What medication is proven to reduce mortality in Heart Failure patients?
A: Metoprolol Succinate
B: Digoxin
C: Metoprolol Tartrate
D: Amlodipine

Q1 Answer: D Q2 Answer: A
ACPE Universal Activity Number 0121-9999-14-634-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
EVALUATION OF A LOWER THERAPEUTIC GOAL HEPARIN NOMOGRAM

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Background: Heparins use as an anticoagulant has been successfully studied in various patient populations, including venous thromboembolism and acute coronary syndrome. Patients with recent stroke, surgery, have a left ventricular assist device (LVAD) or on extracorporeal membrane oxygenation (ECMO) are at increased risk of bleeding and thus utilizing a lower heparin dose with a lower activated partial thromboplastin time (aPTT) goal may be advantageous for these patients. However, traditional heparin dosing regimens, including weight based nomograms have not been well studied in these populations.

Cleveland Clinics Heparin Stroke Nomogram (CCHSN) was developed to target a lower aPTT goal (0.2-0.5 IU/mL anti-Xa) utilizing an initial heparin infusion of 12 units/kg/hour without an initial bolus or intra-therapy boluses for subtherapeutic aPTT values.

Objective: Evaluate the percentage of patients who achieve therapeutic aPTT within 24 hour of initiation of the CCHSN, determine adherence to the protocol, amount of time patients are subtherapeutic, supratherapeutic, and therapeutic during heparin administration, and incidence of bleeding.

Methodology: A non-interventional, retrospective chart review will be conducted to evaluate the safety and efficacy of the CCHSN. Patients will be identified by an EPIC query of patients initiated on the CCHSN and received at least 24 hours of heparin between June 2011 and July 2013. Patients will be excluded if they have a prolonged aPTT at baseline, if heparin is monitored using anti-Xa or activated clotting time levels, or were on a different heparin nomogram in the previous 24 hours. Patients will be divided into two groups of 50 patient each: patients with an intracranial process (ischemic stroke, hemorrhagic stroke, or intracranial tumor), or patients without an intracranial process (surgical patients, ECMO, or patients requiring a lower anticoagulation goal). Each group will be analyzed separately using descriptive statistics.

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

Learning Objectives:
- Review the pharmacodynamic and pharmacokinetic properties of heparin
- Discuss appropriate monitoring parameters of heparin

Self Assessment Questions:

Q1: When should an aPTT be checked after a heparin dose adjustment?
A: 2 hours
B: 3 hours
C: 6 hours
D: 12 hours

Q1 Answer: C

Q2: Reaching a therapeutic aPTT within what time frame has been associated with decreased thromboembolic events?
A: 24 hours
B: 48 hours
C: 72 hours
D: 96 hours

Q2 Answer: A

EVALUATION OF A THERAPEUTIC SUBSTITUTION OF ALBUTEROL/IPRATROPIUM COMBINATION INHALERS TO NEBULIZERS AT AN ACADEMIC MEDICAL CENTER

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Purpose: During the fiscal year of 2012, albuterol/ipratropium inhalers were the fifteenth most expensive medication at The Ohio State University Wexner Medical Center (OSUWMC), accounting for expenditures over $450,000. Our department sought ways to decrease this expenditure without compromising patient care. The purpose of this study was to assess the financial impact to our department and analyze the effect on respiratory therapists (RT) workload after a therapeutic substitution from the inhaler to the nebulized formulations was instituted.

Methods: Data were collected from October to December of 2012 and 2013 to compare similar timeframes before and after the formulary substitution. Data collected to evaluate the impact of the substitution included medication administration, cost, and prescribing patterns. Medications evaluated include albuterol inhalers and nebulizers, ipratropium inhalers and nebulizers, budesonide/formoterol inhalers, fluticasone inhalers, budenoside nebulizers, formoterol inhalers and nebulizers, racemic epinephrine and albuterol/ipratropium combination inhalers and nebulizers. Purchasing data were compared to measure the cost impact of therapeutic substitution to the department. Pharmacy verification data were evaluated to determine the impact on order volume. Additionally, documented administrations were assessed to evaluate the change in RT workload.

Results: Final analysis is ongoing and the results will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
- Recognize the potential cost savings associated with substituting albuterol/ipratropium combination nebulizers for albuterol/ipratropium combination inhalers
- Explain the impact of this change on the respiratory therapy department

Self Assessment Questions:

Q1: How much money was spent annually on albuterol/ipratropium inhalers? (in 000’s)
A: $100,000
B: $200,000
C: $300,000
D: Over $450,000

Q1 Answer: D

Q2: How did this formulary change impact respiratory therapist workload?
A: Increased
B: Decreased
C: Stayed the same
D: Not enough Information

Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-786-L04-P
Activity Type: Knowledge-based Contact Hours: 0.5
ANTI-XA MONITORING OF ENOXAPARIN FOR VENOUS THROMBOEMBOLISM PREVENTION IN HIGH-RISK TRAUMA PATIENTS

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Purpose: Emerging data for venous thromboembolism (VTE) prophylaxis in trauma patients suggests standard enoxaparin 30 mg subcutaneously (SQ) every 12 hours may be suboptimal. Increased metabolism and higher volumes of distribution following resuscitation are postulated to contribute to low serum drug concentrations. Trough serum anti-factor Xa (anti-Xa) concentrations are undetectable (e.g., < 0.1 IU/mL) in 50% with a subsequent increased risk for VTE. At the University of Cincinnati Medical Center, a level 1-trauma center, high-risk patients are initiated on enoxaparin 30 mg every 12 hours. Recently, the protocol was changed to assess serum anti-Xa 30 minutes prior to the 4th dose with dose titration if serum level is undetectable. The purpose of our study is to describe the characteristics of patients with low anti-Xa requiring dose titration.

Methods: This retrospective, single center, cohort study will include high-risk patients admitted to the trauma service between March 1, 2013 and April 1, 2013. Demographic data will be collected including incidence of low serum anti-Xa. The data collected will be analyzed for patient specific associations with safety or efficacy to allow for better patient-specific associations with safety or efficacy to allow for better patient titration. This retrospective observation will serve as a pilot study prior to a future prospective evaluation of other regimens in this patient population. It will aid in our ability to attain the best efficacy and safety profile in trauma patients. Results: Data collection and analysis are on-going.

Learning Objectives:
Explain the risk factors that place trauma patients at increased risk for venous thromboembolism (VTE) compared to other patient populations. Discuss the evolution of data and guidance for monitoring anti-Xa concentrations of enoxaparin for VTE prophylaxis in trauma patients.

Self Assessment Questions:
What is the anti Xa: anti IIa ratio for low-molecular weight heparin (LMWH) agents?
A 1:1
B 2-4:1
C 6-8:1
D 10:1

What are some of the potential contributors to subtherapeutic concentrations of LMWH in trauma patients?
A Edema
B High body weight
C Critical illness
D All of the above

Q1 Answer: B Q2 Answer: D

EVALUATING CHANGES IN EFFICACY, SAFETY, AND COST WHEN SWITCHING FROM REGULAR INSULIN TO INSULIN ASPART IN A PHARMACIST-MANAGED TYPE 2 DIABETES CLINIC

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Purpose: Approximately 20% of veterans have type 2 diabetes and many require the use of prandial insulin therapy to reach their treatment goals. Studies have shown that fast-acting insulin analogues like insulin aspart improve treatment satisfaction and flexibility when compared to regular insulin. These newer agents are more costly, however, and evidence showing therapeutic benefits over regular insulin have been inconsistent in the literature. The purpose of this study is to investigate if switching from regular insulin to insulin aspart improves diabetes control and hypoglycemia risk for veterans in a pharmacist-managed diabetes clinic. Evaluating these differences will help determine if restricting aspart use at the VA is beneficial to patients and the facility.

Methods: This study is a retrospective analysis of type 2 diabetics who have switched from regular insulin to insulin aspart at the Chalmers P. Wylie VA Ambulatory Care Center in Columbus, Ohio. Data will be collected for patients seen in the Diabetes Control Clinic from August 1st, 2010 to July 31st, 2013. Patients enrolled must be on basal insulin therapy with insulin glargine, and have previously used regular insulin for at least three months. The primary objective is change in hemoglobin A1c from the time of the therapy change (baseline) to three months after aspart initiation. Hemoglobin A1c six months after the therapy change will also be recorded, if available. Secondary objectives such as incidence of hypoglycemia, changes in weight, and cost of therapy will be reviewed.

Preliminary Results: Ten patients were deemed eligible for study enrollment. Preliminary results reveal hemoglobin A1c decreased an average of 0.35% approximately three months after aspart initiation. Hemoglobin A1c six months after the therapy change will also be recorded, if available. Secondary objectives such as incidence of hypoglycemia, changes in weight, and cost of therapy will be reviewed.

Conclusion: Final conclusions pending further statistical analysis.

Learning Objectives:
Identify the main pharmacologic differences between insulin aspart and regular insulin. Describe the risks and benefits of various insulin regimens used to treat type 2 diabetes.

Self Assessment Questions:
What is the estimated duration of action of regular insulin?
A 30 to 90 minutes
B 2 to 4 hours
C 3 to 5 hours
D 5 to 8 hours

Which medication class is most commonly associated with masking the symptoms of hypoglycemia?
A ACE Inhibitors
B Beta-Blockers
C NSAIDs
D Statins

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-633-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
AN EVALUATION OF ANTIBIOTIC SELECTION OF DAPTOMYCIN, LINEZOLID, OR VANCOMYCIN FOR THE TREATMENT OF METHICILLIN-RESISTANT STAPHYLOCCUS AUREUS (MRSA)

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Purpose: Methicillin-resistant Staphylococcus aureus (MRSA) is a significant cause of community and health-care acquired infections and can be associated with considerable costs. Certain infections including bacteremia, prosthetic joint infection, osteomyelitis, and pneumonia often involve prolonged antibiotic therapy and inpatient stay. Several treatment options are available for MRSA infections but costs vary widely. The purpose of this study is to evaluate the length of stay, cost, and treatment outcomes of antibiotic selection of daptomycin, linezolid, or vancomycin for MRSA infections. Methods: The study is a retrospective analysis of adult inpatients admitted to Mount Carmel Health System between January 1, 2012 and December 31, 2012. Approval was granted by the Mount Carmel Institutional Review Board. Patients were included if they (1) had a positive culture for MRSA; (2) had an ICD-9 code for either bacteremia, prosthetic joint infection, osteomyelitis, or pneumonia; and (3) were treated with daptomycin, linezolid, or vancomycin. Patients were excluded if they received less than three days of antibiotic therapy or had a culture with vancomycin MIC of 2 or greater. The primary outcome is length of stay. Secondary outcomes include total hospital cost, 30 day re-admission, and mortality. Analysis of factors affecting these outcomes including age, gender, length of antibiotic therapy, obesity, diabetes, chronic obstructive pulmonary disease, acute kidney failure, chronic kidney disease, sepsis, severe sepsis, and septic shock will be conducted. Preliminary Results: Collection and analysis is in progress. Conclusion: Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Identify the indications for antibiotics commonly used to treat MRSA
Recognize the mechanism of action of antibiotics commonly used to treat MRSA

Self Assessment Questions:
Which of the following are antibiotic treatment options for MRSA pneumonia?
A: Daptomycin, linezolid, or vancomycin
B: Linezolid or vancomycin
C: Daptomycin or vancomycin
D: Vancomycin only

What is the mechanism of action of linezolid?
A: Inhibits protein synthesis
B: Inhibits cell wall synthesis
C: Causes depolarization of cell membrane
D: Inhibits topoisomerase II

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-413-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5

EVALUATION OF PHARMACIST INVOLVEMENT WITH THE STROKE RESPONSE TEAM
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Purpose: Delivery of thrombolytic therapy within three hours of time last known well to acute ischemic stroke patients is a core measure set by the Centers for Medicare and Medicaid Services. Administration of alteplase within this timeframe may help reduce patient morbidity and mortality. The purpose of this study is to determine if direct pharmacist involvement with the stroke response team will decrease the door to needle time for administration of alteplase for eligible ischemic stroke patients. Additionally, the study will also determine if pharmacist involvement aids in waste aversion and improves patient morbidity and mortality. Methods: Patients 18 years and older who received alteplase for an acute ischemic from January 2011 through study conclusion will be included for analysis by retrospective and prospective study design. Retrospective data will be identified via a search of quality databases and billing, pharmacy, and medical records during the specified study period. When available, competent pharmacists will respond to the initial stroke alert with the materials necessary to appropriately compound, dispense, and document administration of alteplase at the patients bedside, as opposed to the current practice of mixing the drug product in the inpatient pharmacy. Retrospective and concurrent patient data to be collected will include: gender, age, height, weight, date of admission, diagnosis, risk factors for stroke, time last known well, time of brain imaging, time alteplase ordered, time alteplase administered, NIHSS scores (initial, pre alteplase, post alteplase, on admission, 24 hours post admission, at discharge/transfer), dosing of alteplase, amount of alteplase wasted, length of stay and patient outcome. A random patient number will be assigned to the data collection forms and maintained confidentially. Results and Conclusions: Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Describe the eight stroke core measures that have been shown to improve patient outcomes
Explain how to appropriately dose and administer alteplase for acute ischemic stroke patients

Self Assessment Questions:
Which of the following statements are part of the core measures for stroke?
A: Ischemic/hemorrhagic stroke patients should not receive VTE prophylaxis
B: If indicated, intravenous alteplase should be administered within 3 hours
C: Stroke patients should be prescribed antithrombotic therapy by the end of hospital stay
D: Stroke patients should be prescribed a statin by the end of hospital stay

A 67 year old, 80 kg male is brought to the emergency room exhibiting signs of stroke. His symptoms began approximately 45 minutes prior to arrival. After review of his head CT and medical history it is determined that the patient meets the criteria for acute ischemic stroke. The patient is administered alteplase at the patients bedside, as opposed to the current practice of mixing the drug product in the inpatient pharmacy. Points of care education for the stroke response team will consist of how to appropriately compound, dispense, and document administration of alteplase at the patients bedside, as opposed to the current practice of mixing the drug product in the inpatient pharmacy. Points of care education will also include the importance of door to needle time for administration of alteplase for eligible ischemic stroke patients. Points of care education will also include the importance of door to needle time for administration of alteplase for eligible ischemic stroke patients. Points of care education will also include the importance of door to needle time for administration of alteplase for eligible ischemic stroke patients.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-819-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Purpose: Current methods utilized to initiate renally adjusted medications at our institution are based on weight and estimated creatinine clearance (CrCl) using the Cockcroft and Gault equation. Factors such as age, body composition and disease can also play a role in a patient’s ability to renally eliminate medications. Elderly patients display a combination of these factors which make dosing for this population more difficult. Currently there is a lack of literature to support measures that involve modifying values in an attempt to account for these factors, and many rely on practices that are handed down in training. One of these practices involves rounding serum creatinine (SCr) values when calculating a CrCl for a patient. The concern is by utilizing this practice this may lead to subtherapeutic serum levels of initial and maintenance therapy. In an effort to account for such changes, the purpose of this study is to determine if a standardized, age adjusted vancomycin dosing protocol for patients 75 years and older will yield consistent serum vancomycin levels of 10-20 mcg/mL. Methods: This is a prospective study that will consist of collecting vancomycin data from individuals receiving an age adjusted dosing protocol at Hillcrest Hospital from January 2014-March 2014. This data will be compared to baseline data collected October 2013-January 2014. EPIC will be utilized to identify patients 75 years and older that received vancomycin during the study time frame and information collected will include demographics, comorbidities relevant to renal function, concomitant use of nephrotoxic agents, CrCl calculation methods, vancomycin levels, and assessment of pharmacist intervention. Data will be analyzed using descriptive statistics. IRB approval was obtained. Results: In progress.

Learning Objectives:
Review creatinine clearance methods for dosing vancomycin.
Discuss therapy goals for elderly patients on vancomycin.

Self Assessment Questions:
Which equation is used as a gold standard when calculating CrCl?
A. Jellife
B. Cockcroft and Gault
C. Mdrd
D. Salazar-Corcoran

What is the target serum level for vancomycin therapy?
A. 5-10 mcg/mL
B. 20-30 mcg/mL
C. 10-20 mcg/mL
D. 30-40 mcg/mL

Q1 Answer: B Q2 Answer: C
Implementation of a Pharmacist Directed Medication Therapy Management Service for Oral Chemotherapy Patients in an Outpatient Cancer Center

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Purpose: Providing patient care services in an ambulatory care setting is an important area of growth for the profession of pharmacy. According to the American Society of Health System Pharmacists the most frequently reported practices for ambulatory care pharmacists are: tracking adverse drug reactions, providing written and oral patient education information, and conducting medication management. Pharmacy services in ambulatory care settings have been shown to increase outcomes, patient satisfaction, and cost savings. In the oncology setting, pharmacy services have the potential for significant cost savings due to the inherent cost of care and the risk of chemotherapeutic agents. The American Society of Clinical Oncology recommends that two qualified personnel independently review all prescriptions for cytotoxic therapy. This recommendation is a result of research indicating that error rates with chemotherapy and supportive medication may be as high as 10%. Literature supports the inclusion of a pharmacist within an interdisciplinary oncology program can decrease medication error rates and increase cost savings. Methods: New patients starting on oral chemotherapy will be reviewed by a pharmacist for new medication dosing, renal and hepatic function, pertinent laboratory values, and drug-drug interactions. Problems discovered will be reported to the primary physician for review, and potential changes discussed with the patient care team. One week following initiation of oral chemotherapy, the pharmacist will follow up with a phone call to the patient. During this call the pharmacist will inquire about patient understanding of their medication, patient compliance, and side effects, along with answering all patient questions. Results/Conclusions: Data collection and analysis is currently in progress, and will be reported at the Great Lakes Residency Conference.

Learning Objectives:
Describe the need for pharmacy clinical services in an outpatient cancer center at a community hospital.
Define the impact pharmacists can make in assisting physicians with monitoring oral chemotherapy doses, laboratory values, and drug interactions.

Self Assessment Questions:
The American Society of Health System Pharmacist has found that the most common practices for pharmacists in ambulatory care settings are:
A: Recommending medications and making dose adjustments for patients
B: Tracking adverse drug reactions, providing patient education, and conducting medication management for patients
C: Counseling patients on dose, administration schedule, and side effects
D: Reviewing medication profiles for drug-drug and drug-disease interactions

Why does The American Society of Clinical Oncology recommend that two qualified personnel independently review all prescriptions for cytotoxic therapy?
A: Independent review of cytotoxic medications can result in cost savings
B: Independent review has been shown to improve patient outcomes
C: Documented error rates for cytotoxic and supportive medications are lower
D: Documented error rates for cytotoxic and supportive medications are higher

Q1 Answer: B Q2 Answer: C
ACPE Universal Activity Number 0121-9999-14-713 -L04-P
Activity Type: Knowledge-based Contact Hours: 0.5

The Design, Implementation, and Evaluation of a Pharmacist-Driven Medication Reconciliation Process

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Purpose: With the emergence of pay for performance and the growing interest among government agencies, insurance providers, accrediting organizations, and patient advocacy groups; healthcare providers are continually seeking new methods to improve performance in areas assessed by these quality measures. Recently, considerable attention has been paid to the pharmacists role in improving the numerous quality measures centered on medications, specifically the medication reconciliation process. It has been shown that discrepancies in a patients medication reconciliation at admission may be associated with 50% of discrepancies at discharge. Numerous studies have shown the benefit of a clinical pharmacists intervention in reducing medication reconciliation errors (most commonly addressing discrepancies in strength, dosage form, and frequency of administration). During 2012 Akron General Medical Center (AGMC) implemented a pharmacist-based predischarge medication reconciliation program for patients with a diagnosis of heart failure. In 2013 the medication reconciliation service was expanded to include patient medication education. The objective of this project is assess the impact of the pharmacist-based discharge medication reconciliation and counseling program on 30-day readmission rate and core measure HF1d (medications instructions at discharge) compliance. Methods: This retrospective, single center, nonrandomized cohort study includes patients discharged from AGMC between January 1, 2012 and October 31, 2013. The analysis includes 1398 patients, aged 18 years and older, who were admitted with a primary diagnosis of heart failure. Using electronic medical records, a pharmacist intervention log, and CMS compliance data obtained by the AGMC Quality Department, data collection included primary diagnosis, deidentified patient account numbers, and readmission status. The intervention was pharmacist medication reconciliation or medication reconciliation with discharge counseling. 30-day readmission rates and core measure HF1d (medications instructions at discharge) compliance will be compared between the medication reconciliation, the medication reconciliation plus patient medication education, and standard discharge process groups. Results and Conclusions: To be presented at GLPRC.

Learning Objectives:
Explain the role of the pharmacist in providing medication reconciliation and patient education services at hospital discharge
Discuss the impact of the Akron General Medical Center (AGMC) pharmacist-driven medication reconciliation program on core measure scores and readmissions at AGMC

Self Assessment Questions:
Congestive heart failure is a diagnosis which is associated with a(n)
A: Decreased risk of 30 day readmission compared to other diagnoses
B: Increased risk of 30 day readmission compared to other diagnoses
C: Similar risk of 30 day readmission compared to other diagnoses
D: None of the above. Specific diagnoses are not associated with an

As discussed, which of the following is not one of the most common discrepancies addressed during the medication reconciliation process
A: Strength
B: Dosage form
C: Frequency of administration
D: Reason for use

Q1 Answer: B Q2 Answer: D
ACPE Universal Activity Number 0121-9999-14-331 -L04-P
Activity Type: Knowledge-based Contact Hours: 0.5
EVALUATION OF HEMODYNAMIC AND ADVERSE EFFECTS OF KETAMINE VERSUS ETOMIDATE FOR RAPID SEQUENCE INTUBATION

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Purpose  Etomidate, the current gold standard induction agent for rapid sequence intubation (RSI), is known to cause temporary suppression through inhibition of 11-beta-hydroxylase. This effect may be deleterious in critically ill patients, such as septic or hypotensive patients. Ketamine is a dissociative sedative agent utilized for RSI and is considered to be an alternative to etomidate in appropriate patients for induction, particularly in hypotensive patients. Recent studies have demonstrated no difference in maximum sequential organ failure assessment scores between critically ill patients receiving etomidate versus ketamine for RSI. The purpose of this study is to compare morbidity and all-cause mortality between trauma patients receiving either etomidate or ketamine for RSI.

Methods  This study is a single center, investigator-initiated, retrospective chart review. Adult patients admitted to the University of Cincinnati Medical Center Emergency Department from June 1, 2008 to June 30, 2013 with a primary diagnosis of trauma who were intubated utilizing rapid sequence intubation facilitated by the use of either ketamine or etomidate will be screened for inclusion. The primary outcome will compare seventy-two hour fluid resuscitation and blood product requirements between groups. Secondary endpoints include all-cause mortality, drug-related adverse effects and a pre-defined subgroup analysis of traumatic brain injury patients. Continuous variables will be analyzed using the Student t-test or Wilcoxon Rank-Sum test as appropriate for parametric and non-parametric data. Categorical data will be analyzed using a Chi-squared or Fisher’s exact test as appropriate. Results  Data is currently being reviewed and analyzed. Conclusions  Conclusions will be made at the end of data analysis and will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Describe hemodynamic impact of both ketamine and etomidate when used for rapid sequence intubation
Identify potential benefits of ketamine over etomidate for rapid sequence intubation in trauma patients

Self Assessment Questions:
What is the mechanism by which ketamine acts as a dissociative sedative agent?
  A  What is the mechanism by which ketamine acts as a dissociative sedative agent?
  B  Competitive inhibition of the N-methyl-D-aspartate receptor
  C  Potent central alpha-2 receptor agonism
  D  Non-competitive inhibition of the N-methyl-D-aspartate receptor

Through what mechanism does etomidate inhibit cortisol?
  A  Direct inhibition of the peripheral cortisol tissue receptor
  B  Inhibition of cortisol synthesis through 11-beta-hydroxylase
  C  Direct inhibition of adrenocorticotrophic hormone
  D  Inhibition of corticotrophic releasing hormone release

Q1 Answer:  D  Q2 Answer:  B

ACPE Universal Activity Number  0121-9999-14-575-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5

THERAPEUTIC DRUG MONITORING OF AZOLE ANTIFUNGALS IN PATIENTS WITH ACUTE LEUKEMIA OR MYELODYSPLASTIC SYNDROMES

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Background: Nearly all patients diagnosed with a hematologic malignancy will develop significant neutropenia. Prolonged neutropenia could occur because of the disease itself or secondary to chemotherapy and may last a few days to weeks, even indefinitely, depending on the patient and disease. This state of prolonged and profound neutropenia places patients at high risk for the development of invasive fungal infections (IFI). The Infectious Diseases Society of America (IDSA) currently recommends therapeutic drug monitoring (TDM) for patients receiving voriconazole and posaconazole that meet certain disease state criteria; however, these are not specific and include most patients that would be found to have an invasive fungal infection. Objectives: The primary objective is to determine the percentage of time TDM led to a change in therapy. Secondary objectives are to determine the percentage of patients who underwent TDM, to evaluate TDM procedures for accuracy, to identify predictive factors of performing TDM and to assess incidence of toxicity in patients that underwent TDM.

Methods: A retrospective chart review of adult acute leukemia and myelodysplastic syndrome patients will be conducted to characterize the use of TDM of voriconazole and posaconazole. Patients must be treated by the leukemia service and be receiving voriconazole or posaconazole for the treatment of or prophylaxis against an IFI to be included. Patients will be excluded if they are undergoing hematopoietic stem cell transplantation at the time of TDM. Data to be collected includes: demographics (gender, height, weight, smoking history), underlying malignancy, chemotherapy regimen, suspected site of infection, determination of fungal infection, azole drug, azole dose, interacting medications, and adverse events (if patient underwent TDM). Results

Learning Objectives:
Describe patient populations IDSA recommends for therapeutic drug monitoring of voriconazole and posaconazole
Identify drug interactions that make therapeutic drug monitoring of azole antifungals challenging

Self Assessment Questions:
Which of the following medications can cause ELEVATED serum drug levels of voriconazole?
  A  Calcium carbonate/Vitamin D
  B  Ceftriaxone
  C  Clarithromycin
  D  Carbamazepine

Which of the following medications can cause ELEVATED serum drug levels of voriconazole?
  A  Patients receiving azole antifungals and antibiotics
  B  Patients with hepatic dysfunction
  C  Patients receiving dual antifungal therapy
  D  Patients receiving continuous infusion of D5-0.2% NS maintenance

Which of the following medications can cause ELEVATED serum drug levels of voriconazole?
  A  Calcium carbonate/Vitamin D
  B  Ceftriaxone
  C  Clarithromycin
  D  Carbamazepine

Q1 Answer:  B  Q2 Answer:  C

ACPE Universal Activity Number  0121-9999-14-622 -L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
Objectives: Atrial fibrillation (AF) with rapid ventricular response is one of the most common cardiac arrhythmias treated in the emergency department (ED). Intravenous (IV) diltiazem is often utilized as first-line pharmacologic therapy due to its titratability, provider familiarity, and current AF treatment guideline recommendations. Regardless of medication selection, emergency practitioners aim to provide timely and sustained ventricular rate control to reduce the risk of negative AF sequelae. Though diltiazem is used widely, it is unknown if an efficacious difference exists when treating first-onset AF versus recurrent or permanent AF. The purpose of this study was to determine if IV diltiazem achieves ventricular rate control sooner in patients presenting to the ED with first-episode AF compared to other types of AF and to evaluate clinically significant consequences if such differences do exist. Methods: A retrospective cohort study was conducted in a 70-bed ED at an academic medical center. Patients with first-episode, recurrent, and permanent AF treated initially with IV diltiazem in the ED were included and those with systolic blood pressure <90 mmHg, known history of sick sinus syndrome, presence of third-degree atrioventricular block, history of Wolff-Parkinson-White syndrome, allergy to diltiazem, diltiazem listed as a home medication, or treated with direct current cardioversion were excluded. The primary outcome was time (minutes) required to achieve sustained rate control (heart rate less than 110 beats per minute or conversion to normal sinus rhythm) after the first dose of IV diltiazem in those with first-episode versus recurrent or permanent AF. Secondary endpoints were use of additional antiarrhythmics, rate of treatment failure, time to hospital discharge, and total costs of stay. Statistical analysis for the primary outcome will be performed by the log-rank test. Results: Data collection is ongoing. Conclusions: Pending investigation.

Learning Objectives:
Recall current rate control strategies for the management of acute atrial fibrillation in the emergency department.
Discuss clinical and financial impact of atrial fibrillation.

Self Assessment Questions:
What is the most common arrhythmia treated in the ED?
A Ventricular tachycardia
B Atrial fibrillation
C Second degree heart block, Type 2
D Premature atrial contractions

Which of the following statements is correct:
A Optimal management choice for first-episode AF in the ED is well-timed IV diltiazem in those with first-episode versus recurrent or permanent AF.
B Current AF treatment guidelines recommend rate control over rhythm control.
C Direct current cardioversion is usually the preferred means of management.
D Both beta blockers and non-dihydropyridine calcium channel blockers are commonly used.

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-678-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Purpose: Venous thromboembolism (VTE) is a common and potentially life-threatening complication in hospitalized patients. The risk of VTE is highest in the subset of critically injured patients, with estimated incidence of deep vein thrombosis (DVT) and pulmonary embolism (PE) without prophylaxis ranging from 40-80% and 4-10%, respectively. Studies evaluating the use of unfractionated heparin and low-molecular weight heparins (LMWH) have concluded that LMWH is more efficacious for VTE prophylaxis in high-risk trauma patients (multiple orthopedic injury; injury severity score >9). However, conflicting evidence exists regarding the efficacy of once-daily dalteparin for VTE prophylaxis in high-risk trauma patients. In September 2012, the University of Cincinnati Medical Center (UCMC) changed the formulary to enoxaparin. Prior to this change, the trauma service was dose-adjusting dalteparin based on anti-Xa levels. Following the formulary change, high-risk trauma patients receive enoxaparin 30mg SQ Q12h dosing without routine anti-Xa monitoring. This change provides UCMC with the unique opportunity to compare outcomes of anti-Xa adjusted dalteparin with non-adjusted enoxaparin prophylaxis in high-risk trauma patients.

Methods: This retrospective, single center, cohort study will include patients admitted to the trauma service for at least 72 hours at University of Cincinnati Medical Center and receiving anti-Xa adjusted dalteparin, or non-adjusted enoxaparin for VTE prophylaxis. The primary outcome is to determine the incidence of VTE in trauma patients receiving anti-Xa adjusted dalteparin (October 2011 - September 2012) versus non-adjusted enoxaparin (October 2012 - September 2013). Secondary outcomes are to determine the incidence of death and bleeding events between the two groups, as well as to determine patient-specific factors associated with VTE or bleeding events.

Results: Data collection and analysis are on-going.

Learning Objectives:
Describe venous thromboembolism risk factors
Discuss venous thromboembolism prophylaxis strategies in trauma patients

Self Assessment Questions:
Which of the following represents the venous thromboembolism risk factors of Virchow's triad?
A: Venous stasis, physical activity, coagulopathy
B: Venous stasis, endothelial damage, hypercoagulability
C: Endothelial damage, adequate blood flow, low injury severity score
D: Younger age, physical activity, glasgow coma scale > 8

Which of the following is the most appropriate choice for venous thromboembolism prophylaxis in high-risk trauma patients?
A: Unfractionated heparin
B: Argatroban
C: Low molecular weight heparin
D: Warfarin

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-664-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
LIPOSOMAL BUPIVACAINE VERSUS ELASTOMERIC CONTINUOUS INFUSION BUPIVACAINE PUMP

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Background: Multimodal analgesia, the utilization of two or more medications acting through different mechanisms, is the preferred pain management strategy for surgical patients. A multimodal approach can help reduce opioid utilization and therefore limit opioid-related adverse events that may occur in post-operative patients. Bupivacaine is a local anesthetic that is used as part of a multimodal regimen, but is limited by its duration of action. Two delivery forms have been developed to extend bupivacaine pharmacologic effect. An elastomeric continuous infusion bupivacaine pump has been used to infuse the medication via a catheter and a liposomal bupivacaine formulation has been recently approved by the Food and Drug Administration (FDA) for single intra-operative infiltration. This study will assess the utilization and efficacy of liposomal bupivacaine in comparison to elastomeric continuous infusion bupivacaine pump. Objectives: The primary study objective is to compare the total opioid use in the first 24 hours after surgery between patients receiving liposomal bupivacaine and patients receiving an elastomeric continuous infusion bupivacaine pump. Secondary outcomes include total opioid use 72 hours after surgery, time to first rescue opioid use, hospital length of stay (LOS), and identifying current methods to reduce opioid use. Methodology: A retrospective chart review will be conducted to evaluate patient outcomes following medication administration. The study population will be identified from medication orders for adults from January through June 2013. Data will be collected regarding demographics, surgical procedure, study medication, opioid and non-opioid analgesic use, hospital LOS, and medication-related adverse effects. Opioid medication use (converted to morphine equivalents) and hospital LOS will be analyzed using medians and the Mann-Whitney U test. The log-rank test will be used for time to first rescue opioid use and descriptive statistics will be used for medication utilization and adverse events. Results and Conclusions: To be presented at the Great Lakes Residency Conference.

Learning Objectives:
Explain the benefits of using a multimodal approach in treating pain in post-operative patients.
Describe the advantages of using alternative bupivacaine dosage forms.

Self Assessment Questions:
What are the main opioid-related side effect(s) that can potentially be reduced with multimodal analgesia?
A: Constipation and sedation
B: Insomnia
C: Nephrotoxicity
D: Infection

What is the main justification for using alternative dosage forms of bupivacaine in a multimodal treatment approach?
A: Reduced medication cost
B: Extend duration of action
C: Reduce bupivacaine-related side effects
D: Allow for higher doses to be administered

Q1 Answer: A  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-470-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5

NATIONAL SURVEY OF CLINICAL PHARMACY SERVICES PROVIDED FOR CANCER CLINICAL TRIALS

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Purpose: Oncology clinical pharmacists play a significant role in patient care by actively managing complex chemotherapy regimens and educating patients and staff to ensure the safe and effective utilization of medications. An increasing number of cancer patients are enrolled in complex investigational trials that require close monitoring and frequent dosage adjustments. With the increase in oral investigational chemotherapy trials, patient education, monitoring, and routine follow-up are critical elements to ensure patient adherence to complicated medication regimens. Although oncology clinical pharmacists are well positioned to provide the same level of service to patients enrolled in clinical trials, their role has not been well described in the literature. This study will assess clinical pharmacy services provided for cancer patients enrolled in clinical trials at NCI-designated cancer centers. Specifically, the survey will focus on three aims: 1) determining clinical pharmacy services currently provided to cancer clinical trial patients, 2) respondent perception of the necessity of these services, and 3) identifying barriers to implementing these services. Findings from this survey will assist with the development of best practice recommendations for clinical pharmacists involved in the care of cancer clinical trial patients.

Methods: This study was a cross-sectional survey of the 68 NCI-designated cancer centers. Directors of Pharmacy were contacted and study data was collected electronically via Qualtrics survey over the course of 30 days. Respondents were sent a recruitment email, with reminder emails sent periodically prior to survey closure. Only one submission was allowed per institution. Descriptive and inferential statistics were used to evaluate the study aims.

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

Learning Objectives:
Describe trends in oncology that have led to increased complexity in cancer clinical trials.
Identify clinical services that pharmacists can provide for cancer clinical trial patients.

Self Assessment Questions:
Roughly what percentage of cancer clinical trials in development utilize oral chemotherapy agents?
A: 5%
B: 10%
C: 25%
D: 50%

Which of the following are potential clinical roles for pharmacists in the care of cancer clinical trial patients?
A: Participate in the development of cancer trial protocols for investigational agents
B: Educate research staff on investigational agents in cancer trials
C: Make recommendations for dose adjustments per protocol
D: All of the above

Q1 Answer: C  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-47 -L04-P
Activity Type: Knowledge-based  Contact Hours: 0.5
Activity Type: Knowledge-based     Contact Hours: 0.5

Q1 Answer: D  Q2 Answer: C

Purpose: Sulfamethoxazole/trimethoprim (SMX/TMP) is the current gold standard for prophylaxis of PCP in immunocompromised pediatric patients. However, not all children tolerate SMX/TMP, and many, including intravenous (IV) pentamidine, have not been proven to be as effective or as safe as SMX/TMP in the pediatric transplant population. There is increasing use of IV pentamidine in the transplant population but there is limited published data to support its efficacy and safety. This study is to determine the efficacy and safety of IV pentamidine in preventing PCP in pediatric transplant patients.

Methods: A retrospective chart review was conducted to evaluate all transplant patients less than 18 years of age that received at least one dose of IV pentamidine from January 2010 to July 2013. The primary outcome, pentamidine efficacy was evaluated by the incidence of PCP diagnosis. The secondary outcome, pentamidine safety was evaluated by adverse events leading to pentamidine discontinuation. All data was analyzed using descriptive statistics. Results: All transplant patients at Cincinnati Children Hospital Medical Center (CCHMC) who had received IV pentamidine were reviewed and 333 patients met inclusion criteria. The overall incidence of PCP was found to be 0.3% for pediatric transplant patients on pentamidine. Pentamidine was found to be safe and the incidence of adverse events leading to discontinuation was 6.3% with the most common reason being tachycardia 31.8%. Adverse event rates were approximately equal among small bowel, renal and bone marrow transplant populations. No adverse events leading to discontinuation were observed in liver or heart transplant and bone marrow transplant populations. No adverse events leading to discontinuation were observed in the pediatric bone marrow transplant population.

Conclusions: In a three year time span only 1 patient (0.3%) receiving IV pentamidine prophylaxis had a breakthrough PCP infection. Although SMX/TMP is considered first line for PCP prophylaxis, based on the results of this study, IV pentamidine should be considered a safe and effective alternative in pediatric transplant patients.

Learning Objectives:
- Describe the patient populations and risk factors for developing PCP infection and current guidelines for treating these populations
- Discuss IV pentamidines efficacy and safety as primary PCP prophylaxis in pediatric transplant population

Self Assessment Questions:

1. Patient JJ is a 18 month old female, s/p liver transplant; post-op day (POD) # 3 with normal renal function. Donor CMV + and recipient CMV -. Current medication regimen: Amlodipine, Aspirin, Fluconazole, Lansoprazole
   A: Corticosteroids
   B: Solid-organ transplant
   C: Immunosuppressants
   D: All of the above

2. Patient JJ is currently starting to increase oral intake and the team asks you what agent should be initiated for PCP prophylaxis:
   A: Inhaled pentamidine
   B: Intravenous pentamidine
   C: Sulfamethoxazole-trimethoprim
   D: Dapsone

Q1 Answer: D  Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-338 -L01-P
Activity Type: Knowledge-based     Contact Hours: 0.5

Additional content has been omitted for brevity.
DEVELOPMENT OF AN EVIDENCE BASED COMPREHENSIVE IMMUNIZATION MENU IN THE COMPUTERIZED PATIENT RECORD SYSTEM (CPRS)

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PURPOSE Vaccinations are key to the prevention of many common diseases. The current immunization ordering process at the Cincinnati Veteran Affairs Medical Center (CVAMC) lacks a uniform approach in the computerized patient record system (CPRS), creating unnecessary barriers to the delivery of care. The objective of this project is to design a user-friendly and informative immunization order set in CPRS. The implementation of such an order set stands to potentially streamline the vaccination process, improve adult vaccination rates, and enhance the delivery of care to our diverse veteran population.

METHODS AND PROCEDURES A CPRS order set shall be designed by conducting an internal review, surveying providers, and by reviewing immunization guidelines. A review of current immunization ordering practices and available vaccination rates at the VA medical center shall be collected and select healthcare professionals and services involved in ordering immunizations will be surveyed regarding current challenges in ordering vaccines through CPRS and frequently asked immunization inquiries. With assistance from informatics and pharmacy, a CPRS order set will be designed to address the needs and focuses identified from the aforementioned analyses. A drafted order set shall then be reviewed and approved by the Pharmacy and Therapeutics committee (P&T) and Clinical Executive Board (CEB). Clinical Informatics will implement the order set into CPRS following its approval.

Learning Objectives:
Discuss the importance of vaccinations and their benefits.
Identify how informatics and an order set can be utilized to address inquiries regarding immunization schedules and indications.

Self Assessment Questions:
Which of the following is true regarding vaccinations?

A Only patients with comorbidities or the elderly stand to benefit from
B: Immunizations can prevent cancer, protect against infections prev
C: More patients are receiving the herpes zoster vaccination in comp
D: Immunization guidelines are updated every two years by the Cent

According to the Institute for Safe Medication Practices, which of the following is a benefit to standard order sets?
A: Increase variation and unintentional oversight through unstandardi
B: Modify practice through evidence-based care
C: Reduce necessary calls to physicians for clarifications and questio
D: Increase the potential for medication errors through integrated saf

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-784 -L04-P
Activity Type: Knowledge-based Contact Hours: 0.5
Influence of Colistin Dose on Clinical and Microbiologic Outcomes in Patients with Gram-Negative Bacteremia

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Background: There is increasing prevalence of severe multidrug resistant (MDR) nosocomial infections, which accounts for increased morbidity and mortality. MDR Gram-negative (GN) isolates are frequently treated with colistin. Unfortunately, there are very limited pharmacokinetic (PK) and pharmacodynamic data available to guide appropriate dosage. Based on recent PK studies, current colistin dosing regimens may result in prolonged time to reaching therapeutic concentrations, leading to suboptimal and delayed effective treatment. In addition, several studies have demonstrated an association between increased colistin dose and improved outcomes. However, the specific dose at which these outcomes are observed is unknown, thus warranting further investigation.

Methods: This study is a retrospective chart review to evaluate whether high dose colistin improves clinical and microbiologic outcomes in critically-ill patients with carbapenem-resistant GN bacteremia. The primary objective is to determine if high dose colistin therapy independently predicts clinical improvement at day 7 of therapy. The secondary outcomes of this study include microbiologic outcomes, clinical cure, global cure, ICU/hospital length of stay, as well as 7- and 28-day mortality. In addition, safety outcomes will focus on incidence of nephrotoxicity associated with high dose colistin therapy. Adult patients who received intravenous colistin for at least 72 hours for treatment of a carbapenem-resistant GN bloodstream infection will be included. Patients will be excluded if they had polymicrobial bacteremia or received colistin for less than 72 hours. Classification and regression tree analysis will be used to determine the distinction between high and low dose colistin therapy. Data describing patient demographics, baseline characteristics, antibiotic regimen, mortality, clinical response, and length of stay will be collected. Nominal data will be assessed with chi-square or Fishers exact test and continuous data with Students t-test or Mann Whitney U test, as appropriate.

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

Learning Objectives:
Identify the mechanism of action and pharmacokinetics of colistin
Outline research design and methods

Self Assessment Questions:
What are the colistin Css,avg and AUC0-24h targets, respectively?
A 2.5 mg/L/60 mg*h/L
B 3.5 mg/L/65 mg*h/L
C 4.5 mg/L/70 mg*h/L
D 5.5 mg/L/80 mg*h/L

Which of the following statements is correct?
A Significant morbidity and mortality are not associated with gram-negative colistin therapy
B Current colistin dosing regimens may result in prolonged time to reach therapeutic concentrations
C Decreasing the dose of colistin independently predicts day-7 microbiologic cure
D The ideal dose of colistin has been established.

Q1 Answer: A  Q2 Answer: B

Thirty-Day Hospital Readmission for Thromboembolic Complications Meeting Criteria for Suspected Heparin-Induced Thrombocytopenia

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PURPOSE: Heparin-induced thrombocytopenia (HIT) is an immune-mediated disease resulting from heparin exposure, leading to thrombocytopenia and thrombotic complications. Without timely recognition and management, the incidence of thrombosis and mortality may be up to 50 percent. Two retrospective studies have shown an association between recent positive HIT PF4 antibody tests and subsequent thrombosis after discharge. Such HIT testing is not routinely done in patients on heparin since thrombocytopenia may have multiple causes. However, platelet monitoring should be part of standard care for these patients. The purpose of this study is to compare the rate of 30-day readmissions for thromboembolic complications (TEC) in hospitalized patients exposed to heparin products among three patient groups: (1) Those with potentially undiagnosed HIT (thrombocytopenia without HIT testing); (2) those with low suspicion for HIT (no thrombocytopenia or negative tests); and (3) those with confirmed HIT (thrombocytopenia and positive tests, or clinical diagnosis). Secondary objectives include assessing HIT rates with unfractonated heparin versus low molecular weight heparin (LMWH).

METHODS: This is a retrospective cohort study assessing patients exposed to heparin or LMWH products over an 18-month period. Adults were included if they had exposure to any heparin product using the hospitals electronic medical record and were excluded if they expired prior to discharge or were discharged on chronic anticoagulation outside of the setting of confirmed HIT. Based upon HIT testing results and HIT platelet criteria (<150,000/mm3 or a ≥ 50% decrease from baseline without expected timeframes of presentation), patients were grouped into the three aforementioned cohorts. The rate of readmissions due to TEC will be compared among these cohorts using ICD-9 codes for the readmission.

RESULTS & CONCLUSIONS: To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Describe the utility of predictive clinical scoring tools in the identification of heparin-induced thrombocytopenia.
Identify patient populations who have a high risk of developing heparin-induced thrombocytopenia.

Self Assessment Questions:
Which of the following clinical scoring tools are highly specific for heparin-induced thrombocytopenia?
A The 4 Ts Score
B The HIT Expert Probability (HEP) Score
C Both A & B
D None of the above

Which of the following patient populations are most likely to have a diagnosis of heparin-induced thrombocytopenia after heparin product exposure?
A Orthopedic surgery
B Medical patient population
C Cardiac surgery
D Both A & C

Q1 Answer: C  Q2 Answer: D
SECOND VICTIMS: PHARMACY STAFF PERCEPTIONS OF A SUPPORT PROGRAM AT A PEDIATRIC HOSPITAL

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Second victims are health care providers who are involved in an unanticipated adverse patient event, medical error, and/or patient related injury who become victimized in the sense that the provider is traumitzed by the event. Many organizations provide some type of formal employee support, such as pastoral care or employee assistance programs. However, there is gross underutilization of these programs and often a reluctance of staff to use formal support services. In a survey conducted by Scott and colleagues, only one percent of respondents expressed a desire to involve individuals outside of their practice environment for second victim support. Thus, internal peer support is often what a second victim desires when coping with an emotional event. A survey was distributed to all pharmacy employees at a free-standing academic pediatric hospital to evaluate the staff perception of support following an unanticipated or stressful event. After analyzing the survey results, a second victim program was implemented to provide support for those employees involved in such events. The program consists of trained peer supporters who serve as first responders. If a staff member requires support beyond what is provided by peer supporters, a chain of escalation is followed. A second survey was given to staff to evaluate their perception of support following involvement in unanticipated or stressful event.

Learning Objectives:
- Define the term “second victim”
- Discuss the Three-Tiered Interventional Model of Second Victim Support

Self Assessment Questions:
- Tier 2 of the Scott Interventional Model of Second Victim Support consists of which of the following groups?
  A. All department employees
  B. Trained peer supporters
  C. Employee assistance programs
  D. Clinical psychologists

- After which of the following situations might a member of the health care team feel they are a second victim?
  A. After learning that they dispensed an incorrect dose of a medication
  B. After caring for a patient who became violent and harmed the empl
  C. After responding to multiple traumas in the Emergency Department
  D. All of the Above

Q1 Answer: B  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-776 -L04-P
Activity Type: Knowledge-based  Contact Hours: 0.5

SECOND VICTIMS: PHARMACY STAFF PERCEPTIONS OF A SUPPORT PROGRAM AT A PEDIATRIC HOSPITAL

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Second victims are health care providers who are involved in an unanticipated adverse patient event, medical error, and/or patient related injury who become victimized in the sense that the provider is traumized by the event. Many organizations provide some type of formal employee support, such as pastoral care or employee assistance programs. However, there is gross underutilization of these programs and often a reluctance of staff to use formal support services. In a survey conducted by Scott and colleagues, only one percent of respondents expressed a desire to involve individuals outside of their practice environment for second victim support. Thus, internal peer support is often what a second victim desires when coping with an emotional event. A survey was distributed to all pharmacy employees at a free-standing academic pediatric hospital to evaluate the staff perception of support following an unanticipated or stressful event. After analyzing the survey results, a second victim program was implemented to provide support for those employees involved in such events. The program consists of trained peer supporters who serve as first responders. If a staff member requires support beyond what is provided by peer supporters, a chain of escalation is followed. After implementation of the program in the pharmacy department, a second survey will be given to staff to evaluate their perception of support following involvement in unanticipated or stressful event.

Learning Objectives:
- Define the term “second victim”
- Discuss the Three-Tiered Interventional Model of Second Victim Support

Self Assessment Questions:
- Tier 2 of the Scott Interventional Model of Second Victim Support consists of which of the following groups:
  A. All department employees
  B. Trained peer supporters
  C. Employee assistance programs
  D. Clinical psychologists

- After which of the following situations might a member of the health care team feel they are a second victim?
  A. After learning that they dispensed an incorrect dose of a medication
  B. After caring for a patient who became violent and harmed the employee
  C. After responding to multiple traumas in the Emergency Department
  D. All of the Above

Q1 Answer: B  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-776 -L04-P
Activity Type: Knowledge-based  Contact Hours: 0.5

EFFECT OF PHYSICIAN EDUCATION ON THE MANAGEMENT OF PATIENTS WITH CHRONIC NON-CANCER PAIN IN THE PRIMARY CARE SETTING: IMPLICATIONS FOR A PHARMACIST-BASED OPIOID MANAGEMENT CLINIC

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The 2009 American Pain Society/Academy of Pain clinical guidelines highlight the importance of prescriber education for identification of opioid misuse in high-risk patients treated with chronic opioid therapy (COT) for chronic non-cancer pain (CNCP). Increased COT prescribing parallels increased incidence of opioid diversion, overdoses, addiction, and death. CNCP management is complex and often impeded by inconsistent, inadequate provider education, lacking adherence to guideline-based assessment and monitoring. The primary study objective will evaluate prescriber adherence to COT prescribing guidelines. Secondary objectives will assess opioid management, pain diagnosis, prescriber and clinic variation, and concomitant benzodiazepine use. Retrospective chart review of Cincinnati VA Medical Center (CVAMC) patients receiving high-risk COT defined as requiring greater than 120 daily morphine equivalents (DME) for greater than three months. Patients must have been managed by a primary care physician from the CVAMC or affiliated community-based outpatient clinic. The study period will evaluate patients one-year prior to and following implementation of prescriber education. Study exclusion includes active cancer diagnosis, hepatic impairment, VA opioid substitution program enrollment or death. Physician compliance will be assessed using the Office of Inspector General (OIG) criteria checklist evaluating pain diagnosis, non-opioid treatment trials, opioid treatment agreement, biannual urine drug screening, baseline and annual methadone EKG monitoring, and reassessment at least every six months. Outcomes will be assessed by treatment site, individual provider, duration of stable of dose, long vs. short acting opiate use, and concomitant benzodiazepine use. Statistical analyses utilized will include descriptive and inferential statistics, and logistic regression analyses for associations with individual characteristics. Patient data will remain confidential, recorded indirectly using medical record numbers. The study protocol has gained IRB approval. Study results will aid with implementation of a primary care pharmacy run opioid management clinic. Results will be presented at the Great Lakes Pharmacy Residency Conference

Learning Objectives:
- Define chronic non-cancer pain (CNCP) and discuss the role of chronic opioid therapy in the treatment of patients with CNCP.

Self Assessment Questions:
- 1. According to the American Pain Society/Academy of Pain Medicine (APS/AAPM), chronic non-cancer pain is defined as:
  A. Pain that persists beyond normal tissue healing time, which is a.
  B. Pain that persists beyond normal tissue healing time, which is a.
  C. Pain that persists beyond normal tissue healing time, which is a.
  D. Pain that persists beyond normal tissue healing time, which is a.

- 2. Which of the following are appropriate risk reduction strategies used for patients receiving chronic opioid therapy for chronic non-cancer pain?
  A. Have an active pain diagnosis, use of only short acting opioid a.
  B. Avoidance of methadone use, active pain diagnosis, patient treatment agreement, routine urine drug screens, patient treatment agreement plans, routine urine drug screens, patient treatment agreement plans, routine urine drug screens, patient treatment agreement plans, routine urine drug screens, patient treatment agreement plans, routine urine drug screens, patient treatment agreement plans, routine urine drug screens, patient treatment agreement plans.

Q1 Answer: A  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-823 -L04-P
Activity Type: Knowledge-based  Contact Hours: 0.5
EFFICACY AND SAFETY OF U-500 INSULIN AS COMPARED TO HIGH DOSE CONVENTIONAL INSULIN THERAPY: A RETROSPECTIVE CHART REVIEW

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Purpose: Patients with insulin resistance often require large volumes of insulin to maintain glycemic control. However, total daily doses greater than 200 units can negatively impact adherence and absorption. Conversion to U-500 insulin allows for fewer daily doses, more predictable absorption, and has been shown to improve glycemic control. The primary objective of this study is to determine if patients converted to U-500 insulin therapy have demonstrated improved glycemic control compared to patients maintained on high dose U-100 insulin regimens. Secondary objectives include evaluation of severe hypoglycemic or hyperglycemic events, change in body weight, total insulin regimens. Secondary objectives include evaluation of severe hypoglycemic or hyperglycemic events, change in body weight, total daily insulin dose, classes of concomitant non-insulin diabetes medications, and identification of reasons for discontinuation of U-500 insulin in patients trialed on this therapy.

Methods: The computerized patient record system will be utilized to conduct a retrospective chart review of all patients who received at least one prescription for U-500 insulin or high dose conventional therapy between January 1, 2008 and December 31, 2012. High dose conventional therapy will be defined as 200 units or more of U-100 insulin per day. Patients will be excluded if they do not have a diagnosis of type 2 diabetes mellitus or at least 6 months of baseline data prior to conversion to U-500. Data collected and analyzed will be de-identified and include: age, sex, weight, type and total daily dose of insulin and duration of therapy, classes of concomitant non-insulin diabetes medications, hemoglobin A1C, and severe hypoglycemic or hyperglycemic events as defined by documented blood glucose readings ≤ 70 mg/dL or > 200 mg/dL, emergency room visits, or hospital admissions. preliminary results will be presented at the Great Lakes Pharmacy Residency Conference in April 2014.

Learning Objectives:
Review benefits and risks associated with conversion to U-500 insulin
Identify the impact of conversion to U-500 insulin on patient and medical center outcomes

Self Assessment Questions:
Conversion to a U-500 insulin regimen may offer the following benefit(s):
A Enhanced glycemic control
B Fewer injections per day
C More predictable absorption
D. All of the above

Which of the following patients is a good candidate for conversion to U-500 insulin?
A A patient suffering from glaucoma
B A patient with a history of hypoglycemia
C A patient using 300 units of insulin aspart and glargine
D A patient with a refill history indicating poor adherence to conventional insulin regimens

Q1 Answer: D  Q2 Answer: C

PHARMACIST GUIDED METHADONE OPIOID ROTATION IN HOSPICE PATIENTS THROUGH AN INTERDISCIPLINARY METHADONE FOLLOW-UP PROGRAM

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Purpose: Methadone can be used effectively for pain management in patients with a poor response to other opioids; however, despite the potential clinical and economic benefits, methadone is used less commonly than other opioids in the hospice setting. Reviewing existing literature reveals limited studies regarding the efficacy of conversion to methadone in hospice patients, and no studies exist describing a methadone follow-up program in the hospice setting. The purpose of this study is to evaluate methadone opioid rotation in hospice patients who were referred to a methadone follow-up program. Methods: This was a retrospective study at a national pharmacy benefits management company which has an established methadone follow-up program. Preliminary Results: A total of 344 patients were referred to the program between May 1, 2013 and November 30, 2013, and methadone was initiated in 285 of these patients. Pre-methadone and post-methadone pain scores were documented in 110 patients, and 76 (69.1%) patients met the definition for successful conversion. Overall, pharmacists methadone dosing recommendations were fully accepted 71% of the time. Conclusions: The preliminary results of this study provide support to methadone opioid rotation in hospice patients as well as the role of pharmacists in an interdisciplinary methadone follow-up program.

Learning Objectives:
Discuss potential advantages and barriers to using methadone for pain management in hospice patients
Discuss the impact of a multidisciplinary methadone follow-up program on pain management for hospice patients

Self Assessment Questions:
Which of the following is a disadvantage of methadone for pain management?
A Less expensive than other long-acting opioid medications
B Multiple methadone dosing protocols
C Lack of active metabolites
D Effectiveness against neuropathic pain

Which of the following are potential barriers to the use of methadone as an analgesic?
A Stigma associated with methadone
B Concerns regarding patient monitoring upon initiation of methadone
C Lack of understanding regarding the role of methadone in pain management
D All of the above

Q1 Answer: B  Q2 Answer: D

Activity Type: Knowledge-based  Contact Hours: 0.5
ACPE Universal Activity Number 0121-9999-14-601-L01-P
ACPE Universal Activity Number 0121-9999-14-838-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
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Purpose: The purpose of this study is to evaluate a newly initiated transition-of-care shared discharge office visit program. The primary objective of this study is to determine the impact of pharmacist interventions, including a comprehensive medication review (CMR) and medication specific disease state education, on 30-day readmission rates in patients recently discharged from a community hospital.

Methods: This study has been submitted to the institutional review board and approved with exempt status. The study was completed at the Fairview Hospital Center for Family Medicine clinic, at which an existing pharmacist managed ambulatory care clinic is established. All eligible adult family medicine patients discharged from the affiliated community hospital were scheduled for a transition-of-care visit within fourteen days of discharge. Standardized face-to-face transition-of-care visits were completed by a team consisting of an ambulatory care pharmacist, a care enhancement physician resident, and a nurse. The pharmacy portion of the visit included a comprehensive medication review and brief disease specific medication education. The pharmacist also participated in an integrated portion of the visit with the physician and patient. The ambulatory care pharmacist was responsible for 30 days of follow up care, including additional phone encounters and office visits. The primary outcome of interest is 30-day readmission rates of patients seen by the transition-of-care team during the study period. Several secondary outcomes have also been evaluated including the number and type of pharmacy interventions, frequency of acceptance of recommendations by the physician, identified risks for readmission, and tracking of Medicare reimbursement using the new CPT transition-of-care codes.

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

Learning Objectives:
- Review the rationale for pharmacist participation in the implementation of an outpatient transition-of-care discharge visit program
- Describe potential barriers encountered during implementation of an outpatient transition-of-care discharge visit program

Self Assessment Questions:

The use of transition-of-care CPT codes requires which of the following elements?
- A: Face-to-face visit within 90 days of discharge
- B: Low risk for readmission
- C: Communication with patient within 2 days of discharge
- D: Length of admission >7 days

Which of the following is part of the pharmacy portion of the discharge visit?
- A: Physical Exam
- B: Comprehensive medication review
- C: Obtaining vitals and rooming
- D: Problem list reconciliation

Q1 Answer: C  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-628-L04-P

Activity Type: Knowledge-based  Contact Hours: 0.5
EVALUATION OF THE ACCURACY OF PRESCRIBED RENAL-DOSE ADJUSTED MEDICATIONS IN AN ACADEMIC MEDICAL CENTER
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Purpose
Results from previous studies have shown poor adherence to renal-dose adjustment guidelines in ambulatory care. The Hoxworth General Medicine Clinic is a Level III National Committee for Quality Assurance (NCQA) certified patient-centered medical home situated in the University of Cincinnati Medical Center. The clinic serves as a practice site for medical residents and nurse practitioners. This study will focus on the education of prescribers in the General Medicine Resident Clinic in an effort to improve dosing of medications in chronic kidney disease patients within the ambulatory care setting. The primary endpoint of this study is to measure the incidence of correct renal-dose adjustment of medications pre and post-prescriber education.

Methods
This single center, observational study will include patients with a creatinine clearance less than 50 mL/min who were prescribed a target medication by a prescriber in the General Resident Medicine Clinic from November 2013 through March 2014. Clinic prescribers will be educated via face-to-face interactions, presentations, online-modules, and written literature. The accuracy of renal-dose adjustments will be analyzed before and after prescriber education.

Results
Data collection and analysis are on-going.

Learning Objectives:
Review the effect of chronic kidney disease on drug pharmacokinetics
Outline current literature related to compliance with dosing guidelines in patients with chronic kidney disease

Self Assessment Questions:
Chronic kidney disease affects which pharmacokinetic parameters:
A Absorption
B Distribution
C Metabolism
D All of the above

How does chronic kidney disease affect plasma protein binding of acidic drugs?
A Increase
B Decrease
C No effect
D Unknown

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-719 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5

AN EVALUATION OF CONTINUOUSLY INFUSED REMIFENTANIL IN MECHANICALLY VENTILATED CRITICAL CARE PATIENTS
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Purpose
Remifentanil is an ultra short acting opioid agonist with a rapid onset and short duration of action. Organ independent metabolism, lack of accumulation, and rapid onset/offset of action are several properties that make it unique from other opioid agents. Remifentanil has been made available for selection by the ICU team at Riverside Methodist Hospital for sedation management for a trial period of four months. The purpose of this study will be to evaluate the use of remifentanil for management of analgesia and sedation in mechanically ventilated patients.

Methods
Remifentanil was approved by the Pharmacy and Therapeutics Committee for a trial period for use in analgesia and sedation management in mechanically ventilated patients in October 2013. Following approval by the Institutional Review Board, data was collected in two cohorts of patients. Cohort 1 contained mechanically ventilated patients admitted to the medical, surgical, cardiac, or neurological intensive care units at OhioHealth Riverside Methodist Hospital initiated on remifentanil infusion beginning one month post-implementation of a remifentanil protocol. For Cohort 2, data was collected on a group of pre-remifentanil protocol patients with the same criteria as Cohort 1 who were admitted during the same three months of the previous year. The primary objective was to evaluate the frequency of remifentanil use following implementation of the protocol. Secondary objectives include a comparison between the two cohorts of ICU delirium, ventilator days, ICU length of stay, average sedative dose, and number of days at goal RASS. This data will be used to assess the implementation and utilization of remifentanil in mechanically ventilated patients.

Results
Data collections is in progress. Final results and conclusions will be presented at the Great Lakes Residency Conference.

Learning Objectives:
Report the frequency of use of remifentanil as a first-line medication to achieve adequate sedation in mechanically ventilated patients following implementation of a remifentanil protocol.
Describe patient outcomes including prior to and following implementation of a remifentanil protocol.

Self Assessment Questions:
Which of the following is (are) true with respect to the 2013 Pain, Agitation, and Delirium Guidelines?
A These guidelines recommend an analgesia based sedation
B Opiates, including remifentanil, are first line medications for management of pain
C Pain is typically under treated in adult ICU patients
D All of the above

Which of the following is true regarding the use of continuously infused remifentanil?
A Accumulation can be seen following extended duration of infusion
B Mechanism of action varies from other opiates
C Metabolized independent of organ function
D Offset of action may vary in obese patients

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-422 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Purpose: Vancomycin is utilized for the treatment of gram-positive bacterial infections. The pharmacokinetics of vancomycin have been extensively studied and the kinetics vary in the obese population. Obese patients may require vancomycin dosing that is inconsistent with current guidelines; however there is a lack of data in this area. This study is designed to investigate empirically dosed vancomycin in obese patients. We hypothesize that the percentage of obese patients within the goal trough range upon first appropriate trough draw will be less than the percentage of non-obese patients.

Methods: This study will be a retrospective chart review at the Louis Stokes VAMC (LSCDVAMC). The primary objective is to compare percentage of first appropriately collected vancomycin troughs within the goal therapeutic range in obese versus non-obese patients. All inpatients on general medicine floors between October 3, 2010 and August 31, 2013 who meet the inclusion criteria will be evaluated. Approval from the Institutional Review Board has been obtained. Inclusion criteria include: 18 years of age or older, inpatient at LSVDVAMC, at least 1 appropriately collected vancomycin level, and at least 3 consecutive doses of vancomycin therapy. Exclusion criteria are as follows: any dialysis, acute renal failure, creatinine clearance less than 30 mL/min, goal vancomycin trough other than 15-20 mg/L, or any repeat patient who was previously included in the study. Data collected includes demographics, initial dose and length of duration of vancomycin therapy, trough levels, and renal function. A sample size of 126 patients is needed to meet power. P values < 0.05 are statistically significant. Comparisons between two groups will use a student t-test for continuous variables and chi-square tests for nominal variables. Comparisons of three or more groups will use ANOVA tests.

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

Learning Objectives:
- Review current vancomycin dosing and monitoring guidelines and recommendations in the obese population.
- Discuss literature that evaluates vancomycin - dosing in the obese population

Self Assessment Questions:
What is the goal AUC/MIC ratio to maximize bacterial killing if the MIC < 1?
A: >150
B: >400
C: >700
D: >1000

Which of the following is true regarding vancomycin pharmacokinetics in obese patients?
A: Decreased half-life
B: Increased nephrotoxicity
C: Decreased vancomycin clearance
D: Decreased volume of distribution

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-614 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Purpose: The Infectious Diseases Society of America (IDSA) recommend targeting vancomycin trough concentrations of 15-20 mg/L to potentially optimize patient outcomes. Data collected from The Ohio State University Wexner Medical Center (OSUWMC) in October of 2012 revealed that only 30% of patients who received vancomycin were within the desired trough range of 15-20 mg/L without a loading dose and 15 mg/kg maintenance dose. A subsequent study demonstrated that 22% of patients who received a 20 mg/kg loading dose followed by a 15 mg/kg maintenance dose were within the desired trough range. These data led to the implementation of an aggressive vancomycin regimen consisting of a 25 mg/kg loading dose and 20 mg/kg maintenance dose. The primary objective of this study was to evaluate the percentage of patients who achieved a steady state vancomycin trough of 15-20 mg/L after implementation of an aggressive dosing regimen and to compare results to the previous studies.

Methods: All patients who received a vancomycin loading dose of 25 mg/kg, subsequent 20 mg/kg maintenance doses and had a steady state level between November 1st and 2012 and November 15th, 2013 were included in the study. Patients <18 or ≥89 years of age, prisoners, and pregnant females were excluded from the study. Pertinent data were retrospectively obtained from OSUWMCs electronic record, pharmacy, and microbiology databases. Variables analyzed included age, sex, dosing weight, ideal body weight, serum creatinine, creatinine clearance, vancomycin regimen, trough, site of infection, organism, and hospital length of stay.

Results: Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference. A descriptive analysis will be conducted.

Learning Objectives:
Discuss the rationale for utilizing a loading dose in patients treated with vancomycin

Explain the rationale for targeting vancomycin trough levels of 15-20 mg/L after implementation of an aggressive dosing regimen and to compare results to the previous studies.

Self Assessment Questions:

Why are loading doses of vancomycin recommended in seriously ill patients?
A To achieve rapid therapeutic concentrations
B Loading doses have been shown to increase survival in the serious illness setting
C Adverse effects are not correlated with larger doses
D Loading doses are not recommended

Which of the following statements are true about vancomycin monitoring?
A Vancomycin peaks should be monitored to avoid nephrotoxicity
B Ototoxicity correlates with serum vancomycin trough levels
C Vancomycin trough levels should be drawn prior to the fourth dose
D Vancomycin troughs are easily predictable in most patients

Q1 Answer: A  Q2 Answer: C

USE OF PROTHROMBIN COMPLEX CONCENTRATE IN ADDITION TO VITAMIN K FOR WARFARIN REVERSAL PRIOR TO EMERGENT CARDIOTHORACIC SURGERY

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Background: Anticoagulation with warfarin is common in patients presenting for emergent cardiothoracic surgery. Prior to emergent surgery, anticoagulation reversal is necessary to avoid significant intra- and peri-operative bleeding. Commonly, warfarin reversal is achieved with vitamin K and fresh frozen plasma (FFP); however, these therapies have limitations. Another option for reversal is Prothrombin Complex Concentrate (PCC). Recently at the Cleveland Clinic, a warfarin reversal protocol prior to emergent cardiothoracic surgery was implemented using low-dose PCC. This study assesses both efficacy and safety outcomes as well as blood product utilization post-PCC administration in patients needing warfarin reversal prior to emergent cardiothoracic surgery.

Objective: To assess the utilization of blood products as well as in-hospital mortality, re-operation, thromboembolic events, duration of chest tube utilization, time to extubation, and intensive care unit and hospital length of stay with the use of PCC in addition to vitamin K for warfarin reversal prior to emergent cardiothoracic surgery compared to a historical control group.

Methods: This was a retrospective IRB approved medical record review. The PCC cohort included patients undergoing emergent cardiothoracic surgery on warfarin with an INR ≥1.5 after initiation of the PCC reversal protocol and received at least one dose of PCC. Blood product utilization was measured from post-operative day (POD) 0 to POD 2. Results: The PCC and historical control cohorts included 20 and 50 patients, respectively. There was a significant reduction in the utilization of FFP (5.90 ± 6.37 vs 9.88 ± 7.91 units, P= 0.03) and platelets (1.50 ± 2.24 vs 2.56 ± 2.32 units, P= 0.02) in the PCC cohort compared to the historical control. There were no significant differences in utilization of other blood products and other secondary efficacy endpoints. Conclusion: Use of PCC prior to emergent cardiothoracic surgery reduces blood product administration in the intra- and peri-operative setting.

Learning Objectives:
Discuss the clinical and pharmacoeconomic impact of using Prothrombin Complex Concentrate prior to emergent cardiothoracic surgery for warfarin reversal.

Self Assessment Questions:

What coagulation factors does Prothrombin Complex Concentrate contain?
A Ii, vii, x, xii
B Ii, vii, ix, x
C Ii, viii, xi, xii
D V, vii, ix, x

What is the main difference between 3-factor and 4-factor Prothrombin Complex Concentrate?
A There is more Factor II in 4-factor Prothrombin Complex Concentrate
B There is more Factor VII in 4-factor Prothrombin Complex Concentrate
C There is more Factor IX in 4-factor Prothrombin Complex Concentrate
D There is more Factor X in 4-factor Prothrombin Complex Concentrate

Q1 Answer: B  Q2 Answer: B
IMPACT OF ADVANCING AGE ON VANCOMYCIN PHARMACOKINETICS


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Purpose: Advancing age causes changes in body composition and function, including body fat, body water, lean mass, and renal function which may alter medication pharmacokinetics (PK). Vancomycin, a broad-spectrum antibiotic frequently used to treat severe infections in hospitalized elderly patients, should be dosed to achieve trough levels of 15-20 mcg/mL to optimize clinical outcomes while minimizing toxicities. Vancomycin PK data in hospitalized elderly patients are very limited, making achievement of pharmacodynamic goals challenging in this patient population. The objectives of this study are to 1) describe vancomycin PK in hospitalized elderly patients and 2) identify patient-specific factors contributing to PK alterations.

Methods: This prospective, single-center, clinical PK study will include elderly (≥ 65 years of age), non-obese patients with normal renal function being treated with vancomycin according to local standards of care for suspected or confirmed infection. Three vancomycin serum concentrations (drawn just prior to infusion, 2 hours post-infusion, and 6 hours post-infusion) will be assessed after the first day of therapy and measured using a quantitative enzyme immunoassay. PK parameters (volume of distribution in central compartment, elimination rate constant, half-life, maximum concentration, minimum concentration, area under the curve, and total body clearance) will be determined by fitting data to either a one or two compartment open model with first-order elimination, as appropriate. Multivariable logistic regression will be used to determine if patient-specific factors, such as age, albumin, nutritional status, fluid administration, and inflammation, alter vancomycin PK. Goal enrollment is a total of 15 patients (5 patients aged 65-74, 75-84, and ≥ 85 years, respectively).

Self Assessment Questions:

Which of the following physiologic changes occur with advancing age?

A: Increased Proportion of Adipose Tissue
B: Decrease in total body water and lean mass
C: Increased proteinuria
D: All of the above

Q1 Answer: D  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-845 -L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
Purpose: The emergence of multi-drug resistant (MDR) gram-negative pathogens and concomitant lack of novel antibiotics have led to an increase in the use of colistin. Despite over fifty years of experience with colistin, the optimal intravenous (IV) dosing regimen is still unknown. Results of pharmacokinetic studies suggest that critically ill patients may require a loading dose and higher maintenance doses to obtain necessary concentrations. Based on this evidence, a guideline for IV colistin including a 5 mg/kg loading dose and high-dose maintenance regimen was implemented on September 1, 2012 at The Ohio State University Wexner Medical Center (OSUWMC). The purpose of this study was to determine if a colistin loading dose and high-dose regimen increases the rate of clinical cure in ICU patients with MDR gram-negative pneumonia. Methods: A single-center, retrospective cohort study was completed to compare clinical cure pre- and post-implementation of a colistin loading dose, high-dose maintenance regimen. Patients were eligible for inclusion if they were admitted to a medical or surgical ICU between April 1, 2009 and February 28, 2014 and were treated for MDR gram-negative pneumonia with IV colistin. Additionally, patients must have received IV colistin for greater than 48 hours within 72 hours of culture obtainment. Exclusion criteria included age less than 18 or greater than 89 years, pregnancy, and incarceration. The primary outcome was clinical cure defined as improvement of all signs and symptoms caused by the infection (i.e. resolution of WBC, fever, respiratory status). Secondary outcomes included mortality, signs and symptoms caused by the infection (i.e. resolution of WBC, fever, respiratory status). Results and conclusions will be presented.

Learning Objectives:
- Explain recent trends resulting in increased use of colistin for treatment of gram-negative multidrug resistant infections.
- Describe limitations associated with the use of colistin in the treatment gram-negative multidrug resistant pneumonia and potential strategies to optimize colistin therapy.

Self Assessment Questions:
Which of the following have contributed to the increased use of colistin:
A. Increased development of newer antibiotics
B. Increasing numbers of multidrug resistant infections
C. Newer formulations of colistin with less toxicity
D. Drug shortages

Which strategy has been proposed to overcome colistins long-half life in critically-ill patients:
A. Use of inhaled colistin in addition to intravenous colistin
B. Administration of a loading dose
C. Use of combination therapy
D. Administering colistin as an extended-infusion over four hours

Q1 Answer: B  Q2 Answer: B

EVALUATION OF VANCOMYCIN INDUCED NEPHROTOXICITY FOLLOWING IMPLEMENTATION OF A PHARMACIST-INITIATED DOSING SERVICE.

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Purpose: A previous Cincinnati Veterans Affairs Medical Center (CVAMC) study conducted in 2011 indicated there was no difference in nephrotoxicity after implementation of a protocol for pharmacists to dose vancomycin. Recent literature publications indicate vancomycin nephrotoxicity incidences are increasing for numerous reasons around the country. At our facility, increasing concerns regarding vancomycin nephrotoxicity among physicians, pharmacists, and patient safety advisors led to this study. The purpose of this study is to compare patient characteristics in the nephrotoxic and non-nephrotoxic group to identify differences that may contribute to the incidence of nephrotoxicity. Methods: The study is a retrospective chart review, quality improvement study performed at the CVAMC. Prior to study initiation, study protocol was approved by both the IRB and VA R&D. The health systems electronic medical record will be used to identify patients who received vancomycin from May to December of 2013. The study will exclude patients who did not have a documented vancomycin trough level, patients on hemodialysis, patients who received vancomycin for surgical prophylaxis, and patients who received vancomycin as outpatient therapy or at another facility prior to admission to the CVAMC. Eligible patients will be stratified into one of two groups, either nephrotoxic or non-nephrotoxic. The following data elements will be collected for all patients included in the study: age, gender, height, weight, vancomycin dose, indication for use, goal trough, and vancomycin levels drawn. Additional risk factors known to increase the incidence of vancomycin nephrotoxicity will also be evaluated. These include obesity, as defined as BMI ≥30, >4 grams/day dosing, >20mcg/mL trough levels, and other concomitant nephrotoxic agents. Collected data will be evaluated for differences to identify if certain characteristics contribute to vancomycin nephrotoxicity at our facility. Results/Conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
- Review the ASHP/IDSA/SIDP consensus review and its impact on vancomycin dosing.
- Discuss the incidence of vancomycin-induced nephrotoxicity and any specific patient characteristics thought to contribute to the development of vancomycin-induced nephrotoxicity at the Cincinnati VA.

Self Assessment Questions:
Based on the ASHP/ISDA/SIDP, vancomycin-induced nephrotoxicity is defined as:
A. Increase of baseline serum creatinine by ≥50% for two consecutive days
B. Any increase in Scr while receiving vancomycin therapy
C. Serum creatinine increase of ≥ 0.5mg/dL for two consecutive days
D. A & c

Based on the ASHP/ISDA/SIDP consensus review, trough concentrations of 15-20 mcg/mL is recommended for which of the following infections:
A. Urinary Tract Infection
B. Endocarditis
C. Cellulitis
D. All of the above

Q1 Answer: D  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-671-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
CASE MIX INDEX VS. PHARMACY INTENSITY SCORE: WHICH IS A BETTER INDICATOR OF ACTUAL DRUG SPEND?
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Purpose: There is currently no nationally accepted external benchmark for evaluating the appropriateness of a hospitals drug expense. To make meaningful comparisons over time, information must be standardized to account for differences in volume and acuity. Several metrics are available that attempt to provide this standardization, but there is limited literature to recommend one metric over another. The Ohio State University Wexner Medical Center (OSUWMC) standardizes drug costs on data from over 1000 hospitals across the country. Institution specific Case Mix Index (CMI) adjusts patient day for differences in volume and acuity. A better standardized resource consumption metric that has become an indicator of hospital disease severity. Institution specific CMI is calculated for hospital disease severity.  Institution specific CMI is calculated using the national relative weight (RW) of the diagnosis related group (DRG) adjusted for hospital and DRG specific volume. Pharmacy Intensity Weight (PIW) is a metric correlating the percent of drug costs relative to the total expense for a DRG specific admission, and is based on data from over 1000 hospitals across the country. Institution specific Pharmacy Intensity Score (PIS) is calculated utilizing the PIW of the DRG adjusted for hospital and DRG volume. This study evaluates OSUWMC CMI and PIS adjusted patient day to determine which is a stronger predictor of actual drug cost. The results of this study will assist OSUWMC in choosing the most effective metric for monitoring drug expenses over time.  Methods: This is a single-center observational study which reviews all patient days from admissions between October 1, 2012 and March 31, 2013. CMI and PIS are evaluated by the Pearson Correlation Coefficient to assess the relationship between CMI-adjusted patient day and medication spend, and PIS-adjusted patient day and medication spend. The difference between these two coefficients is compared to determine which is a more predictive of actual drug spend at OSUWMC.  Results: Results will be presented at the Great Lakes Residency Conference.

Learning Objectives: Describe the difference between Case Mix Index and Pharmacy Intensity Score
Discuss the ability of each cost metric to predict actual drug spend

Self Assessment Questions:
Case Mix Index is:
A: an institution specific acuity metric
B: a pharmacy-specific cost metric
C: calculated by averaging the total hospital reimbursement per patient
D: based on patient length of stay

An advantage to utilizing a standardized adjustment metric rather than comparing actual drug spend over time, is:
A: a cost metric may help account for volume and patient complexity
B: actual drug spend is more difficult to calculate
C: utilizing actual drug spend is only appropriate in complex patient populations
D: no real advantage exists; hospitals may choose to use a standardized metric for evaluating drug spend

Q1 Answer: A  Q2 Answer: A

PATIENT CHOICE OF WARFARIN OR RIVAROXABAN FOR NONVALVULAR ATRIAL FIBRILLATION: ASSESSMENT OF PATIENT PREFERENCES WHEN CHOOSING ORAL ANTICOAGULATION
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Purpose: Current CHEST and American Heart Association (AHA)/American Stroke Association (ASA) guidelines recommend anticoagulation for patients with atrial fibrillation and a moderate to high risk of stroke. The importance of involving patients with nonvalvular atrial fibrillation (NVAF) in their own care is demonstrated by numerous trials that use patient decision aids to allow patient participation in the clinical decision-making process. Studies show that patients who use decision aids have a better understanding of their risk of stroke and hemorrhage, are more knowledgeable about clinical issues with the drugs, and improve their understanding of risks versus benefits of the treatments. With availability of novel oral anticoagulants, further emphasis needs to be placed on patient preference when selecting an anticoagulation strategy. The purpose of this study is to assess specific factors that influence patient choice between rivaroxaban and warfarin for stroke prevention, correlate patient demographics with their decision, and assess patient satisfaction and adverse events related to the therapy.  Methods: This single center, investigator initiated, prospective study conducted at the University of Cincinnati Medical Center aims to enroll 50 patients who are new to oral anticoagulation for NVAF. The study investigators provide the patient with unbiased counseling using a video plus a handout with information regarding safety and efficacy of warfarin and rivaroxaban. It includes visual aids to demonstrate the bleeding risk, information on reversibility, drug and food interactions, monitoring, dosing, and cost of the two drugs. After counseling is complete, the patient chooses which drug he/she prefers to take for prevention of stroke and takes a short survey assessing factors that led to his/her decision. A follow up phone call survey is performed after 30 days to evaluate patient satisfaction and adverse events.  Results: Data is currently being collected and analyzed. Conclusions: Conclusions will be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:
Describe the importance of patient preference when deciding on oral anticoagulation for patients with NVAF.
Explain the value of appropriate counseling with visual aids to ensure patient understanding of treatment with anticoagulation for NVAF.

Self Assessment Questions:
If the CHA2DS2-VASc score for a patient is 2 and the HAS-BLED score is 3, what do the guidelines suggest for anticoagulation?
A: Aspirin as monotherapy
B: Dose adjusted warfarin with INR goal of 2-3
C: Not defined
D: Dabigatran 150mg BID

Current literature on patient preference for anticoagulation for NVAF shows that
A: Patients prefer to prevent bleeding rather than stroke when deciding on treatment
B: Patients are more knowledgeable about treatment options, benefits, and drawbacks
C: There are standard ways to describe stroke and bleeding to patients
D: Patients do not display decisional conflict after being counseled with the information provided

Q1 Answer: C  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-531 -L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
Purpose: Liposomal amphotericin B (Ambisome®) is a lipid formulation of the antifungal agent, amphotericin B. The benefit of the liposomal formulation is equivalent efficacy with reduced risk of adverse drug events (e.g., nephrotoxicity and infusion-related reactions) as compared to the deoxycholate formulation. Literature suggests comparable efficacy in the use of liposomal amphotericin B across a wide dosing range of 1 mg/kg/day to 15 mg/kg/day. Package insert dosing recommendations are 3 mg/kg/day to 5 mg/kg/day for most fungal infections. Current practice at The Ohio State University Wexner Medical Center (OSUWMC) is 5 mg/kg/day for both empiric and targeted therapy. The objective of this study is to evaluate the use of liposomal amphotericin B at OSUWMC and its associated side effects. The secondary objective is to provide education to prescribers encouraging the use of lower doses within the recommended dosing range. Methods: A retrospective review was conducted of all patients who received at least one dose of liposomal amphotericin B at OSUWMC between July 1, 2012 and June 30, 2013. The sample size was determined by expected patient volume rather than statistical power. Patients from all hospitals within OSUWMC were included in the study. Patients < 18 years or > 89 years of age and prisoners are excluded from the data analysis. Data collected will include: age, gender, weight, service, length of stay, fungal pathogen(s) isolated, dosing regimen, concurrent antifungals and nephrotoxins, host factors, indication(s), adverse drug events and hospital mortality. A descriptive analysis will be conducted. Results: Final results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Discuss the recommended dosing strategies for liposomal amphotericin B in the management of invasive fungal infections.
Review the incidence of adverse drug events associated with liposomal amphotericin B.

Self Assessment Questions:

Which of the following is the recommended dosing for liposomal amphotericin B in the management of acute pulmonary Histoplasmosis?

A: 1 mg/kg/day to 5 mg/kg/day
B: 3 mg/kg/day to 4 mg/kg/day
C: 3 mg/kg/day to 5 mg/kg/day
D: 5 mg/kg/day to 7.5 mg/kg/day

Compared to the deoxycholate formulation, liposomal amphotericin B has demonstrated a reduction in which adverse drug events?

A: nephrotoxicity, electrolyte abnormalities, hepatotoxicity
B: nephrotoxicity, thrombocytopenia, infusion-related reactions
C: nephrotoxicity, thrombocytopenia, hepatotoxicity
D: nephrotoxicity, electrolyte abnormalities, infusion-related reactions

Q1 Answer: C  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-414 -L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5

THE EFFECT OF A PHARMACIST BASED DISCHARGE COUNSELING PROGRAM ON HOSPITAL CONSUMER ASSESSMENT OF HEALTHCARE PROVIDERS AND SYSTEMS (HCAHPS) SCORES, 30-DAY READMISSION RATES, AND PATIENT SATISFACTION

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Background: With the ongoing evolution of our healthcare system from a fee for service to a pay for performance model, the roles of pharmacist are likely to change. The implementation of the hospital consumer assessment of healthcare providers and systems (HCAHPS) survey, a survey that measures patients perceptions of their hospital experience, is a key factor in this reform. Beginning October 1st, 2013, all hospitals receiving funding from Medicare now have 1% of their reimbursement withheld. Reimbursement is reallocated to those hospitals that perform well on HCAHPS survey. Many studies have been conducted in the ambulatory setting showing the benefit of pharmacist involvement in medication management, however no current literature exist on the effects of pharmacists intervention on HCAHPS scores in the inpatient setting. Objective: Evaluate the effect of pharmacist based discharge counseling on overall HCAHPS scores, as well as composite scores of discharge information and medication communication, and 30-day readmission rates. Methodology: A prospective, observational study was conducted to evaluate patient outcomes after receiving medication related discharge counseling from a pharmacist. The study population included all patients 18 years or older, with a hospital stay of at least 24 hours, being discharged home from a cardiovascular surgery step-down unit at the Cleveland Clinic. Over a six month period, all patients discharged from the intervention unit received counseling and will be compared to baseline and post-intervention data for patients that did not receive counseling. Data was collected regarding demographics, co-morbid disease states, number of medications at discharge, discharge diagnosis, length of hospital stay, and previous hospital admissions within the last 12 months, overall HCAHPS scores, medication communication composite HCAHPS scores, and discharge information composite HCAHPS scores. Results and Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Explain the effect HCAHPS scores will have on a health-system's reimbursement
Recognize the evolving structure of value based purchasing

Self Assessment Questions:

Beginning October 1st, 2013, what percentage of Medicare DRG reimbursements is withheld by CMS?

A: 1%  
B: 1.25%  
C: 1.5%  
D: 2%

What percentage of the Total Performance Score does the patient experience domain (HCAHPS) represent?

A: 5%  
B: 15%  
C: 30%  
D: 50%

Q1 Answer: B  Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-796 -L04-P
Activity Type: Knowledge-based  Contact Hours: 0.5
ASSESSMENT AND IDENTIFICATION OF INFECTION RISK FACTORS IN POST-CARDIAC ARREST PATIENTS AFTER THERAPEUTIC HYPOTERMIA

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Purpose: Therapeutic hypothermia is widely utilized in patients after cardiac arrest to improve mortality and neurologic outcomes. Unfortunately, its use is associated with higher rates of infection. Previous studies have demonstrated that common markers of infection have limited diagnostic utility for identifying true infection in this patient population. The mixed clinical picture, altered inflammatory response, and critical nature of these patients make it difficult for the clinician to appropriately identify and treat true infections. The objectives for this research are to identify risk factors and signs of infection that incentivize providers to start antibiotics and that most strongly correlate with true infection. Data will be used to develop a scoring system for infection risk assessment in this patient population.

Methods: This is an investigator initiated, single-center, retrospective, cohort study to be conducted through chart review at the University of Cincinnati Medical Center. Patients included will be eighteen years of age or older, status post cardiac arrest, and will have received therapeutic hypothermia. Reasons for exclusion are: prescribed antibiotics at the time of arrest, post cardiac arrest, and will have received therapeutic hypothermia. Vital signs, infectious markers, microbiologic culture results, and antibiotic administration will be followed for seven days from cardiac arrest. Logistic regression analyses will be used to determine the relationships between patient characteristics and positive cultures, and also between patient characteristics and the initiation of antibiotic therapy. Factors with the strongest correlation will be incorporated into the risk assessment scoring system.

Results: Data analysis is in process and will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Describe the limitations of common infectious markers in diagnosing true infection in patients undergoing therapeutic hypothermia after a cardiac arrest.
Identify risk factors and signs of infection that incentivize providers to start antibiotics in therapeutic hypothermia patients and that most strongly correlate with true infection.

Self Assessment Questions:
What is the mechanism by which therapeutic hypothermia increases the risk of infection?
A: Immunosuppression
B: Decreased cellular metabolism
C: Hyperglycemia
D: Hemodynamic instability

Which of the following statements is true about fever, white blood cell count, procalcitonin, and C-reactive protein in cardiac arrest patients who have undergone therapeutic hypothermia?
A: They strongly correlate with culture-positive infection in that patient
B: They are unreliable markers of infection in that patient population
C: There is strong data supporting their use in diagnosis of infection in patients using hypothermia
D: Several of them have been shown to have good diagnostic utility in patients using hypothermia

Q1 Answer: A Q2 Answer: B

ACID SUPPRESSION THERAPY USE IN NON-CRITICALLY ILL GENERAL MEDICINE PATIENTS IN A COMMUNITY HOSPITAL

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Purpose: Acid suppression therapy (AST) use among non-critically ill general medicine patients has become widespread while the evidence to support such use is lacking. As a result, some patients are receiving AST without any acceptable indication. This leads to an increased risk for the development of adverse effects associated with AST, including Clostridium difficile colitis. The purpose of this study is to determine the percentage of patients receiving inappropriate AST and to determine the economic impact incurred by both the patient and institution. In addition, this study will explore the incidence of Clostridium difficile colitis in patients using AST.

Methods: This was a retrospective, observational chart review on patients admitted to the institution between June 2012 and June 2013 who had active orders for AST. Patients were included in a singular fashion and were not counted for multiple admissions. Inclusion criteria include all patients admitted or transferred to our general medicine units with an active order for AST. All patients discharged from the ICU were excluded. Patient records were reviewed for AST use and indication in the following instances: prior to admission, inpatient, and upon discharge. Acceptable indications for AST include those approved by the FDA as well as additional indications supported by medical literature. The economic impact for patients inappropriately discharged on AST was estimated using the average wholesale price of the selected medication extrapolated to reflect one year of prescriptions. The economic impact on the institution was estimated using the hospitals acquisition cost for the selected medication. Patients included also had an additional retrospective review looking for any 90 day readmissions with a diagnosis of Clostridium difficile colitis.

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

Learning Objectives:
Identify accepted indications which warrant the use of acid suppression therapy
Review the adverse effects associated with acid suppression therapy

Self Assessment Questions:
Which of the following is considered an accepted indication for acid suppression therapy use in non-critically ill general medicine patients?
A: Lower gastrointestinal bleed
B: Hiatal hernia
C: Gastroesophageal reflux disease
D: Stress ulcer prophylaxis

Adverse effects which may be associated with acid suppression therapy use include:
A: Clostridium difficile colitis
B: Hypermagnesemia
C: Urinary tract infection
D: Bradycardia

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-837 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
OBJECTIVES include evaluation of adjunctive dexmedetomidine for alcohol withdrawal. The primary objective of this study is to determine if dexmedetomidine plus benzodiazepine therapy is significantly more expensive than traditional benzodiazepine therapy.

Few studies exist that examine adjunctive dexmedetomidine use in alcohol withdrawal. The primary objective of this study is to determine if the use of adjunctive dexmedetomidine in patients with alcohol withdrawal is associated with shorter ICU length of stay. Secondary objectives include evaluation of adjunctive dexmedetomidine for alcohol withdrawal with regards to hospital length of stay, rate of intubation/mechanical ventilation, and requirement for benzodiazepine administration.

Methods: This retrospective cohort evaluated adult patients admitted to the ICU with acute alcohol withdrawal syndrome. Patients were divided into two groups, dexmedetomidine in addition to benzodiazepine therapy or benzodiazepine therapy alone. Patients were excluded from analysis if a concurrent order for clonidine was present or if, through review of clinician documentation, it was determined dexmedetomidine was not received solely for management of alcohol withdrawal syndrome. Data was collected regarding patient characteristics, dexmedetomidine use, medications for alcohol withdrawal including benzodiazepine and antipsychotic agents, need for intubation, ICU and hospital length of stay, as well as Clinical Institute Withdrawal Assessment (CIWA) of Alcohol scores. Results: Data collection is currently in process. Conclusions: To be presented.

Learning Objectives:
- Review pathophysiology of alcohol withdrawal syndrome.
- Discuss the role of dexmedetomidine in alcohol withdrawal syndrome.

Self Assessment Questions:
Which of the following is true regarding alcohol withdrawal syndrome?
A: Alcohol withdrawal can result in seizures, autonomic instability, and death.
B: The Richmond Agitation Sedation Scale is primarily used for evaluation of alcohol withdrawal syndrome.
C: Alcohol alters neurotransmission through inhibition of GABA and serotonin.
D: Delirium tremens is a mild form of alcohol withdrawal syndrome.

What best describes the use of dexmedetomidine in the management of alcohol withdrawal syndrome?
A: Benzodiazepine administration is not required when dexmedetomidine is used.
B: Dexametomidine in addition to benzodiazepines may reduce agitation.
C: Dexmedetomidine is FDA approved for treatment of alcohol withdrawal syndrome.
D: The primary use of dexmedetomidine in alcohol withdrawal is for sedation.

Q1 Answer: A  Q2 Answer: B
DECREASING IMMUNIZATION ERRORS ACROSS THE CONTINUUM OF CARE IN A PEDIATRIC HEALTH-SYSTEM

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Background: Immunization errors continue to be a challenge in pediatric and adult patients due to the complexity of vaccine schedules, product changes, and educational deficiencies. The Institute for Safe Medication Practices (ISMP) conducted their first annual review of data submitted to the National Vaccine Error Reporting Program that highlighted on these challenges in 2013. In an effort to reach zero preventable harm, Nationwide Children's Hospital (NCH) has a voluntary reporting system for medication errors and follows up on immunization event reports.

Purpose: The purpose of this quality improvement project is to reduce the number of prescribing immunization errors from twenty-four in quarter four (October-December) of 2013 to zero in quarter one (January-March) of 2014 in NCH. Methods: The quality improvement project was conducted through several key interventions to impact the overall number of both inpatient and outpatient prescribing errors within NCH. The primary intervention was designed to improve the clinical decision support with development and implementation of age specific immunization alerts in the electronic medical record. Furthermore, an order comment for all live vaccines was implemented to remind prescribers to check for live vaccines administered in the last 28 days. The secondary intervention was to enhance awareness of errors and mandatory prescriber education. The vaccination error rate will be measured based on voluntary error reporting and compared the two time periods to determine the impact of the interventions on prescribing immunization errors. Results/Conclusion: The quality improvement project is in the data collection phase. Final results with conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Recognize common factors contributing to immunization errors in a pediatric health-system
Discuss the importance of age restrictions on prescribing immunizations

Self Assessment Questions:
Which of the following is a common risk factor for DTaPs errors in a primary care clinic?
A: Confusion between numerous age-dependent formulations
B: Unfamiliarity with dosing and timing of vaccines based on patient's age
C: Failure to verify the patient's age prior to administration
D: All of the above

Which of the follow is NOT a reason to decrease immunization errors in a pediatric setting?
A: Decrease unnecessary injury to a patient
B: The risk for vaccine errors is low
C: Ensure patients are being appropriately immunized
D: Cost savings

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-926-L05-P
Activity Type: Knowledge-based Contact Hours: 0.5

EFFECT OF OPIOID TOLERANCE ON PATIENT REPORTED SATISFACTION OF INPATIENT PAIN MANAGEMENT

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Purpose: Patient satisfaction with pain management correlates with overall patient satisfaction. Limited research is available identifying factors that impact inpatient satisfaction with pain control. Physical dependence and opioid tolerance further complicate acute pain management. This study compared patient reported Hospital Consumer Assessment of Healthcare Providers & Systems (HCAHPS) survey pain scores in medically ill opioid tolerant patients versus opioid naïve patients admitted to a community hospital. Methods: This was a retrospective cohort study of patients 18 years of age and older discharged from our institution between July 1, 2012 and June 30, 2013 who completed the pain portion of the HCAHPS survey. Exclusion criteria included admission to the ICU or observation unit, psychiatric diagnosis, and admission for a surgical procedure. The primary endpoint compared "always" responses between opioid tolerant and opioid naïve patients to questions within the pain domain of the survey. Secondary endpoints included: patient demographics, medication reconciliation, nurse documented pain scores, toxicology results, time to pain medication initiation, hourly nurse rounding, and HCAHPS overall patient satisfaction scores. Results: There were 191 patients randomly selected for review, 150 patients met inclusion criteria, and 30 patients were opioid tolerant on admission. There was no significant difference in response rates to the HCAHPS survey pain domain questions between opioid tolerant patients and opioid naïve patients, (pain controlled: p=0.224, pain staff: p=0.275). Satisfaction with pain control was significantly improved with nurse documented pain scores (p=0.048), documentation of pain scores every 4 hours (p=0.012), appropriate medication reconciliation in opioid tolerant patients (p=0.024), and appropriate medication reconciliation in patients who were currently taking any opioid prior to admission (p=0.011). Conclusion: There is no difference in patient satisfaction with pain management between patients who are opioid tolerant and opioid naïve prior to admission. There is potential to increase patient satisfaction with pain control by focusing on appropriate nurse documentation and opioid medication reconciliation.

Learning Objectives:
Discuss the difference between opioid tolerance, opioid dependence, and addiction and how each term relates to acute pain management. Identify areas of focus that may lead to an increase in patient satisfaction with inpatient pain management.

Self Assessment Questions:
Which of the following is true regarding opioid tolerance?
A: Opioid tolerance is compulsive use of a drug despite physical harm
B: Opioid tolerance is suspected when there is a decreased physiologic response
C: Opioid tolerance is manifested as a drug specific withdrawal syndrrom
D: Opioid tolerance usually involves impaired control over drug use

Based on the research presented, which of the following may be associated with an increased overall patient satisfaction with inpatient pain management?
A: Appropriate opioid medication reconciliation on admission
B: Appropriate nurse documentation of pain scores
C: Patients who are opioid naïve prior to admission
D: Both A and B are correct

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-639-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Management of post-operative fluid balance continues to be controversial in critically ill patients. While the importance of adequate fluid resuscitation has been demonstrated, emerging data in trauma, surgical and acute lung injury patients suggest that a positive fluid balance is associated with increased morbidity and mortality. Currently there is no literature to guide late fluid management in trauma or acute care surgical patients. The objective of this study is to determine the impact of late fluid balance management after initial adequate fluid resuscitation on in-hospital mortality for critically ill surgical and trauma patients. A single-center retrospective cohort study comparing patients with conservative versus liberal fluid management at day 7 will be performed. Mechanically ventilated patients between the ages of 18 and 89 admitted to the Surgical Intensive Care Unit (SICU) at The Ohio State University Wexner Medical Center (OSUWMC) between November 1, 2011 and October 1, 2013 who underwent a surgical procedure within 24 hours preceding or following SICU admission will be eligible for evaluation. Patients must have adequate initial fluid resuscitation, defined as urine output \( \geq 0.5 \text{ml/kg/hr} \) for the initial 12 hour post-operative period, in order to be included. Exclusion criteria include incarceration, pregnancy, SICU length of stay <7 days or admission to any of the following services: Neurosurgery, Neurovascular, Burn, Ear/Nose/Throat Peripheral Vascular Surgery, Oral Maxillofacial Surgery or Post-partum OB. A multivariable logistic regression model will be used to compare in-hospital mortality between patients with liberal versus conservative fluid balance at 7 days. Conservative fluid balance is defined as \( \leq 5 \text{L positive} \), whereas liberal fluid balance is used to describe patients >5L positive. Secondary outcomes to be assessed include fluid balance at 3 and 7 days, total duration of mechanical ventilation, ICU and hospital length of stay, and total hospital and ICU cost. Data collection and evaluation are currently being conducted.

**Learning Objectives:**

Review current literature evaluating fluid resuscitation and management
Discuss concerns with positive fluid balance and potential impact on clinical outcomes

**Self Assessment Questions:**

The importance of adequate initial fluid resuscitation has been repeatedly demonstrated the following patient population:

A. Diabetes mellitus
B. Liver failure
C. Septic shock
D. Hematologic malignancy

Which of the following is a proposed consequence of positive fluid balance?

A. Hyperglycemia
B. Venous thromboembolism
C. Prolonged duration of mechanical ventilation
D. Shorter ICU length of stay

Q1 Answer: C  Q2 Answer: C
ANALYSIS OF EPOETIN AND DARBEPOETIN USE WITHIN THE OHIO STATE UNIVERSITY WEXNER MEDICAL CENTER
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PURPOSE The purpose of this study was to analyze the use of the erythropoiesis stimulating agents, epoetin and darbepoetin, to determine the feasibility of streamlining to one formulary agent. The primary objective was to characterize use between epoetin and darbepoetin within The Ohio State University Wexner Medical Center (OSUWMC). The secondary objective was to evaluate clinical use of epoetin and darbepoetin to ensure baseline labs were available and justified the initiation of these medications. METHODS Researchers used an electronic medication record (EMR) generated report of patients prescribed an erythropoiesis stimulating agent between January 1, 2013 to December 31, 2013 at OSUWMC. A retrospective chart review characterized patients by medical service, indication, and admitting diagnosis and whether they were being treated with epoetin or darbepoetin. For this retrospective, observational study, the following data were collected and assessed: renal function, iron studies, supplemental therapy, and outcome. This was an exploratory study and the sample size was driven by the expected patient population size rather than statistical power. RESULTS Final results are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Identify when erythropoiesis stimulating agents are appropriate for use based on laboratory results
Recognize the feasibility of having one erythropoiesis stimulating agent on formulary

Self Assessment Questions:
What lab values are most important in determining whether a patient meets the requirement for an erythropoiesis stimulating agent?
A Albumin, Alkaline Phosphatase
B Folate, Vitamin B12
C Iron saturation, Hemoglobin
D Mcv, bun
Which of the following are true regarding epoetin and darbepoetin use?
A Changes in hemoglobin usually occur 3-4 hrs after administration c
B A hemoglobin lab value of 13 is an appropriate indication for darbe
C Epoetin is commonly dosed less frequently than darbepoetin
D Darbepoetin has a longer half life than epoetin

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-416 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5

EVALUATION OF THE 24/7 EMERGENCY DEPARTMENT MEDICATION RECONCILIATION PILOT
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Purpose: Accurate medication reconciliation is a key aspect of delivering safer care to patients throughout their hospital admission. In response to the Pharmacy Practice Model Initiative (PPMI), OhioHealth has expanded the role of pharmacy technicians and interns to include conducting medication histories in the emergency department. The objective of this study was to evaluate the impact of a new 24/7-admission medication reconciliation service in the emergency department. Methods: A single-center, retrospective review of emergency department admission records and clinical surveillance software at a tertiary care hospital during a two month pre-implementation evaluation phase and two month post-implementation evaluation phase was used to identify patients who received medication reconciliation conducted by a pharmacy technician. The following data were collected for patients documented using clinical surveillance software: number and type of documented intervention(s), time from decision to admit patient to time admission orders were received, reason medication reconciliation was not completed prior to admission (if applicable), time spent per patient on medication reconciliation, internal and external methods for obtaining information relevant to medication reconciliation, and time of day when medication reconciliation was performed. Overall patient capture rate and mean time spent per patient performing medication reconciliation were also calculated. A satisfaction survey was also administered to assess physician perceptions of satisfaction with the expanded pharmacy service. Results: Data collection and analysis is currently in progress. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Describe the frequency and type of medication discrepancies identified by pharmacy technicians as a part of the medication reconciliation process.
Identify the average time pharmacy technicians spent with patients on medication reconciliation activities.

Self Assessment Questions:
Which of the following was one of the most common interventions documented by pharmacy technicians during the medication reconciliation process?
A Clarified Last Dose
B Clarified Allergy
C Clarified Medication
D Clarified Home Pharmacy

What was the most common amount of time spent per patient on medication reconciliation activities?
A <10 minutes
B 10-20 minutes
C 20-30 minutes
D >30 minutes

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-761 -L04-P
Activity Type: Knowledge-based Contact Hours: 0.5
EVALUATION OF AN INSTITUTIONAL PROTOCOL CHANGE TO INCREASE THE MAXIMUM INITIAL INFUSION RATE FOR INTRAVENOUS UNFRACTIONATED HEPARIN

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Purpose: The American College of Cardiology recommends intravenous unfractionated heparin infusions (IV UFH) to run at a maximum initial infusion rate of 1000 units/hr. Mount Carmel Health System (MCHS) changed the institutional protocol, increasing the maximum initial infusion rate from 1000 units/hr (group A) to 1800 units/hr (group B) based on new evidence in treating patients with body mass index greater than 30 kg/m2. The primary objective of this study is to determine if a difference in time to therapeutic activated partial thromboplastin time (aPTT) exists between groups. Secondary outcome include bleeding incidence and the percent of correct versus incorrect draw times. Methods: This retrospective study is approved by the MCHS Institutional Review Board. The study assesses patients 18 years of age and older admitted to MCHS. Those included were on IV UFH infusion for more than 24 consecutive hours between September 1, 2012 and September 30, 2013. Exclusion criteria include: contraindications to infusion for more than 24 consecutive hours between September 1, 2012 and September 30, 2013. Those included were on IV UFH infusions (IV UFH) to run at a maximum initial infusion rate from 1000 units/hr (group A) to 1800 units/hr (group B) based on new evidence in treating patients with body mass index greater than 30 kg/m2. The primary objective of this study is to determine if a difference in time to therapeutic activated partial thromboplastin time (aPTT) exists between groups. Secondary outcome include bleeding incidence and the percent of correct versus incorrect draw times. Results: To date, 102 patients have been evaluated. Time to therapeutic aPTT within 24 hours and 48 hours was found to be 54.9% and 59.6% in group A and 49% and 48.9% in group B, respectively. Percent of correct and incorrect draw times did not differ from group A to B. Group A had 3 patients receiving blood products while on heparin infusions and group B had 4 patients.

Conclusion: Pending final data analysis.

Learning Objectives:
Describe the current literature pertaining to use and administration of intravenous unfractionated heparin (IV UFH).
Discuss the outcomes in increasing the maximum initial infusion rate of IV UFH at a community teaching hospital.

Self Assessment Questions:
What maximum initial infusion rate of intravenous unfractionated heparin does American College of Cardiology recommend?
A: 800 units/hr
B: 1000 units/hr
C: 1500 units/hr
D: 1800 units/hr

Which of the following statements regarding intravenous unfractionated heparin (IV UFH) is true?
A: It is recommended to dose IV UFH based on adjusted body weight
B: The therapeutic activated partial thromboplastin time while on IV UFH
C: The pharmacokinetic and pharmacodynamic properties of heparin
D: Efficacy of IV UFH is measured by the activated partial thromboplastin

Q1 Answer: B Q2 Answer: D

USE OF OMALIZUMAB IN PEDIATRIC PATIENTS WITH MODERATE TO SEVERE PERSISTENT ASTHMA

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Background: Omalizumab is a recombinant humanized monoclonal antibody that binds to free Immunoglobulin E (IgE). Current asthma guidelines include the use of omalizumab as a treatment option for select patients with moderate to severe persistent allergic asthma. Several studies demonstrate the safe and efficacious use of omalizumab to decrease asthma exacerbations in patients with hard to control asthma. Significant improvements in quality of life and decreased inhaled corticosteroid use have also been reported. Purpose: The primary objective of this study is to evaluate the effectiveness of omalizumab in pediatric patients as a component of their asthma treatment regimen. The secondary objective is to develop criteria to assess other pediatric patients who may benefit from omalizumab therapy.

Methods: This study is a retrospective and prospective chart review of all current Akron Childrens Hospital patients receiving omalizumab therapy at either the Boardman or Akron, Ohio outpatient clinic. To be eligible, patients must have received their first dose of omalizumab prior to November 29, 2013. Patients will receive standard asthma care, with no changes in therapy based on study involvement. The following data will be collected: patient demographics; start date of omalizumab treatment; baseline laboratory values, including pre-therapy IgE level, eosinophil and neutrophil percentage, and allergy test results; pre- and post-therapy pulmonary function test (PFT) results; Pediatric Asthma Score (PAS); current medications; and number of asthma-related hospitalizations. Provider documentation will be reviewed to determine patient-reported use of rescue medications, exacerbations, and various quality of life indicators. Data collection and analysis is currently ongoing. Results and conclusions: To be presented at the Great Lakes Residency Conference.

Learning Objectives:
Classify asthma as moderate or severe persistent.
Identify the role of omalizumab in the treatment of asthma in pediatric patients.

Self Assessment Questions:
Which component of severity would you expect to see in a patient who is classified as having severe persistent asthma?
A: Nighttime awakenings ≤ 2 times per month
B: Minor limitations to normal activity
C: Use of a short-acting β2-agonist several times daily for symptoms
D: Normal FEV1 between exacerbations

Omalizumab has been FDA approved for use in which asthma indication?
A: Allergic type moderate to severe persistent asthma
B: Exercise-induced asthma
C: Intermittent asthma
D: Intrinsic, non-allergic type asthma

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-490 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Background: Clinical decision support (CDS) pertaining to adjusting medication doses and frequencies based on patients renal function has been previously described in the literature. Published accounts of renal dosing CDS have described investigators implementing pop-up alerts, which may interrupt the clinicians workflow and lead to alert fatigue. Secondly, the implementation of pop-up alerts has been met with limited success and conflicting results. Currently, no CDS for renal dose adjustment of medications is implemented at Cleveland Clinic. The study investigators were looking to implement a novel method of decision support that goes beyond the use of pop-up alerts.

Objective:
To design, implement, and evaluate real-time renal dosing CDS for providers electronically ordering targeted medications using the electronic health record.

Methodology:
This was an IRB-approved pre/post implementation study that evaluated if implementation of context-based decision support is effective in guiding prescribers to choose initial therapy in accordance with renal dosing guidelines. For this study, we built functionality in our electronic medical record that, upon medication ordering, calculated the patients creatinine clearance and adjusted which dose and frequency are selected by default upon initial appearance to the prescriber. Adult patients were included in the study if they had renal dysfunction defined as a creatinine clearance of less than 50 mL/min and were ordered one of the study’s “target” medications: ciprofloxacin, famotidine, metoclopramide, enoxaparin, gabapentin, and dabigatran. The study’s primary endpoint was the difference in number of orders placed with recommended dose and/or frequency defaults before and after CDS implementation. Secondary endpoints included differences before and after CDS implementation in the following: proportion of orders that generated a renal dosing-related intervention by a pharmacist, cost of therapy, and time-to-verification after order signing.

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

Learning Objectives:
List characteristics of effective clinical decision support
Discuss the effects of utilizing context-based decision support, rather than “pop-up” style alerts

Self Assessment Questions:
Which of the following characteristics should be considered in developing effective clinical decision support?
A: Decision support should be presented at the appropriate point in the workflow.
B: All CDS alerts should display to every clinician involved in the patient’s care.
C: “Pop-up” style alerts are the most effective form of alerting for every situation.
D: Resolution of alerts should require the clinician to input non-pertinent information.

What can be considered an advantage for utilization of context-based renal dosing decision support?
A: “Pop-up” style alerts demonstrate consistent ineffectiveness in the real world.
B: Contextual clinical decision support allows the flexibility to offer different options.
C: Effectiveness of context-based renal dosing decision support has been proven.
D: Context-based renal dosing decision support will eliminate the need for pop-up alerts.

Q1 Answer: A  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-938-L04-P
Activity Type: Knowledge-based  Contact Hours: 0.5
INCIDENCE OF CYTOMEGALOVIRUS AND ACUTE REJECTION IN D+/R- KIDNEY TRANSPLANT PATIENTS ON VALGANCICLOVIR PROPHYLAXIS AFTER MEDICATION DOSE ADJUSTMENTS

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Purpose: The purpose of this project is to compare kidney transplant recipients (KTR) who become leukopenic within the first year post-transplant and determine whether dose adjustments made to cytomegalovirus prophylaxis or immunosuppressant medications (IS) are associated with increased rates of cytomegalovirus disease (CMV-D) and/or acute rejection. Methods: A retrospective chart review was conducted in KTR transplanted between 1/1/2002 and 9/15/2012 who were CMV D+/R-, received valganciclovir prophylaxis, and developed leukopenia (WBC < 3000 cells/mm³). The primary study endpoint was CMV-D as defined by a positive CMV detection assay and CMV-associated symptoms. Secondary outcomes include biopsy-proven acute rejection, graft loss and death within 1 year post-transplant.

Results: A total of 172 patients were included in this study; fifty-one patients developed leukopenia without a change in valganciclovir or IS and 121 patients developed leukopenia with a subsequent change in either valganciclovir or IS. During the specified time period, only 37 (17.6%) patients did not develop leukopenia. There were no differences in baseline characteristics between groups. The majority of patients received antithymocyte globulin for induction and sirolimus and cyclosporine as maintenance IS. Thirty-two patients developed CMV-D; 23 patients (19%) in the Med Change group and 9 patients (17.6%) in the No Med Change group (p=0.83). There were no significant differences between groups for secondary outcomes. No deaths were attributed to complications of CMV-D or rejection. Observed incidence of leukopenia is high especially with the combination of valganciclovir and sirolimus at our center.

Learning Objectives:

Describe reasons why kidney transplant recipients may become leukopenic after transplant
Identify potential options for CMV prophylaxis in kidney transplant recipients

Self Assessment Questions:

Which of the following are possible contributors to leukopenia after kidney transplantation?
   A. Sirolimus
   B. Valganciclovir
   C. Antithymocyte globulin
   D. All of the above

What do IDSA guidelines recommend for CMV prophylaxis in kidney transplant recipients?
   A. Universal prophylaxis
   B. Preemptive therapy
   C. Both A and B
   D. None of the above

Q1 Answer: D    Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-345-L01-P
Activity Type: Knowledge-based    Contact Hours: 0.5
EVALUATION OF CYTOMEGALOVIRUS PROPHYLAXIS REGIMEN IN HIGH AND MODERATE-RISK HEART TRANSPLANT RECIPIENTS AT CLEVELAND CLINIC

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Background: Risk of developing cytomegalovirus (CMV) infections after heart transplant is determined by the CMV status of the donor and recipient. Patients are at a high risk for developing CMV if they are CMV negative and receive a heart from a CMV positive donor. Recipients that are CMV positive are at a moderate risk of developing CMV regardless of the donors CMV status. The International Society of Heart and Lung Transplantation (ISHLT) recommends CMV prophylaxis for the first three months after transplant utilizing valganciclovir or ganciclovir in high and moderate-risk recipients. At Cleveland Clinic, valganciclovir prophylaxis is only prescribed in high and moderate-risk patients for the first month post-transplant followed by two months of acyclovir prophylaxis. The effect of this shortened duration of valganciclovir prophylaxis has not been studied.

Objective: To determine the incidence of CMV in high and moderate-risk heart transplant patients at Cleveland Clinic.

Methodology: This study is an IRB-approved non-interventional retrospective chart review. Adult heart transplant recipients that received post-transplant care at Cleveland Clinic from January 1, 2008 to December 31, 2012 and are high or moderate-risk for CMV infection will be included. Data will be collected for one year post-transplant. Patients that are low-risk for CMV infection will be excluded. Data describing demographic characteristics, CMV episodes, and risk factors for CMV infection and rejection will be collected. The primary objective is to determine the incidence of CMV in high and moderate-risk heart transplant recipients. Secondary objectives include determining the time to CMV development post-transplant, comparing the incidence of CMV infection and disease at Cleveland Clinic to rates reported in the literature and describing the rate of rejection. Descriptive statistics will be utilized for the primary and secondary objectives. Results and Conclusions: To be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
- Identify the appropriate duration of cytomegalovirus prophylaxis based on the International Society of Heart and Lung Transplantation guidelines.
- Describe the risk of CMV infection based on donor and recipient CMV status.

Self Assessment Questions:

According to the International Society of Heart and Lung Transplantation what is the recommended duration of cytomegalovirus prophylaxis in heart transplant recipients?

A: 1 month  
B: 3 months  
C: 6 months  
D: 12 months

Which of the following donor/recipient matches is at the highest risk of developing CMV?

A: Donor negative/Recipient positive  
B: Donor negative/Recipient negative  
C: Donor positive/Recipient negative  
D: Donor positive/Recipient positive

Q1 Answer: B  Q2 Answer: C

MORTALITY RATES OF INFANTS TREATED WITH HIGH-DOSE SILDENAFIL

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Purpose: Sildenafil is commonly used for the treatment of pulmonary hypertension (PH) in pediatric patients. Previous data have shown a decrease in mortality with sildenafil use for PH; however, the STARTS-2 trial described a dose-dependent increase in overall mortality for patients ages 1-17 years (20% high dose, 14% moderate dose, and 9% low dose). Long term mortality in infants <8 kilograms who receive sildenafil has not been well described in the literature. This study will describe the overall mortality rate of infants treated with "high-dose" sildenafil at CCHMC. This rate will be compared to the 9% mortality rate seen in the 8-20 kilogram high-dose subgroup of the STARTS-2 study, since this subgroup most closely matches the age and weight of our study population.

Methods: Infants <8 kilograms with PH who were initiated on high-dose sildenafil from January 2007- January 2012 were included. "High dose" was defined as a dose >3 mg/kg/day for >7 days. Those on concomitant PH medications or ECMO were also included. The primary outcome was overall mortality. Results: Among 141 infants initiated on sildenafil from 2007-2012, 85 were treated with high-dose sildenafil. There were 20 patients lost to follow up and 12 recorded deaths. Female sex (p=0.0117) and an etiology of sepsis (p=0.0082) were found to be significantly different between the surviving and non-surviving groups. Surviving patients were found to have started sildenafil at an earlier age (39 days vs. 97 days; p=0.0196). The overall mortality rate was greater than that observed in the 8-20 kilogram subgroup of the STARTS-2 study (14% vs. 9%, p=0.575). Conclusions: Infants treated with high-dose sildenafil at CCHMC had a higher mortality rate than the 8-20 kilogram subgroup of the STARTS-2 trial.

Learning Objectives:
- Review the mechanism of action of sildenafil and its place in therapy for management of pediatric pulmonary hypertension.
- Discuss the literature supporting the current FDA recommendation for sildenafil use in pediatric patients.

Self Assessment Questions:

By what mechanism is sildenafil effective for treatment of pulmonary hypertension?

A: Inhibits phosphodiesterase type 3 (PDE-3) in cardiac and vascular smooth muscle  
B: Inhibits phosphodiesterase type 5 (PDE-5) in smooth muscle of pulmonary vessels  
C: Blocks endothelin receptors on vascular endothelium and smooth muscle  
D: Acts as prostacyclin leading to vasodilation of all vascular beds

Why did the FDA recently issue a warning regarding high-dose sildenafil therapy in pediatric patients?

A: High-dose sildenafil leads to adverse cardiac outcomes in pediatric patients  
B: Pediatric patients were found to have significant neutropenia following sildenafil therapy  
C: Pediatric patients were found to have a dose-dependent increase in mortality  
D: Pharmacokinetic differences in pediatric patients render sildenafil ineffective

Q1 Answer: B  Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-630-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
ANTIBIOTIC COST SAVINGS ASSOCIATED WITH COST VISIBILITY IN THE ELECTRONIC MEDICAL RECORD

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Purpose: Medication costs can contribute significantly to the cost of healthcare. “Create the Future Now” (CFN) at The Ohio State University Wexner Medical Center (OSUWMC) is a recent initiative with the overarching goal of developing new programs to create a more efficient, value-driven medical center. Currently, there is no literature evaluating the impact of a passive antibiotic cost visibility tool on antibiotic prescribing. As part of the CFN initiative, we developed an observational study to evaluate the impact of a cost visibility tool that displays relative antibiotic cost upon order entry into the OSUWMC electronic medical record. This study will evaluate the impact of antibiotic cost visibility using antibiotic cost per 1000 patient days adjusted for case mix index during three timeframes: pre-CFN (November 2011 to October 2012), post-CFN (November 2012-May 2013) and post-cost visibility tool implementation (June 2013-December 2013). Methods: We will conduct a segmented regression analysis of interrupted time series data to evaluate the impact of an antibiotic cost visibility tool in the OSUWMC electronic medical record. Antibiotic administrations and cost will be identified using the OSUWMC Antimicrobial Datamart, a database aggregating historical antimicrobial use information. Monthly cost of the statin drug class, a group unaffected by the CFN initiative and cost visibility tool, will be used as a “comparator” group. The cost visibility tool is posted on the OSUWMC intranet and the number of views will be evaluated. Subgroup analyses will be performed by hospital service and unit utilizing the same methodology. Results: Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Describe the process of developing and implementing a passive educational tool to enhance awareness of antibiotic cost
Discuss the impact of an antibiotic cost visibility tool on antibiotic prescribing

Self Assessment Questions:
When evaluating current literature, what type of intervention has demonstrated the most consistent success?
A: Active cost visibility interventions
B: Passive cost visibility interventions
C: Neither intervention has been successful
D: Both interventions have demonstrated equal success

When assessing the impact of an antibiotic cost visibility tool on antibiotic prescribing, which of the following could potentially confound the data:
A: Seasonality
B: Patient Severity Scores
C: Contract price changes
D: All of the above

Q1 Answer: A  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-742-L04-P
Activity Type: Knowledge-based  Contact Hours: 0.5

EVALUATION OF A POST-DISCHARGE HEART FAILURE MEDICATION RECONCILIATION CLINIC

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Purpose: The emergence of the Centers for Medicare and Medicaid Services pay for performance standards has resulted in reduction in reimbursement rates for heart failure (HF) readmissions. This has led to various strategies being evaluated to reduce hospital readmissions in patients with HF. Many of the strategies associated with reduction in readmissions include early patient follow-up within seven days after discharge. At the Louis Stokes Cleveland Department of Veteran Affairs Medical Center (LSCDVAMC), the goal of the HF medication reconciliation clinic is early optimization of medication therapy after a HF hospitalization. The objective of this project is to compare the all-cause 30-day readmission rates in HF patients who are seen post-discharge at the HF medication reconciliation clinic to a control group of patients who receive usual post-discharge care.
Methodology: This is a case-control retrospective chart review at LSCDVAMC. Patients will be identified via HF medication reconciliation clinic records from January 1, 2008 to March 1, 2013. Demographic data will be collected at the date of discharge in both groups. Outcome data collected will include the dates of the index hospitalization discharge and any readmissions and/or ED visits, reason for readmission or ED visit, total number of readmissions and ED visits, dates of follow-up visits, medication changes at each visit, and death within 6 months following index HF discharge. Differences in categorical variables will be assessed with the Pearson Chi Squared test, and differences in continuous variables will be assessed with the Student T-test. To detect a 50% decrease in the primary endpoint with a power of 0.80, α =0.05, and effect size of 0.22, this study will require a total sample of 165 patients. The total anticipated sample size is 200 patients. Results/conclusions: Results pending, will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Discuss heart failure hospitalization, 30-day readmissions, and strategies to reduce readmissions.
Explain the role of pharmacists in the heart failure medication reconciliation clinic at LSCDVAMC.

Self Assessment Questions:
Which of the following organizations will reduce reimbursement rates for heart failure readmissions within 30 days?
A: American Hospital Association
B: Centers for Medicare and Medicaid Services
C: Food and Drug Administration
D: Joint Commission on the Accreditation of Healthcare Organizations

Which of the following statements is correct?
A: Heart failure hospitalization is associated with high morbidity
B: Heart failure hospitalization is associated with an increase in health care utilization
C: Patients admitted for heart failure are at high risk of readmission within 30 days
D: All of the above

Q1 Answer: B  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-548-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
Background: Heparin-induced thrombocytopenia (HIT), an immune-mediated reaction, results in thrombocytopenia in the setting of heparin exposure. Diagnosis of HIT is based on both clinical and serologic findings. The validated 4Ts scoring system helps clinicians determine the probability of HIT in their patients. Patients with low pretest probability do not require lab testing for serologic markers and may continue heparin therapy. Lab tests include the anti-platelet factor-4 (anti-PF4) test and serotonin release assay (SRA). The limitation of the anti-PF4 test is its relatively low specificity for platelet-activating antibodies and consequential risk of false-positive results. The limitations of the SRA are its relatively low sensitivity, cost, and delayed results. Despite validation of the 4Ts scoring system and established guidelines, clinical practice seems to vary with regards to the approach in the diagnosis of HIT in the CV-ICU at the Cleveland Clinic.

Objectives: Determine the appropriateness of anti-PF4 lab test ordering based on pre-test probability of HIT and evaluate cost implications with unnecessary lab tests and use of HIT agents

Methodology: A retrospective chart review was conducted to determine the appropriateness of anti-PF4 lab test ordering from August 2012-2013. The inclusion criteria consisted of adult post-cardiac surgery patients in the CV-ICU exposed to any form of parenteral heparin and ordered an anti-PF4 lab test. The exclusion criterion consisted of any patient in whom history of heparin exposure could not be determined. Data was collected regarding demographics, cardiac surgery, heparin exposure, platelet count, other 4Ts criteria, and HIT diagnosis and therapy. A 4Ts score was calculated for each subject using the scoring system in the 2012 CHEST guidelines. The anti-PF4 test was deemed appropriate if the 4Ts score was intermediate or high.

Results will be reported in aggregate using descriptive statistics.

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

Learning Objectives:
Discuss potential causes of thrombocytopenia after cardiac surgery
Explain how the 4Ts score can be utilized in the diagnosis of HIT

Self Assessment Questions:
All of the following are potential causes of thrombocytopenia following cardiac surgery except:
A: ECMO support
B: Exposure to high doses of heparin intra-operatively
C: Multiple blood transfusions
D: Exposure to chemotherapy one year ago

If a patient has a low 4Ts score (≤3), the clinician should:
A: Order an anti-PF4 test to confirm HIT diagnosis
B: Order the serotonin release assay (SRA) to confirm HIT diagnosis
C: Monitor the patient closely and consider other causes of thrombocytopenia
D: Stop all routes of heparin and begin a HIT agent

Q1 Answer: D  Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-563 -L01-P

Activity Type: Knowledge-based  Contact Hours: 0.5
**THE IMPACT OF PHARMACIST EDUCATION IN PATIENTS WITH HEART FAILURE ON DISEASE STATE AND MEDICATION KNOWLEDGE: THE TEACH TRIAL**


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**Purpose:** Current literature suggests that hospital readmissions result from a multitude of factors, including poor patient understanding of disease states, uncertainty in appropriate medication use after discharge, and lack of awareness of warning signs warranting a call to their physician. Heart failure is one of the top reasons for readmissions and a potential target for patient education. The objectives of this study are to determine the impact of pharmacist education about heart failure and associated medications on 1) patient knowledge of the disease state and 2) heart failure 30-day hospital readmission rates. Methods: This prospective, randomized, single-center study will include patients greater than 18 years of age that are admitted with an active diagnosis of heart failure, and recent (within one year) documentation of an ejection fraction. The control group will receive standard of care, including heart failure education by nursing and dietary staff, while the intervention group will receive standard of care plus pharmacist provided education focusing on heart failure and associated medications. Both groups will receive a pre- and post-assessment tool, adapted with permission from the Atlanta Heart Failure Knowledge Test, during their hospitalization. Goal enrollment is a total of 64 patients (32 patients per group) to have 80 percent power to detect a 10 percent difference in post-assessment scores between groups. A chi-squared test will be used to compare achievement rates of a 10 percent difference when comparing groups.

**Results and Conclusions:** Data collection and analysis are currently being conducted.

**Learning Objectives:**
- Describe the epidemiology, pathophysiology and treatment recommendations for heart failure.
- Discuss current literature regarding heart failure readmissions with pharmacy involvement.

**Self Assessment Questions:**
Which of the following class of medications is not recommended in heart failure?
- A Beta-blockers
- B: Angiotensin Receptor Blockers
- C: NSAIDs
- D: Diuretics

Which of the following interventions made by pharmacists have been studied in current literature?
- A Education
- B Medication reconciliation
- C Follow-up phone call post-discharge
- D: All of the above

**Q1 Answer:** C  **Q2 Answer:** D

**Activity Type:** Knowledge-based  **Contact Hours:** 0.5
IMPACT OF DRUG SHORTAGES ON BOWEL RECOVERY IN PATIENTS RECEIVING TOTAL PARENTERAL NUTRITION AFTER EXPLORATORY LAPAROTOMY

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Purpose: Drug shortages have continued to affect healthcare institutions across the United States as product shortages continue to increase. Nearly 20 total parenteral nutrition (TPN) products have been on the product shortage list since the spring of 2010. Since one of the most common causes of post-operative ileus is electrolyte abnormalities, TPN product shortages are likely to negatively impact bowel recovery in such patients and result in the need for longer TPN treatment durations. The objective of this study is to evaluate the impact of TPN related drug shortages on bowel recovery in patients receiving TPN after exploratory laparotomy at the Ohio State University Wexner Medical Center (OSUWMC).

Methods: A retrospective review will be conducted for patients admitted to OSUWMC who received TPN from January 1, 2006 to September 30, 2013. To be included, patients must have undergone exploratory laparotomy. Data collection will include: age, gender, weight, pre-albumin, C-reactive protein, electrolyte laboratories (potassium, magnesium, and phosphate), total daily doses of additional electrolyte replacement given, additional laboratory draws required due to additional electrolyte replacement, total daily caloric components (kcal of lipids, kcal of protein, kcal of dextrose, and kcal total), total number of days from surgery to TPN initiation, total number of days of TPN therapy, number of days to reach TPN goal rate, and whether patient was discharged on TPN. A Charlson Score will be calculated for each patient. Results: Study outcomes remain under investigation, with data collection and evaluation currently being conducted.

Learning Objectives:
- List common reasons for sterile injectable medication shortages
- Recall the most common causes of prolonged ileus

Self Assessment Questions:
- The most common reason for a sterile injectable medication shortage is:
  A Delays or capacity problems  B Discontinuation of product  C Loss of manufacturing site  D Product quality issues
- Which of the following is a common cause of prolonged ileus?
  A Electrolyte abnormalities  B Repeated exposure to nut allergens  C Jaundice  D Orthopedic surgery

Q1 Answer: D Q2 Answer: A

Efficacy of Baclofen in the Treatment of Acute Alcohol Withdrawal

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Purpose: Acute alcohol withdrawal is a common cause of morbidity among hospitalized patients. The standard of care for treating alcohol withdrawal is benzodiazepines with variable dosing based on symptoms. However, using benzodiazepines at high doses can lead to prolonged hospitalization and increased morbidity. Baclofen is a gamma-aminobutyric acid - B receptor agonist that may assist in treating alcohol withdrawal. There have been a limited number studies that show favorable outcomes when combining baclofen with benzodiazepines. The objective of this study is to determine the effect of baclofen on the total dose of lorazepam required for the treatment of acute alcohol withdrawal.

Methods: This is an Institutional Review Board approved retrospective, cohort study from January 2012 to December 2013 comparing the effect of baclofen to no baclofen on the total dose of lorazepam required for acute alcohol withdrawal. Patients were included if they were 18 years of age or older and received treatment with lorazepam via the Clinical Institute Withdrawal Assessment of Alcohol revised scale (CIWA-Ar) for a documented diagnosis of acute alcohol withdrawal. Data collection included demographic information, lorazepam usage, baclofen usage, alternate sedative usage, length of time on the ventilator, critical care and hospital length of stay. Patients were divided into two groups for analysis: patients receiving baclofen and lorazepam via the CIWA-Ar scale and patients receiving only lorazepam via the CIWA-Ar scale. The primary endpoint is the total amount of lorazepam received during hospitalization. Secondary outcomes include an analysis of the length of hospital stay, time in the intensive care unit, and length of time on the ventilator. Patient identifiers were removed prior to data analysis to maintain patient confidentiality.

Results & Conclusions: Data analysis in progress, to be presented at the Great Lakes Pharmacy Resident Conference

Learning Objectives:
- Describe treatment options for patients experiencing acute alcohol withdrawal
- Discuss current literature involving baclofen in the treatment of acute alcohol withdrawal

Self Assessment Questions:
- At what score should treatment for acute alcohol withdrawal be initiated based on the CIWA-Ar scale?
  A 5 or greater  B 10 or greater  C 15 or greater  D 20 or greater

Based on available literature, what dose of baclofen is utilized in the treatment of acute alcohol withdrawal?
- A 5 mg by mouth three times daily  B 10 mg by mouth three times daily  C 15 mg by mouth three times daily  D 20 mg by mouth three times daily

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-384 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Background: Although oseltamivir is recommended as the treatment of choice for severe influenza, the optimal dose is a topic of debate. The approved dose is 75mg twice daily (or renally-adjusted equivalent), regardless of severity of illness. However, the Centers for Disease Control suggest using higher doses of oseltamivir (i.e. 150mg twice daily) may be warranted for severe influenza. Unfortunately, there are limited data comparing high dose to standard dose oseltamivir. To date, there has been no published study evaluating outcomes with high dose oseltamivir exclusively in patients admitted to the intensive care unit (ICU).

Objective: To evaluate differences in clinical outcomes for severely ill ICU patients receiving high dose (>150mg total daily dose equivalent) or standard dose (≤150mg total daily dose equivalent) oseltamivir for the treatment of influenza

Methodology: A non-interventional, retrospective chart review will be conducted to primarily evaluate differences in ICU length of stay for severely ill patients with influenza receiving high dose or standard dose oseltamivir. Secondary objectives include comparing the change in Sequential Organ Failure Assessment (SOFA) Score between 0 and 48 hours after oseltamivir initiation (delta SOFA0-48h), and differences in cure rate, hospital length of stay, and mortality rate. Adult patients admitted to the ICU, who required supplemental oxygen above their baseline requirements, had laboratory identification of influenza virus, and received treatment with oseltamivir for at least 24 hours will be included. Data describing patient demographics, baseline characteristics, ICU length of stay, delta SOFA0-48h, cure at day 5, duration of oxygen requirements above baseline, hospital length of stay, and 28 day mortality will be collected. Nominal data will be analyzed using the Chi-Square or Fishers exact test and continuous data will be analyzed using the Students t-Test or the Mann-Whitney U-Test, as appropriate.

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

Learning Objectives:
Discuss the current literature evaluating high dose versus standard dose oseltamivir in patients with influenza admitted to the intensive care unit
Describe the design and methods of the current study

Self Assessment Questions:
Which of the following statements is correct?
A: High dose oseltamivir (>75mg BID) has been shown to decrease n
B: High dose oseltamivir has been shown to decrease time on mecha
C: High dose oseltamivir has been shown to decrease ICU length of s
D: There has been no study evaluating high dose versus standard do

What is the FDA approved dose for influenza treatment in a patient with normal renal function?
A 150 mg BID
B 75 mg BID
C 150 mg once daily
D 75 mg once daily

Q1 Answer: D  Q2 Answer: B

ACPE Universal Activity Number  0121-9999-14-665-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
PRESCRIBER UTILIZATION OF OHIO AUTOMATED RX REPORTING SYSTEM (OARRS), A PRESCRIPTION MONITORING PROGRAM.

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Purpose: Ohio utilizes a system known as the Ohio Automated Rx Reporting System (OARRS) that tracks all controlled medications as well as tramadol containing products. Pharmacists and prescribers are required by law to request and review an OARRS report before dispensing or prescribing OARRS reported medications. The study investigated factors that predict increased or decreased level of effect an OARRS report has on the decision to write an OARRS reported medication, factors prescribers do not have OARRS access, and method of documentation for OARRS use. The primary outcome is to determine the statewide utilization of OARRS and the factors that impact use. Secondary objectives include: current access to OARRS, Ohio county of practice, reasons for use, perceived impact OARRS has on practice, individual actually requesting the OARRS report for the practice, and method of documentation for receipt and review of the report. All information is stored in a password-protected computer in a limited access area within Akron General Medical Center and all data was collected without personal identifiers.

Learning Objectives:
Discuss the current laws and requirements surrounding the Ohio Automated Rx Reporting System (OARRS)
Report the findings of an Ohio statewide survey conducted to determine prescriber utilization of the Ohio Automated Rx Reporting System (OARRS)

Self Assessment Questions:
Which of the following is true regarding documentation of a report obtained from the Ohio Automated Rx Reporting System (OARRS)?
A. Documentation of receipt and review is only necessary for pharmacy
B. Documentation of receipt and review is not required for patients that exhibit signs of abuse or misuse
C. Documentation of receipt and review can be done by placing a copyspace
D. Documentation of receipt and review must be completed for all patients

Which of the following people can obtain their own personal account for the Ohio Automated Rx Reporting System (OARRS)?
A. Registered Nurse
B. Law enforcement officer
C. Medical Assistant
D. Pharmacy Technician

Q1 Answer: D Q2 Answer: B

ANTIBIOTIC STEWARDSHIP AND RAPID DIAGNOSTIC TESTING IN AN ACADEMIC EMERGENCY DEPARTMENT: OPPORTUNITIES FOR GONORRHEA AND CHLAMYDIA

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Emergency departments provide a key role in diagnosis and treatment of gonorrhea and Chlamydia. However, patients who receive presumptive treatment for these sexually transmitted diseases (STDs) typically have left the emergency department before diagnostic test results are available. This results in antibiotic exposure to patients who often do not have gonorrhea or Chlamydia. Such unnecessary antibiotic exposure drives antibiotic resistance in the community. Rapid diagnostic testing that can provide sensitive and specific results in 90 minutes or less is currently available. The purpose of this study is to examine the potential impact of rapid diagnostic testing on antibiotic treatment of Chlamydia and gonorrhea in an academic emergency department should rapid diagnostic testing be used instead of current methods.

Results and Conclusions: Data analysis in progress, results to be presented.

Learning Objectives:
Define the potential impact of rapid diagnostic testing on antibiotic treatment of Chlamydia and gonorrhea in an academic emergency department should rapid diagnostic testing be used instead of current methods.

Self Assessment Questions:
Presumptive treatment of STDs drives:
A. Increased rates of STDs in the community
B. Increased antibiotic resistance
C. Increased high-risk behavior
D. Increased testing for STDs

Rapid diagnostic testing for gonorrhea and Chlamydia can provide results in _______ or less.
A. 90 minutes
B. 30 minutes
C. 15 minutes
D. 5 minutes

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-814-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5

ACPE Universal Activity Number 0121-9999-14-896-L03-P
Activity Type: Knowledge-based Contact Hours: 0.5
Purpose Surgical site infections (SSI) increase patient morbidity, healthcare costs, and can adversely affect hospital microbiologic flora. As such, adherence to SSI reduction strategies is essential for healthcare systems to improve patient care. SSI associated morbidity and mortality can potentially be reduced with risk factor mitigation, but few studies have evaluated adherence to recommended SSI prevention strategies and SSI risk factors. Risk factor identification can influence many perioperative measures (i.e., antibiotic choice, dose, duration; minimizing endogenous and exogenous risk factors) to further reduce SSI. The purpose of this study is to identify and compare risk factors for the development of SSIs in National Healthcare Safety Network reportable surgeries versus patients without SSI in a similar surgery. In addition, the collected data will provide insight into microbiologic etiologies and resistance patterns, especially in comparison to hospital specific antibiograms.

Methods This study is a single center, case control, retrospective chart review. Adult patients admitted to the University of Cincinnati Medical Center from January 1, 2009 to December 31, 2013 will be evaluated for inclusion. The primary outcome will be to compare whether patients with surgical site infections (SSI) will have similar risk factors, adherence to SSI prophylaxis measures, and outcomes to patients without a SSI with a similar surgery. The secondary outcome measured will evaluate whether patients with culture positive SSI have similar sensitivity patterns to the hospital wide antibiogram. Continuous variables will be analyzed using student t test or Wilcoxin rank sum as appropriate. Discrete variables will be analyzed using chi-squared or Fisher exact test, as appropriate. Univariate and multivariate logistic regression will be used for exogenous and endogenous risk factors for patients with SSI versus matched control patients. Incidence of antimicrobial resistance in patients with SSI with repeat infection will also be reported.

Results Data collection and analysis are on-going.

Learning Objectives:
Discuss the endogenous and exogenous risk factors that have been identified with surgical site infections.
Recognize the pathogens most commonly associated with surgical site infections.

Self Assessment Questions:
Which risk factor for surgical site infection is classified as exogenous?
A: Obesity
B: Older age
C: Impaired glucose control
D: Prolonged procedure duration

Which pathogen has been reported to have the highest incidence in surgical site infections?
A: Klebsiella pneumoniae
B: Staphylococcus aureus
C: Pseudomonas aeruginosa
D: Streptococcus pneumoniae

Q1 Answer: D  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-602-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
Background: Intravenous (IV) workflow systems can enhance the overall safety and efficiency of the sterile compounding room through methods such as bar-code scanning, image capturing, and automation in compounding procedures. Although sterile compounding rooms require highly competent technicians that are proficiently trained in calculations and aseptic technique to ensure safe compounding of high risk medications encountered in this setting, it is challenging to objectively evaluate the performance of technicians staffing in this setting. Currently the Cleveland Clinic Pharmacy Department relies on media fill tests, direct observations, and anecdotal reporting to evaluate technician performance within the sterile compounding room. In addition, technicians are required to complete annual competencies that assess calculation abilities. While these evaluation techniques provide some value to managers, they are subjective and provide a limited snapshot of overall performance. IV workflow information systems have the ability to track technician performance metrics. The utilization of objective metrics has yet to be studied and has the potential to enhance productivity and safety in the sterile compounding room. Objectives: The primary objective of this study is to evaluate IV workflow performance metrics and develop standards in terms of safety and productivity that will objectively identify technicians that reach expectations. The secondary objective of this study is to compare performance metrics across three chemotherapy compounding rooms on the main campus of the Cleveland Clinic. Methodology: Following the implementation of the IV workflow system, technician performance metrics will be tracked across all three chemotherapy areas at the Cleveland Clinic. Performance metrics that will be analyzed include compounding time, incorrect product scan rate, and dose rejection rate. Results and Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference.

Self Assessment Questions:
Which of the following is an objective metric that can be captured using IV workflow information systems?
A: Media fill tests
B: Direct observations
C: Anecdotal reporting
D: Dose rejection rate

Which of the following is a technique utilized by IV workflow systems to replace the syringe pull-back method?
A: Bar-code scanning
B: Image capturing during compounding
C: Automated calculations
D: Dose tracking

Q1 Answer: D Q2 Answer: B

IMPLEMENTATION AND EVALUATION OF THE EFFICACY AND SAFETY OF HIGH-DOSE, EXTENDED INTERVAL AMINOGLYCOSIDE ADMINISTRATION IN CHILDREN
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Purpose: Once daily dosing of aminoglycoside antibiotics has been evaluated demonstrating similar efficacy and less risk of toxicity when compared to conventional dosing. Although sterile compounding rooms require unique pharmacodynamic properties including a post-antibiotic effect and concentration-dependent killing that suggest less frequent administration of larger doses can maximize bactericidal activity. Safety concerns include ototoxicity and nephrotoxicity which may be decreased with extended interval dosing due to saturable uptake mechanisms within the renal cortex and inner ear. Currently, no guidelines have been established for standard dosing or monitoring of extended interval dosing of aminoglycosides in children. The purpose of this project is to implement and evaluate the efficacy and safety of a high-dose extended interval aminoglycoside administration protocol in children at ProMedica Toledo Children's Hospital.

Methods: This prospective, single-center analysis includes children five years of age and older who are prescribed an aminoglycoside antibiotic using the high-dose extended interval protocol after February 2014. Patients with suspected or confirmed infections due to susceptible gram negative bacteria will be included.

Patients are excluded if there is abnormal renal function, hemodynamic instability or critical illness, pre-existing hearing impairment, meningitis, endocarditis, CNS infections, or osteomyelitis. Patients that have severe burns, ascites, aminoglycoside use for surgical prophylaxis, enterococcal infections where aminoglycosides are used for synergy, those receiving concomitant ototoxins, have ophthalmological infections, or history of an allergy or hypersensitivity to aminoglycoside antibiotics have been excluded. The primary objective is to evaluate the efficacy of the high-dose extended interval aminoglycoside dosing protocol by analysis of patient outcomes and therapeutic response. Secondary objectives include a safety analysis for occurrence of nephrotoxicity, ototoxicity, and adverse drug reactions. Various in-service educational sessions regarding the new aminoglycoside administration protocol will be provided to all staff affected.

Results and Conclusions: Results and conclusions to be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Explain the properties of aminoglycoside antibiotics that facilitate the use of high-dose extended interval dosing.
Describe appropriate monitoring guidelines for patients receiving high-dose extended interval aminoglycoside antibiotics.

Self Assessment Questions:
What is the mechanism of action of aminoglycoside antibiotics?
A: A. Inhibits bacterial cell wall synthesis by blocking glycopeptide
B: B. Interferes with bacterial protein synthesis by binding to 30S and 50S ribosomal subunits
C: C. Binds to components of the cell membrane of susceptible organisms
D: D. Inhibits RNA-dependent protein synthesis at the chain elongation step

Important monitoring parameters for aminoglycoside antibiotics include which of the following:
A: Serum electrolytes
B: Liver function tests
C: Serum creatinine and BUN
D: Reticulocytes

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-356 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
EVALUATION OF HYPOGLYCEMIC EVENTS DURING TREATMENT OF DIABETIC KETOACIDOSIS
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Purpose: Despite the implementation of a diabetic ketoacidosis (DKA) treatment protocol at Euclid Hospital, hypoglycemia continues to be problematic during DKA treatment. The purpose of this study is to identify the number of hypoglycemic events (blood glucose < 70 mg/dL) and subsequently, evaluate healthcare providers compliance with the 2009 American Diabetes Association (ADA) guidelines for the management of DKA. Methodology: This study has received institutional review board (IRB) approval prior to data collection. A retrospective chart review will be conducted to determine the number of hypoglycemic events that occurred while patients received treatment for DKA in the ICU at Euclid Hospital. Patients 18 years of age and older with an admitting diagnosis of DKA (defined by ADA guidelines) between June 2012 through September 2013 will be included in the study. Patients that are pregnant, initiated on subcutaneous insulin, or had a length of stay less than 24 hours will be excluded. Data collection will include: patient demographics, potassium, anion gap, blood glucose, arterial pH, serum bicarbonate, time to resolution of ketoacidosis, initiation of D5W, and ICU length of stay. The primary outcome will assess the number of hypoglycemic events while receiving treatment for DKA. Secondary outcomes will assess the rate of glucose reduction, initiation of D5W after blood glucose reaches 200-250 mg/dL, potassium level maintenance of 4-5 mmol/L during treatment, time to resolution of DKA (defined according to ADA guidelines), and ICU length of stay. Results and conclusions: Data collection is in process. Results are pending and will be presented at the Great Lakes Residency Conference.

Learning Objectives:
Discuss the recommended blood glucose range that should be maintained until the resolution of DKA.
Recall the appropriate insulin that should be initiated first when treating DKA, based on the 2009 ADA treatment guidelines for DKA.

Self Assessment Questions:
Based on the 2009 ADA guidelines for DKA treatment, what is the proper range to keep blood glucose levels until the resolution of DKA?
A 100-150 mg/dL
B 150-200 mg/dL
C 200-250 mg/dL
D 250-300 mg/dL

What type of insulin is recommended to be initiated first when treating DKA in the ICU, according to the 2009 ADA guidelines for DKA treatment?
A Insulin glargine
B Insulin NPH
C Insulin lispro
D Insulin regular

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-524 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5

RETROSPECTIVE EVALUATION AND OPTIMIZATION OF PHARMACIST WORKFLOW IN A PREOPERATIVE SURGICAL UNIT
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Statement of Purpose Preoperative surgical units present challenges to complying with The Joint Commission (TJC) Standards related to prospective pharmacist medication order review, especially when institutions pre-admission process do not appropriately protect patients from avoidable medication errors by lacking this review. The purpose of this study is to determine the feasibility of a single pharmacist reviewing all medication orders in the preoperative unit based on compliance rate (e.g. number of orders reviewed/number of orders placed) as the primary outcome, as well as various secondary outcomes (e.g. drug allergies, missing information, time spent on interventions, etc.) related to pharmacist intervention.

Statement of Methods Used A retrospective single-center chart review of surgery patients who were admitted to the preoperative unit during a one month period following implementation of pharmacist medication order review at a tertiary, 1,000 bed teaching hospital in Columbus, OH. The design of the medication order review was to dedicate one full time equivalent (FTE) pharmacists to the preoperative unit in order to review all medication orders. The primary outcome of compliance rate was defined as number of orders reviewed / number of orders placed per day and over the entire course of the surveillance period of 20 days (Monday-Friday). Pharmacist interventions were compiled using Microsoft Office Excel spreadsheets and included collection of the following: drug allergy, allergy information missing, allergy reaction/clarification, dosing interventions, drug information/education, patient counseling, drug interactions, stat medication requests, Pyxis issues, and the time spent on interventions.

Summary of (preliminary) results to support conclusion Results are pending and will be presented at the Great Lakes Pharmacy Residency Conference. Conclusions reached Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Discuss the importance of pharmacist prospective medication order review in preoperative surgical units.
Describe pharmacist workflow and optimization of workflow on preoperative surgical units.

Self Assessment Questions:
According to the 2011 ASHP national survey of hospital pharmacy dispensing and administration, what overall percentage of surgery orders are reviewed and approved by pharmacists before administration?
A 2.9%
B 8.4%
C 15.4%
D 28.1%

Based on The Joint Commission (TJC) Surgical Care Improvement Project (SCIP) core measure set, prophylactic Surgical antibiotics should be received within what time period prior to surgical incision?
A 15 minutes
B 30 minutes
C 1 hour
D 2 hours

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-797 -L04-P
Activity Type: Knowledge-based Contact Hours: 0.5
Fondaparinux is an inhibitor of factor Xa commonly used for therapeutic anticoagulation. Complete absorption after subcutaneous administration and a volume of distribution limited primarily to the intravascular space results in a predictable anticoagulant effect not requiring routine monitoring. No differences have been observed in recurrence of venous thromboembolism or major bleeding when comparing patients weighing greater than 100 kilograms (kg) to those weighing less than 100 kg while receiving FDA-approved, weight-based doses of fondaparinux. However, extremes of body weight were not well represented in the studies determining outcomes and adverse effects associated with fondaparinux. It is currently unclear if patients receiving fondaparinux 10 milligrams (mg) once daily will obtain the maximum and minimum average anti-factor-Xa (anti-Xa) concentrations observed in original research. This multi-center, investigator-initiated, prospective pharmacokinetic study aims to determine if variability in anti-Xa concentrations exists between different weight categories in patients weighing greater than 100 kg. Patients admitted to select UC Health inpatient hospitals or with visits scheduled in select UC Health outpatient clinics that weight greater than 100 kg and are receiving fondaparinux 10 mg subcutaneously every 24 hours will be screened for inclusion. Patients with a creatinine clearance less than 30 milliliters per minute will be excluded. Two to three steady-state anti-Xa concentrations (peak, trough, and a 12-hour post-dose level for inpatient subjects) will be collected from each patient enrolled in this study for the purpose of comparing concentrations obtained in patients weighing 100 to 125 kg, 126 to 150 kg, and greater than 150 kg. Anti-Xa concentrations obtained as a result of this research will also be compared to anti-Xa concentrations reported in original research.

Learning Objectives:
Review the pharmacokinetic parameters altered in obesity.
Discuss the clinical value of anti-Xa concentration monitoring in patients receiving fondaparinux.

Self Assessment Questions:
Which of the following pharmacokinetic parameters is altered in obesity?
A Absorption
B Clearance
C Protein binding
D Drug-receptor affinity

What is the average steady-state anti-Xa peak concentration range for fondaparinux?
A 0.14 – 0.19 mg/L
B 0.6 – 1.2 mg/L
C 1.0 – 2.0 mg/L
D 1.20 – 1.26 mg/L

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-650 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Comparative effectiveness of venous thromboembolism prophylactic strategies for ambulatory multiple myeloma patients on immunomodulatory drug therapy

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Purpose Patients with multiple myeloma (MM) are at an increased risk for the development of venous thromboembolism (VTE). The risk of VTE further increases when patients with MM are placed on immunomodulatory (IMID) therapy with thalidomide, lenalidomide, or pomalidomide. The National Comprehensive Cancer Network (NCCN) has developed guidelines with pharmacologic thromboprophylaxis (PTP) strategies for reducing the risk of VTE in patients with MM receiving treatment with an IMID drug. This study aims to determine the incidence of VTE in patients with MM receiving IMID therapy in the ambulatory setting, to determine if there is a difference in VTE frequency between patients placed on PTP with a low molecular weight heparin (LMWH) agent, warfarin, aspirin, or no PTP, and to investigate compliance with national guidelines for VTE prevention provided by the NCCN guidelines. Methods This is a retrospective chart review will include patients with multiple myeloma over 18 years of age receiving IMID therapy between January 2000 and January 2014. Patients receiving pharmacologic treatment for a VTE diagnosed prior to initiation of IMID therapy, patients placed on an IMID agent through a blinded study, and patients without follow-up for at least 6 months after initiation of an IMID will be excluded. Patients will be stratified by placement on a LMWH agent, warfarin, aspirin, or no PTP. Results Data collection and analysis are ongoing.

Learning Objectives:
Identify patients with multiple myeloma on IMID therapy who are at high risk for VTE, according to the NCCN guidelines.
List the recommended options for VTE prophylaxis in patients with multiple myeloma on IMID therapy who are at high risk for VTE, according to the NCCN guidelines.

Self Assessment Questions:
A. Yes
B. No
C. N/A as this patient has a contraindication for receiving lenalidomide
D. Risk assessment cannot be completed with information provided

What are appropriate VTE prophylaxis options in patients with multiple myeloma on IMID therapy who are at high risk for VTE, according to the NCCN guidelines?
A. Low molecular weight heparin (equivalent to Enoxaparin 40 mg on
B. Low molecular weight heparin (equivalent to Enoxaparin 40 mg on
C. Low molecular weight heparin (equivalent to Enoxaparin 40 mg on
D. Aspirin 81-325 mg daily, low molecular weight heparin (equivalent

Q1 Answer: B  Q2 Answer: B
ACPE Universal Activity Number 0121-9999-14-349-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5

Assessment of ventilator-associated events pre and post implementation of chlorhexidine mouthwash prophylaxis in the surgical intensive care unit

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Background: In July 2013, the Centers for Disease Control (CDC) and Prevention published updated guidelines that address Ventilator-Associated Event (VAE) surveillance for infectious complications. The new VAE guidelines have been developed to streamline the surveillance process and provide a more objective approach for evaluating mechanically ventilated adult patients. Many studies demonstrate the benefits of oral chlorhexidine in mechanically-ventilated patients. However, the 2005 Infectious Disease Society of America Guidelines for hospital-acquired, ventilator and healthcare-associated pneumonia do not recommend routine use until more data becomes available. Unlike many of the previous studies that focus on the clinical pulmonary infections score as it relates to outcomes, the new VAE guideline algorithm provides an alternative method of assessing VAE rates. Purpose: The purpose of this study is to assess the rates of ventilator-associated events in the Surgical Intensive Care Unit (SICU) pre and post chlorhexidine mouthwash implementation. Methods: This is a retrospective, single-center study evaluating ventilator-associated events in a SICU using the updated CDC guideline definition for Ventilator Associated Events. The Surgical Intensive Care Unit at The Ohio State University Wexner Medical Center is a 44-bed unit. A total of 647 patients with bronchoalveolar lavage (BAL) cultures in the SICU from 1/1/09 through 2/28/11 will be screened and stratified based on whether or not they received prophylactic chlorhexidine mouthwash. Two distinct patient groups will be identified. The first group will be composed of patients who did not receive chlorhexidine mouthwash between 1/1/2009 and 12/31/2009. The second group will include those patients that received prophylaxis chlorhexidine mouthwash between 3/1/2010 and 2/28/2011. The rates of ventilator-associated events, which include ventilator-associated condition (VAC), infection-related ventilator-associated complication (IVAC), possible or probable ventilator associated pneumonia, will be compared pre and post chlorhexidine mouthwash implementation using Fisher’s Exact Test. Results: Data collection is ongoing Conclusions: Pending Investigation

Learning Objectives:
Recognize the risk and benefits of mechanical ventilation in SICU patients.
Discuss the role of chlorhexidine mouthwash in mechanically ventilated SICU patients and the need for standardization.

Self Assessment Questions:
A. Hospital acquired pneumonia
B. Aspiration
C. Ventilator-associated pneumonia
D. Hypercapnia

What is the dose and frequency of chlorhexidine mouthwash in mechanically ventilated SICU patients?
A. 2.0%, 15 mL 2 times weekly
B. 0.12%, 15 mL 2 times daily
C. 0.12%, 45 mL 2 times daily
D. 2.0%, 30 mL 1 time daily

Q1 Answer: C  Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-370-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
Purpose The use of remote patient healthcare is increasing which expands care to patients in resource restricted settings. Video based telepharmacy has been used in community pharmacies for technician oversight and remote patient counseling. Whereas telephone based telepharmacy has been used to perform disease state management with patients in remote areas. Our primary objective is to assess the feasibility of video based patient-pharmacist consultations in a hospital based outpatient clinic setting. Secondarily we will evaluate consultation effectiveness. Our goal is to determine if video based pharmacy services will be a viable option to expand pharmacy services within OhioHealth.

Methods This study was approved by the Institutional Review Board. Patients seen in the clinic are screened for study inclusion based on pre-clinic schedule review by a pharmacy resident. Patients are asked to participate if they have a diagnosis of hypertension in their problem list and are older than 18 years of age. Consented patients are given a pre-consultation hypertension knowledge test, then meet with a pharmacy resident via video conference. Visits that cannot be completed by video due to technical difficulties will take place in person. All visits address baseline disease state, lifestyle modification and medication knowledge in a semi-structured format followed by pharmacist provided education. After the visit the pharmacist makes recommendations to the provider and the patient completes a validated satisfaction survey and repeats the knowledge test. To determine feasibility we measure 1) patient satisfaction, 2) percent visits completed by video and 3) percent time on task during the consultation. To determine consultation effectiveness we evaluate the difference between pre and post consultation knowledge test scores.

Results and Conclusions: Results are pending and will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Identify the methods used to determine the feasibility of a video telepharmacy service in an outpatient clinic setting.
Identify the methods used to determine the effectiveness of a video telepharmacy service in an outpatient clinic setting.

Self Assessment Questions:
Which one of the following was used to determine the feasibility of the telepharmacy service?
A: Patient satisfaction
B: Patient consent rate
C: Patient clinic attendance
D: Pre and post consultation knowledge test scores

Which one of the following was used to determine the effectiveness of the telepharmacy service?
A: Pre and post consultation knowledge test scores
B: Percent visits completed by video
C: The number of recommendations accepted by providers
D: Patient consent rate

Q1 Answer: A  Q2 Answer: A
Febrile neutropenia (FN) is an oncologic emergency associated with significant cost, morbidity, and mortality. Guidelines from the Infectious Diseases Society of America (IDSA) recommend specific antibiotics for empiric treatment of FN and also recommend implementing a critical management pathway to improve outcomes and promote antimicrobial stewardship. Guidelines have been developed at Cleveland Clinic Main Campus (CCMC) to help direct appropriate antimicrobial therapy for patients with FN. This project evaluated adherence to guidelines at this institution, focusing on vancomycin and meropenem use. This was a retrospective, single center, cross-sectional study. Adult patients who received vancomycin or meropenem as treatment for FN on an oncology floor between May and September 2013 were included. Patients were excluded if they received antibiotics for a confirmed or suspected infection within 7 days prior to presentation. Primary outcomes were the number of vancomycin and meropenem orders initiated in compliance with the CCMC FN guidelines and the number that were de-escalated within 48 hours in the absence of a specific indication. Secondary outcomes were the duration of treatment with vancomycin and meropenem, admission to an Intensive Care Unit (ICU), and in-hospital mortality. A total of 127 evaluable patients received 177 total vancomycin orders and 58 total meropenem orders over 148 total hospital admissions. Among vancomycin orders, 133 (75%) were initiated in compliance with CCMC guidelines and 111 (67%) were appropriately de-escalated. Among meropenem orders, 22 (38%) were initiated in compliance with CCMC guidelines and 23 (42%) were appropriately de-escalated. Persistent fever was the most common non-guideline indication for initiation. Among all admissions, 32 (21.6%) included an admission to an ICU and the in-hospital mortality rate was 6.1% (N=9).

Based upon the results of this study there are available opportunities for improving compliance to CCMC FN guidelines for use of vancomycin and meropenem.

Learning Objectives:
Discuss whether or not deviations from published guidelines for the management of febrile neutropenia improve patient outcomes
Classify the use of vancomycin and meropenem according to institutional guidelines for treatment of febrile neutropenia

Self Assessment Questions:
Which of the following statements is true regarding deviations from published guidelines for the treatment of patients with febrile neutropenia?

A: Studies have not shown that deviating from guidelines improves clinical outcomes.
B: There is evidence that empiric use of vancomycin in all patients is associated with decreased mortality.
C: Delaying antibiotic therapy until culture results are available improves patient outcomes.
D: Pooled data from many prospective studies shows that deviating from published guidelines may lead to increased mortality.

According to the IDSA guidelines, empiric selection of an antibiotic for treatment of febrile neutropenia should be based upon covering for which organism(s)?

A: Methicillin-resistant Staphylococcus aureus
B: Extended-spectrum β-lactamase producing Gram-negative organisms
C: Pseudomonas aeruginosa
D: Bacteroides fragilis

Q1 Answer: A Q2 Answer: C

TREATMENT OF NEUTROPENIC FEVER AT AN ACADEMIC MEDICAL CENTER

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Purpose: Febrile neutropenia is a potentially fatal complication of chemotherapy. This complication is considered an oncologic emergency and must be treated promptly and accurately to reduce mortality. The purpose of the study is to identify the timeliness and accuracy of guideline-recommended administration of antibiotics in patients with chemotherapy-induced febrile neutropenia at the University of Cincinnati Medical Center. This will be compared between four groups; those that are admitted through the emergency department, those that are directly admitted, those seen in clinic, and those that develop the complication while hospitalized. This study will identify any opportunities for improvement that may exist in the treatment and management of this complication at this institution. The culture data of all patients will be identified and described.

Methods: This study is an investigator-initiated, retrospective chart review. Adult patients admitted to the University of Cincinnati Medical Center from November 1, 2012 to November 1, 2013 with a diagnosis of febrile neutropenia that meet diagnostic criteria (absolute neutrophil count less than 1,000 cells/mm3 and temperature above 38°C) will be screened for inclusion. The primary outcome will be to compare the proportion of patients that receive guideline-recommended antibiotics within two hours between the four different groups described above. Secondary endpoints will be to evaluate specific agents, dosing, and frequency of antibiotics chosen and to identify culture results of this patient population. Continuous data will be compared using ANOVA. Discrete variable comparisons will be done using the chi-square, Fishers exact test or one-way ANOVA, as indicated.

Results: Data is currently being collected and reviewed. Conclusion: Conclusions will be determined and presented at the Great Lakes Pharmacy Resident Conference once evaluation is complete.

Learning Objectives:
Identify a criteria used in the Multinational Association for Supportive Care in Cancer index score to predict which patients are at high risk for complications from febrile neutropenia.
Select empiric antibiotic regimens that are recommended by the Infectious Diseases Society of America for empiric treatment of febrile neutropenia.

Self Assessment Questions:
Identify a criteria used in the Multinational Association for Supportive Care in Cancer index score to predict which patients are at high risk for complications from febrile neutropenia.

A: Age
B: APACHE score
C: Use of prophylactic antibiotics
D: Respiratory rate

Select an antibiotic regimen from below that is recommended by the Infectious Diseases of America for a high risk febrile neutropenia patient without allergies.

A: Oral ciprofloxacin and amoxicillin/clavulanate
B: Intravenous piperacillin/tazobactam
C: Intravenous ceftriaxone
D: Intravenous ciprofloxacin and metronidazole

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-638-L01-P
THE IMPACT OF COMPREHENSIVE MEDICATION REVIEWS POST-EMERGENCY DEPARTMENT OBSERVATION UNIT DISCHARGE: A TRANSITION OF CARE PILOT STUDY.

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Purpose: The purpose of the study is to assess the impact of comprehensive medication reviews (CMR) performed by community pharmacists in collaboration with emergency medicine (EM) pharmacists for patients discharged from an emergency department (ED) observation unit (OU). Objectives include: (1) to compare the modified Care Transition Measure (CTM-15) medication section results after OU discharge to after community pharmacist-performed CMR; and (2) to identify and quantify drug-related problems (DRPs) from the CMR.

Methods: The pilot study will occur with patients discharged from an academic medical center ED OU, who participate in a CMR at a grocery-store chain community pharmacy. Patients will be recruited from the OU. Eligible patients include those 18 years of age or older with a specific Ohio Managed Medicaid insurance plan and diagnoses of cardiovascular disease (hypertension and congestive heart failure), diabetes, and/or respiratory disease (asthma and chronic obstructive pulmonary disorder). EM pharmacists will enroll the patients, create a discharge summary, and fax the summary to the community pharmacist.

The community pharmacist will schedule and conduct a CMR in accordance with the Medication Therapy Management Core Elements within 14 days of OU discharge. After the CMR, the patient will be asked to complete the survey instrument. A retrospective post-then-pre survey methodology will be used to measure the impact of a CMR delivered by an academic medical center ED OU, who participate in a CMR at a grocery-store chain community pharmacy. Patients will be recruited from the OU. Eligible patients include those 18 years of age or older with a specific Ohio Managed Medicaid insurance plan and diagnoses of cardiovascular disease (hypertension and congestive heart failure), diabetes, and/or respiratory disease (asthma and chronic obstructive pulmonary disorder) EM pharmacists will enroll the patients, create a discharge summary, and fax the summary to the community pharmacist.

Learning Objectives:
Discuss patient information hand-off by emergency medicine pharmacists to community pharmacists
Describe commonly identified drug-related problems post-observation unit discharge

Self Assessment Questions:
Which of the following are common drug-related problems identified post-observation unit discharge?
A: Need for additional medication therapy
B: Ineffective medication
C: Dosage too low
D: All of the above

Which of the following is a method to enhance patient understanding of medications post-observation unit discharge?
A: Ignore them; patients do not need to understand their medications
B: Pharmacist collaboration and hand-off of patient information
C: Perform a comprehensive medication review
D: Both B and C

Q1 Answer: D Q2 Answer: D

THE EFFECTS OF PROCALCITONIN LEVELS ON PHYSICIAN PRACTICES OF ANTIBIOTIC TREATMENT: A RETROSPECTIVE COHORT

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Purpose: Procalcitonin (PCT) is a calcitonin precursor that is markedly elevated at the onset of infections. PCT has been studied as a surrogate biomarker to assess the likelihood of bacterial infection and its severity. Numerous studies have used PCT-guided treatment algorithms to decrease antibiotic use and duration. Literature has shown that PCT-guided antibiotic therapy is not associated with increased mortality or treatment failure. In a meta-analysis of 14 randomized controlled trials of acute respiratory infections and the use of PCT to guide initiation and duration of antibiotic treatment, common algorithms of initiation and discontinuation of antibiotics were found. For instance, 12 of the 14 studies recommended against antibiotics if PCT levels were <0.25 mcg/L and recommended antibiotics if PCT levels were ≥0.25 mcg/L. PCT-guided antibiotic therapy can lead to potential benefits, such as decreased antibiotic resistance, costs, and antibiotic-caused adverse events. However, if PCT levels are ordered and merely ignored, then PCT levels lead to increased costs for the institution. The purpose of this retrospective research is to evaluate the association between PCT levels of less than 0.25 mcg/L and the discontinuation of antibiotic therapy.

Methods: Patients who were admitted to Akron General Medical Center and had at least one PCT level reported between September 2012 to November 2013 will be included. Patients <18 years old or patients who were discharged within 48 hours of the PCT level report will be excluded. In the primary analysis, patients will be classified into two groups: PCT levels <0.25 mcg/L and the discontinuation of antibiotics within 3 days of PCT level report. Results and Conclusions: Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Identify the role of procalcitonin in infections
Describe the procalcitonin-guided treatment algorithms that have been used in clinical trials

Self Assessment Questions:
Procalcitonin is used as a surrogate biomarker for which of the following infections?
A: Bacterial
B: Fungal
C: Parasitic
D: Viral

Antibiotics are NOT recommended at which of the following procalcitonin levels?
A: <0.1 mcg/L only
B: <0.25 mcg/L only
C: ≥0.25 mcg/L only
D: ≥0.5 mcg/L only

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-831-L01-P

Activity Type: Knowledge-based Contact Hours: 0.5
OCCURRENCE AND CHARACTERIZATION OF EVEROLIMUS TOXICITY DURING FIRST AND SUBSEQUENT CYCLES IN THE TREATMENT OF METASTATIC BREAST CANCER

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Purpose: Everolimus in combination with exemestane is a novel treatment regimen for patients with advanced, endocrine-resistant breast cancer. The BOLERO-2 trial demonstrated a progression free survival (PFS) benefit with this combination of 6.9 months versus 2.8 months, compared to exemestane and placebo. In this trial, 19% of patients discontinued everolimus due to adverse events, and 63% required a dose reduction or interruption due to toxicity. The timing of these dose reductions or interruptions was not reported. Our clinicians have observed a seemingly large percentage of patients who experience first cycle (initial 28 days) toxicity. This study describes the frequency and timing of everolimus dose reductions and interruptions in patients treated with everolimus and exemestane.

Methods: This was a retrospective case series of all patients who received everolimus in combination with exemestane, from May 1, 2012 through July 31, 2013 at the Stefanie Spielman Comprehensive Breast Center at The Ohio State University Comprehensive Cancer Center. Patients between 18 and 89 years of age who initiated everolimus and exemestane for the treatment of metastatic breast cancer were included. The primary objective is to determine the incidence of first cycle dose reductions or interruptions of everolimus. Secondary objectives include determination of PFS, examination of the effect previous therapies have on PFS, and characterization of differences between 10 mg, 7.5 mg, and 5 mg starting doses. Results and Conclusions: Forty-six patients met inclusion criteria. First cycle dose reductions and/or interruptions were observed in 21 (45.6%) patients. The most common indications for dose reduction or interruption were mucositis (47.6%), diarrhea (14.3%), nausea/vomiting (9.5%), thrombocytopenia (9.5%), fatigue (9.5%) and acute kidney injury (9.5%). Analysis of secondary objectives is ongoing. The early onset of everolimus toxicity seen in this series warrants thorough patient education and close clinical monitoring in the first cycle to manage toxicities.

Learning Objectives:
- Identify which patients would be appropriate for treatment with everolimus in combination with exemestane.
- Recognize the most common first cycle toxicities of everolimus associated with dose interruptions or reductions.

Self Assessment Questions:
Which of the following represents the adverse event associated with the highest incidence of grade 3 or 4 toxicity in patients treated with everolimus and exemestane?

A. Fatigue  
B. Acute kidney injury  
C. Mucositis  
D. Neutropenia

Which cytochrome P450 enzyme is responsible for potential drug interactions with everolimus?

A. 3a4  
B. 2d6  
C. 1a2  
D. 2c19

Q1 Answer: C  Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-651-L01-P  
Activity Type: Knowledge-based  Contact Hours: 0.5
EFFICACY AND SAFETY OF INHALED EPoprostenol in Comparison to Inhaled Nitric Oxide

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Background: Both inhaled nitric oxide (iNO) and epoprostenol (iEP) have been evaluated for the management of hypoxemia associated with acute respiratory distress syndrome (ARDS) and right ventricular (RV) heart failure. Prospective trials suggest that both agents have comparable efficacy on oxygenation with no effect on systemic hemodynamics. These trials have several limitations, making it difficult to draw definitive conclusions about the relative efficacy and safety of these agents.

Objectives: Evaluate the efficacy and safety of iEP in comparison to iNO in mechanically ventilated patients with ARDS or RV failure. Methodology: A propensity-matched, non-inferiority retrospective cohort study will be conducted to evaluate mechanical ventilation-free days between patients receiving iEP therapy and iNO therapy. Patients will be included if they were ≥18 years old, admitted to the intensive care unit with ARDS or acute RV failure, on invasive mechanical ventilation, and received inhaled therapy for ≥1 hour. Patients will be excluded if they received other inhaled vasodilatory therapies or concomitant iNO and iEP. Data collected will include demographics, efficacy outcome data (PaO2/FiO2 ratios, duration of mechanical ventilation, length of ICU and hospital stay), therapy details including ventilation and non-ventilated based strategies for management of hypoxemia, and safety outcomes including hemodynamic parameters, methemoglobin levels, and incidence of rebound hypoxemia. Propensity score will be utilized to match patients to iNO based on predefined set of variables that would influence treatment assignment. Non-inferiority will be concluded if one sided lower boundary of the 95% confidence interval for difference in ventilator-free days between treatments is <1.3 days. Eighty-six patients will be evaluated to provide 80% power (with alpha = 0.05) for assessing the primary outcome.

COMPARISON TO INHALED NITRIC OXIDE EFFICACY AND SAFETY OF INHALED EPOPROSTENOL IN MECHANICALLY VENTILATED PATIENTS WITH ARDS OR RV FAILURE

IMPACT OF PHARMACIST-LED BEDSIDE DISCHARGE COUNSELING FOR PEDIATRIC PATIENTS WITH TYPE 1 DIABETES AND THEIR CAREGIVERS

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PURPOSE: Type 1 diabetes (T1D) affects 5% of the population worldwide and 1 out of 300 children in the United States. Patients with T1D have significant prescription burdens. Currently, discharge prescriptions for patients with T1D at Nationwide Children's Hospital (NCH) are dispensed, after counseling, from the outpatient pharmacy pick-up window. However, pharmacist-led bedside dispensing and counseling is hypothesized to offer improved comprehension of medication use. The comfort and knowledge of the caregiver to manage all home prescriptions will be measured before and after a pharmacist dispenses and counsels at the bedside. METHODS: Pharmacist-led discharge counseling for patients with T1D received expedited approval from the Institutional Review Board. The pharmacist communicates with the endocrinology team regarding planned discharges of patients with T1D. Discharge prescriptions are filled in the NCH outpatient pharmacy. At a scheduled time, the pharmacist brings the prescriptions to the patients bedside. The caregiver completes a pre-counseling survey measuring comfort and knowledge of home prescriptions. The caregiver then completes the survey again post-counseling. One month after discharge, the pharmacist calls patients who received discharge counseling to measure retention of prescription knowledge. The pharmacist also calls patients who did not receive discharge counseling one month after discharge to serve as the control group. The control group completes the same survey. All patient interaction is documented in the patients electronic medical record. The primary outcome is to compare the pre- and post-counseling survey to determine the signification of the pharmacist-led bedside counseling.

Secondary outcomes will compare retention of prescription knowledge of counseled and non-counseled patients. PRELIMINARY RESULTS: Patients will receive pharmacist-led bedside discharge counseling from November 2013 to May 2014. Preliminary results will be presented at the Great Lakes Resident Conference. CONCLUSION: Study results will show the impact of pharmacist-led discharge counseling on caregivers comfort and knowledge of prescriptions.

Learning Objectives:
Describe the role of a transition of care pharmacist during the discharge process. Identify the perceived impact of pharmacist-led bedside discharge counseling.

Self Assessment Questions:
What is a role of a transition of care pharmacist?
A Fill inpatient orders
B Ignore home medication lists
C Provide education for new prescriptions
D Fill according to hospital formulary

What is a perceived impact of pharmacist-led bedside discharge counseling?
A Increase patient wait time
B Improved knowledge of prescriptions
C Decrease in discharge prescription capture
D Reduce pharmacist follow-up with patient

Impact of Pharmacist-led Bedside Discharge Counseling for Pediatric Patients with Type 1 Diabetes and Their Caregivers

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B Improved knowledge of prescriptions
C Decrease in discharge prescription capture
D Reduce pharmacist follow-up with patient

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-820-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
COMPARISON OF TWO PIPERACILLIN/TAZOBACTAM INFUSION STRATEGIES ON THE INCIDENCE OF ACUTE KIDNEY INJURY

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Purpose: Piperacillin/tazobactam is an extended-spectrum penicillin/beta-lactamase inhibitor antibiotic and the drug of choice for many infections. Studies have shown that extended infusion achieves higher pharmacokinetic and pharmacodynamic targets than traditional infusion, thus there has been widespread acceptance of extended infusion strategies. There is data to suggest piperacillin/tazobactam increases the risk of acute kidney injury, but the effect of an extended infusion on this risk is unknown. The objective of this study is to determine the effect of traditional infusion and extended infusion piperacillin/tazobactam on the incidence of acute kidney injury.

Methods: This is an Institutional Review Board approved, retrospective, cohort study from January 2011 through December 2013 comparing the effect of traditional infusion and extended infusion piperacillin/tazobactam on the risk of acute kidney injury. Patients were identified via billing records. Patients were included if they were 18 years of age or older and treated with piperacillin/tazobactam for at least 48 hours. Exclusion criteria included: patients receiving both piperacillin/tazobactam dosing strategies, chronic dialysis, receipt of dialysis within 48 hours of admission, baseline serum creatinine greater than 2mg/dL, or pregnancy. Data collection included: demographics, concomitant nephrotoxic medications, surgery within 48 hours of admission, intensive care stay, length of time on piperacillin/tazobactam, serum creatinine, new dialysis requirement, and mortality. Acute kidney injury was defined as an increase in serum creatinine by 0.3mg/dL or greater than 50 percent from baseline. The primary endpoint was the incidence of acute kidney injury in patients treated with traditional infusion compared to extended infusion of piperacillin/tazobactam. Secondary endpoints evaluate the impact of risk factors for acute kidney injury in each infusion strategy. Patient identifiers were removed prior to data analysis to maintain confidentiality. Conclusion: Data analysis is in progress; results to be presented

Learning Objectives:
Discuss the currently available literature surrounding the use of an extended-infusion of piperacillin/tazobactam
Describe the significance of detecting a difference in the incidence of acute kidney injury in patients treated with two piperacillin/tazobactam infusion strategies

Self Assessment Questions:
What is the rationale behind using the extended-infusion strategy of piperacillin/tazobactam over the traditional infusion strategy?
A: Superior efficacy against Acinetobacter baumanii
B: Greater time above MIC
C: Superior efficacy as empiric therapy for healthcare-associated pneumonia
D: Decreased length of stay in patients with healthcare-associated pneumonia

What is/are the potential mechanism(s) of acute kidney injury caused by piperacillin/tazobactam?
A: Acute interstitial nephritis
B: Acute tubular necrosis
C: Both of the above
D: Neither of the above

Q1 Answer: B Q2 Answer: C

IMPLEMENTATION OF A WEB-BASED APPLICATION FOR CONTINGENCY DRUG INVENTORY MANAGEMENT

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Purpose: Research has shown that pharmacy oversight of medications in all care locations can provide substantial improvement in safety and quality. The execution of this task in large hospitals, however, has been difficult due to the complexities of the medication use process. Timely removal of expired medications, required by law and The Joint Commission, has also become another challenge for personnel once medications leave the pharmacy. Currently, the Cleveland Clinic Pharmacy Department supplies and oversees more than 400 drug boxes for the Main Campus. Medications within these boxes are used for advanced cardiac life support, rapid-sequence intubation, public sporting events, and adverse reactions to contrast dyes. PharmacyKeeper-Carts is an electronic inventory management system designed to improve inventory control of drug boxes through the use of bar code technology and electronic record keeping. The web-based system electronically stores the NDC, lot number, and expiration information for medications contained within drug boxes. Radiofrequency identification (RFID) technology has been integrated to locate drug boxes on campus. Additionally reports can be utilized to determine medication use history for billing and for drug utilization purposes. Objectives: Implement a web-based contingency inventory management program. Determine cost effectiveness of removing items from drug boxes due to non-utilization and improving cost capture of medications used on unidentified patients. Methodology: Quality improvement project within the Department of Pharmacy at Cleveland Clinic Main Campus. Medication, location, and box library were created based on needs of the facility. Barcode training was facilitated to train the system to recognize medications. Personnel were trained to use the system properly. Implementation of PharmacyKeeper-Carts is complete, but enhancements to the product are ongoing. Results and Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Describe the process of implementing PharmacyKeeper-Carts to manage emergency drug inventory
Discuss improved inventory management, productivity tracking, and billing as a result of implementation

Self Assessment Questions:
PharmacyKeeper-Carts is what type of program?
A: software-as-a-solution (SaaS)
B: software-as-a-service (SaaS)
C: software-as-a-device (SaaD)
D: software-as-a-gadget (SaaG)

Cleveland Clinic uses which RFID system to track emergency drug boxes?
A: eTrace
B: eLocate
C: eFind
D: eTrak

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-881-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
TOXICITY COMPARISON OF PRE-ENGRFTMENT UTILIZATION OF INTRAVENOUS VERSUS ORAL TACROLIMUS IN ADULT BLOOD AND MARROW TRANSPLANT RECIPIENTS
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Purpose: Historically, tacrolimus has been administered intravenously to blood and marrow transplant recipients at initiation of therapy and changed to oral administration upon neutrophil engraftment. Our institution began using oral tacrolimus upon initiation of therapy in September 2012 due to lower cost and ease of administration. The primary objective of this study is to determine whether there is a difference in composite tacrolimus toxicity with pre-engraftment utilization of intravenous versus oral tacrolimus for graft-versus-host-disease prophylaxis in adult blood and marrow transplant recipients. Secondary objectives include determining the difference in tacrolimus related hypertension and nephrotoxicity separately and cost difference in intravenous versus oral therapy. Methods: This is a retrospective, observational, single center chart review. This study was approved by the Institutional Review Board. Adult patients who have undergone allogeneic hematopoietic stem cell transplant and received tacrolimus for graft-vs.-host-disease prophylaxis were reviewed. Patients were placed into intravenous or oral tacrolimus groups based on which route of administration they received prior to neutrophil engraftment. Patients were followed from day of transplant through neutrophil engraftment or discharge, whichever came first. Data collection included age, gender, weight, indication for transplant, source of hematopoietic stem cells, donor type, transplant date, and information relating to tacrolimus toxicity, including new onset hypertension and nephrotoxicity. Nephrotoxicity was defined as serum creatinine greater than or equal to 2 mg/dL or an increase of at least 0.5 mg/dL above baseline. New onset hypertension was defined as hypertensive requiring use of additional antihypertensive agents for at least three consecutive days. Incidence of new onset hypertension and nephrotoxicity was compared between study groups. Cost of therapy for each group was evaluated using institutional drug acquisition cost. Results & Conclusion: Research in progress. Results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Identify pertinent monitoring parameters for common adverse effects of tacrolimus
Identify specific patient characteristics and drug interactions that affect the pharmacokinetics of tacrolimus

Self Assessment Questions:
A patient on tacrolimus has the following abnormal lab values. Which one is most likely related to an adverse effect of tacrolimus?
A: Ast/alt – 1336/2792 u/l
B: Wbc – 0.9 k/pl
C: Mg – 1.1 mg/dL
D: Ca – 13.8 mg/dL

For a patient on tacrolimus, starting which of the following medications would require an empiric dose reduction of tacrolimus?
A: Amoxicillin
B: Voriconazole
C: Phenytoin
D: Fluoxetine

Q1 Answer: C Q2 Answer: B

PERIOPERATIVE ORAL AMIODARONE IN COMBINATION WITH POSTOPERATIVE INTRAVENOUS MAGNESIUM TO REDUCE THE INCIDENCE OF POSTOPERATIVE ATRIAL FIBRILLATION
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Purpose: Postoperative atrial fibrillation (POAF) is the most common complication of cardiac surgery leading to increased cost, morbidity, and length of hospital stay. While the ideal prophylactic regimen is not yet well established, amiodarone has the most evidence beyond beta-blocker therapy. After investigating our institutional POAF incidence, we implemented a POAF prophylaxis protocol. Continued process improvement has led to incorporation into the preoperative evaluation, order sets, and is reinforced through staff education. Our prophylaxis protocol includes a perioperative oral amiodarone load and maintenance and intravenous magnesium postoperatively in addition to standard of care therapy.

Methods: This is a single-center, retrospective, cohort study comparing pre-protocol to post-protocol patients. All patients who underwent CABG and/or valvular surgery between October 17, 2011 and October 17, 2013 who received postoperative intravenous magnesium and our perioperative amiodarone prophylaxis protocol will be included. Patients were excluded if they were <18 years old, pregnant, had a history of atrial fibrillation, were on any chronic antiarrhythmic medication or had a transcatheter aortic valve replacement. Our historical control group is established using data from an internal database. The primary aim of this study is to compare the incidence of POAF between patients in the control group versus those who received a preoperative oral amiodarone load followed by postoperative amiodarone maintenance and scheduled intravenous magnesium. Secondary outcomes will compare the incidence of POAF in patients who received intraoperative magnesium versus those who received a preoperative oral amiodarone load followed by postoperative amiodarone maintenance and scheduled intravenous magnesium. Secondary outcomes will compare the incidence of POAF in patients who received intraoperative magnesium versus those who received a preoperative oral amiodarone load followed by postoperative amiodarone maintenance and scheduled intravenous magnesium. Secondary outcomes will compare the incidence of POAF in patients who received intraoperative magnesium versus those who received a preoperative oral amiodarone load followed by postoperative amiodarone maintenance and scheduled intravenous magnesium.

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

Learning Objectives:
Review our institution's protocol for reducing postoperative atrial fibrillation
Review the risk factors for postoperative atrial fibrillation

Self Assessment Questions:
Which of the following regimens does our institution use in addition to standard of care for reducing POAF?
A: Perioperative intravenous amiodarone and magnesium
B: Perioperative oral amiodarone and intravenous magnesium
C: Perioperative sotalol and intravenous magnesium
D: Perioperative colchicine and intravenous magnesium

Which of the following is NOT a known risk factor for POAF?
A: Removal of beta blocker therapy perioperatively
B: Advanced age
C: Use of electrolyte replacements such as magnesium
D: Diabetes

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-652-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
NON-ANTICOAGULATION RELATED INTERVENTIONS IN A PHARMACIST-MANAGED ANTICOAGULATION CLINIC

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PURPOSE: Pharmacists are an easily accessible health care resource for patients and play a significant role in the overall health of patients. Pharmacists provide services and make interventions in pharmacist-managed clinics outside of the clinic’s primary purpose that, if overlooked, could negatively impact the patients’ health and increase health care costs. Data describing these interventions would provide evidence that supports recognizing pharmacists as providers. This study aims to identify the types and results of non-anticoagulation related interventions made in patients enrolled in a pharmacist-managed anticoagulation clinic.

METHODS: This is a retrospective cohort study conducted by chart review of patients referred to the Internal Medicine Center of Akron (IMCA) Anticoagulation Clinic. This study has been approved by the Institutional Review Board. Patients included are at least 18 years old and have attended at least one face-to-face appointment in the IMCA Anticoagulation Clinic between July 21, 2009, and November 30, 2013. No exclusion criteria apply. The primary outcome of this study is the incidence of each type of non-anticoagulation related intervention made by pharmacists. Interventions are classified based on predetermined categories and include promoting continuity of care, health assessment and triage, acquiring necessary diagnostics, reconciling medications, and modifying therapy. Secondary outcomes are the amount of potential reimbursement associated with these interventions and the association between patient characteristics and interventions. The results of selected intervention categories will also be determined. Potential reimbursement is calculated for interventions that qualify as valid claims using OutcomesMTM reimbursement rates. Descriptive statistics will be used for the primary outcome, intervention results, and reimbursement. Relative risk will be used to describe patient predictor data.

RESULTS AND CONCLUSIONS: To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Review current literature regarding pharmacist-managed anticoagulation clinics
Discuss a pharmacist’s role in providing services outside of anticoagulation management in pharmacist-managed anticoagulation clinics

Self Assessment Questions:
Pharmacists in pharmacist-managed anticoagulation clinics have been shown to reduce which of the following?
A: Time within therapeutic range
B: The use of LMWH
C: The use of warfarin
D: Hospital admissions

Which of the following allows pharmacists to make interventions outside of an anticoagulation clinic’s primary purpose that may otherwise be overlooked?
A: Pharmacists increase patient satisfaction
B: Pharmacists have frequent interaction with patients
C: Patients fill prescriptions through the clinic pharmacy
D: Patients can make appointments for other wellness services

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-14-427-L04-P
Activity Type: Knowledge-based Contact Hours: 0.5
ANALYSIS OF THE EFFECT OF SIROLIMUS ON STERNAL WOUND INFECTION AFTER MEDIAN STERNOTOMY IN KINDEY AND/OR PANCREAS TRANSPLANTS

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Purpose: Sternal wound infection is a rare, but potentially fatal complication of median sternotomy. Immune-suppression is a potential risk factor for sternal wound infection and an important component of post-transplant medical care. The standard post-transplant maintenance anti-rejection regimen at The Ohio State Wexner Medical Center (OSUWMC) for kidney and/or pancreas transplant utilizes sirolimus in combination with cyclosporine. Sirolimus is unique among the anti-rejection medications because it inhibits fibroblasts, cells responsible for wound repair, and has been implicated in increased wound infection rates after organ transplantation. This study will assess the effect of sirolimus on the incidence of sternal wound infection. Methods: A retrospective chart review is being conducted on all patients older than 18-years-of-age who underwent median sternotomy at OSUWMC from 01/01/2002 through 05/31/2013 who previously received a kidney, isolated pancreas, or kidney-pancreas transplant. Patients on sirolimus-free anti-rejection regimens serve as the control group. A regimen is considered sirolimus-free if sirolimus discontinuation occurred at least fourteen days prior to median sternotomy or the regimen never contained sirolimus. The primary outcome is the rate of sternal wound infection in patients on sirolimus-based anti-rejection regimens. Secondary outcomes include thirty day readmission and three-month mortality. Results: Results and conclusions are pending and will be presented at the Great Lakes Pharmacy Residency Conference. Learning Objectives: Recognize risk factors for sternal wound infections in patients who undergo open-heart surgery. Identify the mechanism underlying sirolimus role in impaired wound healing.

Self Assessment Questions:

Which of the following statements about sirolimus is correct?
A: Sirolimus has a relatively short half-life in comparison to other anti-rejection medications.
B: Sirolimus inhibits fibroblast activity leading to impaired wound healing when used alone.
C: OSUWMC utilizes sirolimus monotherapy to prevent organ rejection.
D: Recent use of sirolimus, or any immunosuppressant, is a relative contraindication for sternal wound infection.

Which of the following has been identified as a risk factor for sternal wound infection?
A: Diabetes mellitus
B: Time to surgery
C: Recent antibiotic use
D: Transplant recipient status

Q1 Answer: B Q2 Answer: A

IMPACT OF CONVERSION TO LONG-ACTING OPIOIDS AND METHADONE ON OVERALL MORPHINE EQUIVALENTS, PATIENT-REPORTED PAIN SCORES, AND OVERALL MEDICATION COST IN THE TREATMENT OF CHRONIC NONMALIGNANT PAIN

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Purpose: Within the past year, the Veterans Affairs (VA) Healthcare System of Ohio enacted a new policy that states it is preferred for chronic nonmalignant pain patients to only utilize long-acting opioids or methadone. The pharmacokinetic profile of long-acting opioids and methadone allows for less peak and trough effect when compared to short-acting opioids. As the VA Healthcare System of Ohio recently enacted its new initiative concerning chronic pain management, our practice site will provide valuable information. Methods: This retrospective analysis reviewed patients that were converted from a chronic, short-acting opioid used alone or in combination with a long-acting opioid or methadone to a long-acting opioid or methadone between 10/1/2012 and 8/31/2013. To assess the primary objective, total morphine equivalents prior to and 3 months following conversion to a long-acting opioid or methadone alone will be collected using standardized opioid conversions. To assess secondary objectives, patient-reported pain scores and cost of opioid therapy prior to and 3 months following conversion will be collected using pricing information from the facility’s primary wholesaler, McKesson. Results: Data collection is nearly finished. Preliminary results are as follows: Mean change in morphine equivalents: -12.05mg Mean change in patient-reported pain score (scale 1 to 10): -0.08 Mean change in monthly cost of opioid therapy: +$16.90 Conclusion: Pending final results.

Learning Objectives:

Explain the pharmacology of commonly-used opioid medications
Name the opioid medication that is dosed similarly to long-acting opioids but does not fall under this categorization

Self Assessment Questions:

Which of the following medications acts on the N-methyl-D-aspartate (NMDA) receptor in addition to the mu opioid receptor?
A: Oxycodone immediate release
B: Morphine immediate release
C: Morphine extended release
D: Methadone

Which of the following medications is not classified as a long-acting opioid but does not fall under this categorization?
A: Methadone
B: Oxycodone
C: Fentanyl
D: Morphine

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-389 -L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
DEVELOPMENT AND IMPLEMENTATION OF A CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) PATIENT DISCHARGE COUNSELING PROGRAM
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Background: Chronic obstructive pulmonary disease (COPD) is a progressive and chronic disease affecting fifteen million Americans. The National Center for Health Statistics, in 2011, reported that chronic lower respiratory disease, primarily COPD, was the third leading cause of death in the United States. In 2015, the Centers for Medicare and Medicaid will be adding acute COPD exacerbation to their Readmission Reduction Program, which is already in place for heart failure, acute myocardial infarction, and pneumonia. Currently, there is limited information and research on the impact medication education has on COPD readmission rates. In response to the upcoming CMS initiative, the Cleveland Clinic is pursuing disease specific certification in COPD. Pharmacists will provide medication counseling as part of a multidisciplinary effort to improve the care of COPD patients.

Objective: To establish a multidisciplinary COPD Patient Discharge Counseling Program at the Cleveland Clinic to reduce readmission rates. Methodology: A quasi-experimental study with a historical control will be conducted to evaluate the implementation of the COPD Patient Discharge Counseling Program. The study population will include all inpatient adults (≥18 years) in non-intensive care units, who are admitted for an acute COPD exacerbation or newly diagnosed COPD. The patients will be identified through a shared COPD patient list in Epic and a COPD admission order set, which will include a Pharmacy COPD Education consult. Over a three-month period all patients fitting the inclusion criteria will receive medication education from a pharmacist and will be compared to a historical control group. Data will be collected regarding demographics, length of stay, overall readmissions, readmissions within 30 days, overall HCAHPS scores, medication specific HCAHPS score, and bronchodilator prescribed on discharge. Results and Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Discuss the rationale for implementing a COPD discharge counseling program
Describe the research design and methods

Self Assessment Questions:
What two new readmission measures will CMS be adding to their Hospital Readmission Reduction Program in FY 2015?
A Hip/Knee Arthroplasty and COPD
B COPD and Heart Failure
C Asthma and Hip/Knee Arthroplasty
D Diabetes and COPD

What is the 30-day rehospitalization rate of patients initially admitted for COPD?
A 26.9
B 20.1
C 22.6
D 24.6

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-674-L01-P
Activity Type: Knowledge-based Contact Hours: 0.5
INSULIN SLIDING SCALE AND HYPOGLYCEMIA IN NON-CRITICAL PATIENTS
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Purpose: Inappropriate glycemic control places patients at increased risk for morbidity and mortality. In an effort to avoid poor outcomes associated with hyperglycemia, institutions may use insulin sliding scale to control patients blood glucose concentration. Patients placed on insulin sliding scale are inherently at an increased risk for hypoglycemia. In a recent unpublished quality improvement project at Hillcrest Hospital, a Cleveland Clinic hospital, evaluating medication-related hypoglycemia in non-intensive care units, the authors concluded that the insulin sliding scale usage predominantly caused the hypoglycemic events. The purpose of this study is to determine if the institution needs to modify the insulin sliding scale used in the protocol. The rationale is to evaluate the incidence of hypoglycemia (≤70 mg/dL) between insulin regular sliding scale and the insulin lispro sliding scale. Methods: This is a retrospective, open-label, active-controlled, observational study in a 496-bed community hospital. Inclusion criteria consists of non-critical patients admitted into the hospital from January 2013 to September 2013, aged ≥18 years old, time to glycemic event ≤ six hours after admission, and treated with an insulin sliding scale. Exclusion criteria included patients admitted for diabetic ketoacidosis, admitted to labor and delivery, admitted to a critical care unit, or receiving enteral/parenteral nutrition. Patients will be screened via a report run on the institutional computer software detecting all patients ordered insulin sliding scale. Enrolled patients will have blood glucose concentrations recorded from six hours after admission until discharged or transferred to a critical care unit. Institutional review board was obtained prior to conducting the study. Statistical analysis for nominal data will be evaluated via chi-square. Results and Conclusions: Data will be collected and results will be extracted/analysis to be presented at the 2014 Great Lakes Pharmacy Residency Conference.

Learning Objectives:
Review the importance of glycemic control and the associated thresholds.
Discuss the use of insulin sliding scale in medical/surgical patients

Self Assessment Questions:
What is the threshold for hypoglycemia as defined by the American Diabetes Association?
A  ≤ 60 mg/dL
B  ≤ 70 mg/dL
C  ≤ 80 mg/dL
D  ≤ 90 mg/dL

Which of the following statements is true?
A  Insulin sliding scale is reactive not proactive
B  Insulin sliding scale is not recommended by the American Diabetes Association
C  Insulin sliding scale is proactive not reactive
D  A and B

Q1 Answer: B  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-439-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5

IMPACT OF HEART FAILURE SPECIALTY CLINIC ON INPATIENT READMISSIONS
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Heart failure is a chronic disease with high mortality, high readmission rates, and a high economic burden to the healthcare system. The Dayton Veterans Affairs Medical Center (D-VAMC) developed a multidisciplinary heart failure specialty clinic to help combat these problems. An attending physician, nurse practitioners, pharmacists, registered dietitians, registered nurses, and representatives from mental health staff the clinic. Current literature shows better outcomes and decreased hospital readmissions for heart failure exacerbation if prompt follow-up in the outpatient setting is achieved. Furthermore, achieving targeted doses of therapeutic agents, such as ACE inhibitors, ARBs, beta-blockers, and spironolactone, also give way to better outcomes and improvements in NYHA functional classification in patients with heart failure. To assess the impact of this clinic on veterans with a recent heart failure exacerbation requiring inpatient admission at D-VAMC, this quality assessment project was developed. The aforementioned endpoints, as well as assessment of treatment of common co-morbidities and patient education, will all be included in the data extraction/analysis to be presented at the Great Lakes Pharmacy Resident Conference and used by D-VAMC to adjust clinic procedures and foci to further improve the value of this clinic to the veterans the D-VAMC serves.

Learning Objectives:
Recognize the importance of prompt follow-up post-discharge for patients with heart failure exacerbation
Discuss the need to titrate heart failure medications to the appropriate target dosages

Self Assessment Questions:
Following hospitalization for a heart failure exacerbation, which of the following should take place?
A  Patient should be referred to primary care provider for follow-up in 30 days
B  2.) Patient should be given medications at discharge and counsel
C  Patient should be referred to specialist clinic specifically designed for heart failure patients
D  Patient should be started on high dose loop diuretics to maintain diuresis

Which three drugs have evidence for positive mortality benefits in patients with heart failure with reduced ejection fraction?
A  Lisinopril, metoprolol succinate, and spironolactone
B  Furosemide, metolazone, and valsartan
C  Simvastatin, digoxin, and timolol
D  Furosemide, digoxin, and spironolactone

Q1 Answer: C  Q2 Answer: A

ACPE Universal Activity Number 0121-9999-14-449-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5
OUTPATIENT PARENTERAL ANTIMICROBIAL THERAPY (OPAT) FOR THE MANAGEMENT OF STAPHYLOCOCCUS AUREUS BACTEREMIA (SAB)

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Purpose: Staphylococcus aureus bacteremia (SAB) is an infection associated with significant morbidity and mortality. According to standard practices and guidelines from the Infectious Diseases Society of America (IDSA), patients may receive up to six weeks of intravenous (IV) antimicrobial therapy. Treatment is frequently administered in outpatient settings to decrease cost and risk of nosocomial infections. While OPAT is generally safe and effective, a previous study at Louis Stokes Cleveland Department of Veterans Affairs Medical Center (LSCDVAMC) found a high failure rate in veterans with bone and joint infections. This study will identify risk factors for OPAT failure in veterans with SAB such that OPAT patient selection, determination of disposition, and treatment can be improved.

Methods: This is a retrospective chart review of patients with initial SAB diagnosis enrolled in the LSCDVAMC OPAT program between January 2011 and September 2013. Patients bacteremic with more than one organism or enrolled in the spinal cord rehabilitation program will be excluded. Collected data will include patient characteristics and demographics, past medical history, infections concomitant with SAB, microbiology, time to clearance of bacteremia, treatment regimen and setting, and success or failure of therapy. Patients will be classified as a treatment failure if one of the following criteria are met: requiring unplanned extension of IV or oral suppressive antimicrobial therapy, relapse of infection within 60 days after end of therapy, requiring admission or unplanned surgical intervention related to the initial infection within 60 days after end of therapy, or failing to complete therapy. Chi-squared tests and odds ratios will be used to determine differences between success and failure groups in univariate analyses. Multivariate logistic regression will then be used to determine which risk factors are the strongest predictors of treatment failure. Results and Conclusions: To be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:
Review pathogenicity of Staphylococcus aureus and management of SAB
Describe OPAT, associated guidelines, and the OPAT program at LSCDVAMC

Self Assessment Questions:
What is the approximate mortality rate associated with Staphylococcus aureus bacteremia?
A 0-10%
B 10-20%
C 20-40%
D >50%

What are the potential advantages of OPAT compared to inpatient therapy?
A Lower risk of nosocomial infection
B Decreased cost
C Higher cure rate
D Both A and B

Q1 Answer: C  Q2 Answer: D

ACPE Universal Activity Number 0121-9999-14-653-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5

IMPACT OF RAPID IDENTIFICATION OF ACINETOBACTER BAUMANNII VIA MATRIX-ASSISTED LASER DESORPTION IONIZATION TIME-OF-FLIGHT (MALDI-TOF) AND ANTIMICROBIAL STEWARDSHIP INTERVENTION IN PATIENTS WITH PNEUMONIA

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Purpose: Rapid pathogen identification is important in optimizing outcomes in patients (pts) with infections due to multi-drug resistant (MDR) pathogens, including Acinetobacter baumannii (AB). Previous studies have demonstrated improved outcomes in pts with the use of rapid diagnostic tests and antimicrobial stewardship (ASP) interventions. Our study sought to evaluate the impact of rapid identification of AB via MALDI-TOF and ASP interventions in pts with bacteremia and/or pneumonia.

Methods: Retrospective, quasi-experimental study of adult inpatients with bacteremia and/or pneumonia due to AB between Jan 2011 and Aug 2013. In the pre-intervention period, AB was identified via MALDI-TOF and results were communicated to the ID team. During the intervention period, AB was identified by MALDI-TOF and results were communicated to the ASP team. Secondary outcomes included clinical cure at seven days and in-hospital mortality. Differences between groups were explored using a Wilcoxon rank-sum, χ2, students t-test or Fishers exact test as appropriate. A two-tailed α of ≤0.05 was considered statistically significant.

Results/Conclusions: 206 pts were reviewed, 136 met inclusion criteria. Time to effective therapy was significantly reduced (75 hours vs. 28 hours; P=<0.01) and a higher rate of clinical cure was achieved in the intervention group (8% vs. 24%; P=0.01). There was no difference in hospital mortality between the groups (21% vs. 19%; P=>0.99). Our study demonstrates the impact of MALDI-TOF combined with ASP intervention on clinical outcomes in pts with AB bacteremia and/or pneumonia; an impact which would likely be experienced by patients in other healthcare settings.

Learning Objectives:
Recognize the implications of rapid pathogen identification and early appropriate antimicrobial therapy on patient outcomes.
Describe the impact of MALDI-TOF and antimicrobial stewardship interventions on patients with infections due to Acinetobacter baumannii.

Self Assessment Questions:
1. In patients with bacteremia due to Acinetobacter baumannii, mortality has been shown to be reduced by which of the following interventions:
A Strict use of contact precautions and isolation parameters
B Early effective antimicrobial therapy
C Prompt fluid resuscitation
D Decreasing overall and infection-related costs

2. When compared to traditional microbiological methods, pathogen identification via MALDI-TOF can reduce the time to organism identification by approximately:
A 6 days
B 72 hours
C 1.5 days
D 320 minutes

Q1 Answer: B  Q2 Answer: C

ACPE Universal Activity Number 0121-9999-14-666-L01-P
Activity Type: Knowledge-based  Contact Hours: 0.5