

2024 Abstracts

College Students' Perceptions of Pharmacist-Led Prescribing of HIV Pre-Exposure Prophylaxis in Community Pharmacies

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Purpose

The primary objective of this study is to characterize patients' potential acceptability and perceived appropriateness of pharmacists prescribing PrEP in a community setting. The secondary objective of this study is to identify potential barriers for acceptance of pharmacist-prescribed PrEP and strategies to mitigate such concerns.

Methods

This project will be a sequential, explanatory, mixed methods design with a quantitative survey administered first followed by semi-structured interviews with a subset of survey respondents.

Any individual who is a student at Purdue University, is at least 18 years or older, meets at least one indication for a PrEP prescription, and is HIV negative is considered eligible.

Descriptive statistics and regression analyses from surveys will be analyzed utilizing either SPSS or SAS. Data from the interviews will be transcribed using the professional transcription service Infracore, and then manually coded via a hybrid approach. A codebook mapped to the Proctor et al. framework will be initially developed, with additional codes developed, as necessary. The two primary investigators will code all data from the interviews individually using the codebook and compare their results. Discrepancies will be resolved through discussion between investigators once each interview is coded.

Results

Data collection is in progress. Results will be presented at the Great Lakes Pharmacy Residents Conference.

Conclusions

Conclusions will be presented at the Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Explain the prevalence of HIV in the United States and the likelihood of an eligible individual using PrEP

Describe the eligibility criteria for PrEP

Self Assessment Questions:

What percentage of eligible individuals had prescriptions for PrEP as of 2021?

A. 0.1

B. 0.25

C. 0.4

D. 0.6

Which of the following is included in the eligibility criteria for PrEP?

A. Have been diagnosed with HIV or AIDS

B. Men who have sex with women

C. Individuals who have a partner with HIV with an undetectable viral load

D. Individuals who use condoms inconsistently

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-855-L02-P

Impact of a pharmacy technician in an outpatient clinic on hospital cost reduction and patient outcomes

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Pharmacy technicians can serve as an impactful resource in a variety of outpatient clinic settings. Our quality improvement team worked to assess the impact of a pharmacy technician in an outpatient endocrine clinic with a focus on improving prior authorization completion and reimbursement of clinic-administered long-acting injectable medications. The intent behind improving these processes for reimbursement was to ensure patients would be able to receive their medication without experiencing delays related to losses in medication coverage. Our team became dedicated to improving our percentage of encounters with prior authorization approval by almost 20% for one of the endocrine clinic's long acting injectables. This project allowed our team to explore a variety of interventions for our pharmacy technician using Plan-Do-Study-ACT (PDSA) cycles based on key drivers identified by pharmacy and endocrine clinic personnel. Based on our results we will create a suite of services that can be replicated and offered for other outpatient clinics within our health system, ultimately creating a new career pathway for pharmacy technicians.

Learning Objectives:

Discuss various quality improvement tools that can be used for process improvement in pharmacy technician workflow development.

Describe the benefits of pharmacy technicians embedded within outpatient clinics on pharmacy advocacy and pharmacy technician career development

Self Assessment Questions:

Which of the following quality improvement tools can be utilized to identify barriers to completing steps within a process and identify potential interventions that can occur at each process step?

A. Key Drivers Diagram (KDD)

B. Pareto Chart

C. Simplified Failure Mode Effects Analysis (sFMEA)

D. PDSA worksheet

Which of these is a barrier to reimbursement of clinic-administered medications?

A. Pharmacy technicians trained to coordinate completion of prior authorizations

B. Prior authorizations that are not monitored leading to unacknowledged expirations

C. Communication diagrams to improve timeline of the prior authorization process

D. Implementation of software for ensuring insurance accuracy

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-780-L04-P

Evaluation of a Symptom-Triggered Lorazepam Alcohol Withdrawal Protocol in a Rural Community Hospital

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Purpose: Fifty percent of patients with alcohol use disorder (AUD) will experience alcohol withdrawal syndrome (AWS) when discontinuing or decreasing alcohol intake. Symptoms of AWS can range from minor symptoms like insomnia, sweating, anxiety and headaches to severe symptoms like hallucinations, delirium tremens and seizures. Historically, benzodiazepines (BZD) have been drug of choice for AWS. But support of BZDs is often limited by factors such as short-half lives that require frequent redosing, risk of oversedation and development of BZD resistance. The purpose of this retrospective study is to determine if patients with symptom-triggered lorazepam orders for AWS were receiving appropriate treatment.

Methods: This is a single center, retrospective, chart review evaluating the use of a symptom-triggered lorazepam alcohol withdrawal protocol in a rural community hospital. Patients were included if they were ordered the alcohol withdrawal protocol during hospitalization at St. Claire Regional Medical Center during the time period of January 1, 2023 to June 30, 2023. Exclusion criteria included patients that left against medical advice, transferred to a tertiary care center, required urgent intubation for reasons other than AWS, consistently scored less than 5 on the Clinical Institute Withdrawal Assessment Alcohol Scale Revised (CIWA-Ar) prior to admission, or had their home benzodiazepine prescription reordered while inpatient. Data collection will include patient demographics, total milligrams of lorazepam, number of CIWA-Ar scores reported and total number of doses given that were appropriate for scores reported. The primary outcome of this review is to evaluate the appropriateness of lorazepam doses based on scores reported. The secondary outcomes include determining if patients required additional medications for symptom management, if patients received lorazepam doses in a timely manner and overall length of hospital stay.

Results/Conclusion: This study is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify patterns of symptom-triggered lorazepam prescribing in hospitalized patients with alcohol withdrawal

Discuss recommended revisions to a symptom-triggered alcohol withdrawal protocol in order to reduce benzodiazepine doses and adjunctive as needed medications while ensuring effective symptom management

Self Assessment Questions:

Which patient would a short-acting benzodiazepine be the most appropriate for?

- A. 32 YOM with no history of AWS who is currently intoxicated
- B. 40 YOF who states her last drink was 6 days ago
- C. 70 YOM with CIWA-Ar score of 18
- D. 55 YOM with elevated liver enzymes

Which of the following refers to the definition of resistant alcohol withdrawal?

- A. Requirement of greater than 50 mg of diazepam in 2 hours
- B. Requirement of greater than 200 mg of diazepam in 6
- C. Requirement of greater than 10 mg of lorazepam in 1 hour
- D. Requirement of greater than 4 mg of lorazepam in 30 hours

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-697-L01-P

Optimizing Healthcare: Implementation of a Pharmacist-Driven Transitions of Care Pilot Program

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Purpose: Transitions of care (TOC) is defined as the movement of patients between healthcare practitioners, settings and home. Ineffective TOC can lead to hospital readmissions, increased healthcare costs, and patient dissatisfaction. Pharmacists have a unique opportunity to ensure that medications are optimized across the continuum of care. As there are currently no TOC services at Ascension Genesys Hospital (AGH), a new program will be implemented in which inpatient and ambulatory care pharmacists coordinate TOC for hospitalized patients. **Methods:** This is a single-center quality improvement pilot program in which a pharmacist to pharmacist TOC program will be implemented at AGH between January through April 2024. Patients managed by the inpatient family medicine service are eligible if they are 18 years of age and older and discharged with five or more medications. Patients are excluded if they are pregnant/postpartum, discharged to an off-site rehabilitation center, hospice/palliative care, or admitted for a planned surgery. The inpatient pharmacist will assess the patient's medications and provide recommendations to optimize pharmacotherapy and document interventions. At the time of discharge, the pharmacist teams will communicate to facilitate the smooth discharge of the patient. The ambulatory care pharmacist will then receive a referral to perform a comprehensive medication review (CMR) at the outpatient family medicine clinic. The CMR will be performed in person or virtually, depending on the patient's availability. Similarly, the ambulatory care pharmacist will also document recommendations to optimize medication therapy. Descriptive analysis will be conducted to identify the most common medication related problems (MRPs) identified and pharmacist interventions to optimize therapy. Additionally, the acceptance of pharmacist recommendations by physicians will be assessed.

Results/Conclusions: Data collection is currently in progress. Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review previous studies implementing pharmacist to pharmacist transitions of care programs.

Identify the medication related problems reported in the pharmacist to pharmacist transitions of care pilot study.

Self Assessment Questions:

Which of the following is a benefit of a pharmacist to pharmacist transitions of care program?

- A. Higher readmission rates
- B. Identify medication related problems
- C. Higher healthcare costs
- D. Decreased number of CMRs performed

Which of the following was not a medication related problem tracked during this pilot program?

A. Antibiotic stewardship
B. Patient counseling needed
C. Renal dosing adjustment
D. Beers list criteria not met
Q1 Answer: B Q2 Answer: D
ACPE Universal Activity Number 0121-9999-863-L04-P

Impact of Pharmacist Intervention on Prescribing Rates of Sodium-Glucose Cotransporter-2 inhibitors in Patients with Reduced Ejection Fraction Heart Failure

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PURPOSE: Reduced ejection fraction heart failure (HFrEF) is the leading cause of hospitalizations and readmissions in the United States. Current AHA/ACC/HFSA guidelines include sodium-glucose cotransporter-2 inhibitors (SGLT2i) as first-line medications in HFrEF patients due to proven reductions in mortality and re-hospitalization rates. Pharmacists are key in HFrEF management through ensuring appropriate guideline-directed medical therapy (GDMT) utilization. The purpose of this study is to evaluate the change in prescribing rates of SGLT2i with and without pharmacist intervention. **METHODS:** This was a retrospective and prospective single-center chart review. For the retrospective portion, patients were identified using a generated report of adults who had a diagnosis of HFrEF between November 1, 2022 through January 30, 2023 and scheduled to follow up with an internal cardiologist. Patients that met the inclusion criteria were reviewed to determine if an SGLT2i, along with other GDMT, were prescribed during the hospitalization. Prospective chart review was conducted between November 1, 2023- January 30, 2024 using the same criteria as the retrospective review. A pharmacist working in the heart failure clinic prospectively identified patients that were recently discharged from the hospital and set to follow up with an internal cardiologist. If a patient was identified to be an appropriate candidate for SGLT2i initiation and was not started on one prior to discharge, the pharmacist would make an intervention during the patient appointment. After the intervention period, the prescribing rates of SGLT2i, and other GDMT, with pharmacist intervention was determined. The primary outcome of this study was to determine the percentage change in SGLT2i prescribing rate in HFrEF patients with and without pharmacist intervention. Secondary outcome was to determine the prescribing rate of all other GDMT with and without pharmacist intervention. **CONCLUSION:** Results/conclusions will be presented at the Great Lakes Pharmacy Resident Conference 2024.

Learning Objectives:

Discuss updated GDMT guidelines.
Identify opportunities for ambulatory pharmacists to optimize GDMT prescribing and patient adherence.

Self Assessment Questions:

Which of the following is correct?

- A. GDMT first-line medications include: SGLT2i, beta-blocker, ACEi/ARB/ARNi, and hydralazine/isosorbide dinitrate
- B. HFrEF is defined as an ejection fraction ≤ 50
- C. SGLT2i are second-line pharmacologic options for patients with HFrEF
- D. GDMT first-line medications include: SGLT2i, beta-blocker, mineralocorticoid receptor antagonist, ACEi/ARB/ARNi

What opportunities are there for ambulatory pharmacist to optimize GDMT prescribing?

- A. Identify and address gaps in GDMT prescribing
- B. Verify appropriate dose and indication
- C. Ease insurance process burden for patients to help with adherence
- D. All the above

Q1 Answer: D Q2 Answer: D
ACPE Universal Activity Number 0121-9999-669-L01-P

Every Hour Counts in Febrile Neutropenia: Evaluating the Performance of T2 Panels for Early Detection of Bloodstream Infections in Neutropenic Patients

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Purpose: Febrile neutropenia causes significant morbidity and mortality in hospitalized patients with hematologic malignancy, particularly those undergoing hematopoietic stem cell transplant (HSCT). Unfortunately, blood cultures only identify causative agents in approximately 30% of episodes, leading to unnecessary broad-spectrum antimicrobials and delays in achieving appropriate therapy. Thus, optimizing microbiological detection could substantially improve therapeutic decision-making. Advanced molecular diagnostic tools have the potential advantage to detect organisms sooner but have not been evaluated in febrile neutropenia. We aim to determine the diagnostic accuracy of T2 diagnostic panels in hospitalized patients with febrile neutropenia, specifically those with hematologic malignancy and/or are undergoing HSCT.

Methods: This single-center, retrospective study will evaluate hospitalized adult patients between January 2019 to August 2023 that meet diagnostic criteria for febrile neutropenia and have a hematologic malignancy, history of HSCT, or are currently undergoing HSCT. Patients will be included if concurrent blood cultures and T2 molecular panel results were drawn at the onset of febrile neutropenia. Results will then be categorized according to the supporting evidence for the bacterial or fungal species identified and likelihood of bloodstream infection. All cultures within three weeks of febrile neutropenia onset will be considered as supporting evidence of infection in accordance with previous studies. The primary endpoints of sensitivity and specificity for each panel along with their negative and positive predictive values will be calculated. Secondary endpoints include mortality at 30 days following onset and a characterization of antimicrobial changes immediately following molecular results. Bacterial and fungal species identified via culture not tested by the molecular diagnostic panel will also be reported. Patient data will be collected from electronic health records at UofL Health's Brown Cancer Center and UofL Hospital. IRB approval has been obtained.

Results: Results and conclusions will be disseminated at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the most common organisms that cause infectious febrile neutropenia.
Discuss advantages and challenges to microbiological detection in febrile neutropenia.

Self Assessment Questions:

The most common bacteria detected in bloodstream infections in patients with febrile neutropenia is _____?

- A. Staphylococcus aureus
- B. Escherichia coli
- C. Pseudomonas aeruginosa
- D. Anaerobic organisms

Which of the following statements accurately characterizes blood cultures in febrile neutropenic patients?

- A. Fungal blood cultures have a very quick turnaround time
- B. Blood cultures have a high percentage of detection of the causative organism
- C. Blood cultures are not impacted by agents used for antimicrobial prophylaxis
- D. Blood cultures can detect a broad range of organisms

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-611-L01-P

Effect of Intravenous N-acetylcysteine Administration on Clinical Outcomes in Patients with Non-Acetaminophen-Induced Acute Liver Failure

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The role of n-acetylcysteine (NAC) in reversing acute liver injury associated with acetaminophen toxicity is well-established; less is known, however, about its efficacy in other types of acute liver failure (ALF). Acetylcysteine binds the toxic metabolite of acetaminophen, n-acetyl-p-benzoquinone imine (NAPQI), and acts as a glutathione substitute, allowing metabolism of acetaminophen to proceed through metabolic pathways that produce non-toxic metabolites. Acetylcysteine also appears to exert other protective effects, including inotropic and vasodilatory effects, increased blood flow to the liver, and direct antioxidant and anti-inflammatory activity. The discovery of these other hepatoprotective mechanisms led to speculation that NAC may be useful in other etiologies of ALF. Based on findings from several randomized placebo-controlled trials as well as retrospective observational studies, several society guidelines on the management of ALF have recommended or suggested the use of NAC for non-acetaminophen-induced ALF (NAI-ALF). However, other guidelines note that there is insufficient evidence to strongly recommend its use in routine management outside of clinical trials.

This study aims to contribute to the growing body of literature on the use of NAC in NAI-ALF by examining outcomes for patients treated at CHH for this condition with and without NAC.

Learning Objectives:

Define acute liver failure and identify etiologies for which n-acetylcysteine (NAC) has been studied as a potential therapy.

Discuss the primary literature and current guideline(s) recommendations for the use of n-acetylcysteine (NAC) in non-acetaminophen-induced acute liver failure (NAI-ALF).

Self Assessment Questions:

Acute liver failure presents with all of the following except:

- A. Coagulopathy, defined as an INR of greater than 1.5
- B. Encephalopathy
- C. Elevated liver transaminases
- D. Variceal bleeding

According to the 2023 American College of Gastroenterology Acute Liver Failure Guidelines, for which etiology may n-acetylcysteine be considered?:

- A. Mushroom poisoning
- B. Autoimmune hepatitis
- C. Wilson disease
- D. CMV hepatitis

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-750-L01-P

Dual Antiplatelet Therapy Compared to Therapeutic Anticoagulation Status-Post Left Atrial Appendage Occlusion

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Purpose:

Atrial fibrillation is a common cause of stroke and requires anticoagulation in patients with a CHA2DS2-VASc score of ≥ 2 in men and ≥ 3 in women. However, anticoagulation is not a benign treatment, and many patients have intolerances or contraindications to therapy. The left atrial appendage is a primary source for thromboembolism in atrial fibrillation. Therefore, left atrial appendage occlusion (LAO) has been studied and is an alternative to oral anticoagulation (OAC) in patients that cannot tolerate oral anticoagulation. The WATCHMAN and WATCHMAN FLX devices are the mainstay of therapy for LAO. However, current guidelines still recommend 45 days or longer of anticoagulation after the device is implanted. Recently, the FDA approved dual antiplatelet therapy after the WATCHMAN FLX device is implanted due to more recent literature. This new practice is promising but remains controversial due to a lack of head-to-head studies comparing OAC's to DAPT in patients that are post-LAO. Thus, the purpose of this study is to determine if DAPT is as effective as OAC's post-LAO.

Methods:

This was a retrospective, single-center noninferiority study evaluating clinical outcomes in patients post-LAO between September 2017 and August 2022. Patients 18 years of age and older prescribed DAPT or OAC plus aspirin following a LAO procedure were included. Patients were excluded if they were discharged on monotherapy or if their procedure was unsuccessful. Pertinent baseline characteristics collected per chart review were age, sex, and components of the CHA2DS2-VASc and HAS-BLED scores. The primary outcome was device-related thrombus within 45 days of the procedure. Key secondary outcomes included device-related thrombus within 1-year, major bleeding within 45 days and 1 year, stroke within 1 year, and all-cause death within 1 year.

Results:

The results of this research project will be presented at the 2024 Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Describe the implications of the left atrial appendage and current mechanisms of left atrial appendage occlusion.

Review literature comparing dual-antiplatelet therapy to oral anticoagulation plus aspirin in patients post-left atrial appendage closure.

Self Assessment Questions:

What percentage of strokes due to atrial fibrillation originate from the LAA?

A. 0.9

B. 0.75

C. 0.6

D. 0.5

Based on previous literature, DAPT is associated with which of the following outcomes?

A. Increased rates of device-related thrombus

B. Increased rates of stroke

C. Increased rates of death

D. None of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-599-L01-P

Heparin Monitoring Strategies in Adult Patients Receiving Extracorporeal Membrane Oxygen Support: A Retrospective Chart Review

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Anticoagulation is necessary for patients receiving extracorporeal membrane oxygen support (ECMO) due to inflammatory responses from blood exposure to ECMO tubing. Close monitoring of anticoagulation is needed to balance the risk of bleeding versus thrombosis in these patients. The Extracorporeal Life Support Organization (ELSO) does not provide guidelines or specific recommendations on the optimal anticoagulation monitoring method. Our institution transitioned anticoagulation monitoring practices for ECMO patients, and no internal review has been conducted to evaluate these changes. This study aims to evaluate which anticoagulation monitoring method, activated clotting time (ACT), activated partial thromboplastin time (aPTT) or anti-Xa, optimizes the percentage of time patients spend within therapeutic range.

This is a retrospective, observational study evaluating anticoagulation monitoring in adult patients who received heparin for anticoagulation while on ECMO support from January 1st, 2019 to October 13th, 2023. Patients will be grouped by the strategy of anticoagulation monitoring utilized; ACT, aPTT or anti-Xa. The primary outcome will measure the percentage of time ECMO patients received anticoagulation that was within the therapeutic goal of the chosen anticoagulation monitoring strategy. Secondary outcomes will include major bleeding and thrombotic events as defined by the ELSO guidelines, time to therapeutic goal, mortality on ECMO, 30 day mortality and hospital length of stay. Safety outcomes will look at minor bleeding events as defined by ELSO, administration of anticoagulation reversal agents, time heparin is held due to supratherapeutic values and incidence of new onset heparin induced thrombocytopenia. Primary, secondary and safety outcomes will be analyzed using Kruskal Wallis or analysis of variance as appropriate based on outcomes.

Data collection is ongoing to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify why anticoagulation is necessary for patients receiving extracorporeal membrane oxygen support

Discuss differences in heparin anticoagulation monitoring strategies

Self Assessment Questions:

What is the most common complication of ECMO?

A. ECMO machine malfunction

B. Thrombosis

C. Infection

D. Bleeding

Which anticoagulation monitoring strategy is a chromogenic test that directly measures heparin inhibition of a specific clotting factor?

A. ACT

B. aPTT

C. Anti-Xa

D. Thromboelastography

Q1 Answer: D Q2 Answer: C
ACPE Universal Activity Number 0121-9999-724-L01-P

Influence of Perioperative Antibiotic Duration on Cardiac Implantable Electronic Device (CIED) Infection Rates in a Community Hospital

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Between 1993 and 2008, cardiac implantable electronic device (CIED) use has increased 96% in the United States, with over 4.2 million implantations. Device infection is associated with increased health care costs, considerable morbidity, mortality, and longer hospital length of stay. The estimated incidence of infection is 1-3%. Current guidelines do not support the use of antibiotics in the pocket or postoperative antibiotic therapy, but do recommend the use of antibiotic envelopes in high risk patients. The purpose of this study was to evaluate the impact of post-operative antibiotic duration on the incidence of infection in patients who had a CIED implanted or a generator change at the study institution.

A retrospective chart review of adult patients who received a CIED at the study institution between May 1, 2021 and May 31, 2023 was conducted. Patients were excluded if a temporary or leadless pacemaker or subcutaneous cardiac defibrillator was implanted, a lead revision occurred, or if they were already receiving antibiotics for another infection. Patients were categorized into 3 groups based on whether or not post-operative antibiotics were prescribed and the duration of therapy. Data points collected included demographic information, procedure performed, pre-operative antibiotic choice and administration time, procedure duration, post-operative antibiotic choice and duration, hospitalization or death within 90 days of procedure, use of antibiotic envelope, and presence of CIED infection within 90 days, among others. Data will be analyzed with chi-square tests and/or Fisher's exact tests.

Data collection and analysis are ongoing. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify appropriate perioperative therapies for prevention of CIED infections.

Discuss the potential impact of post-operative antibiotic administration on incidence of CIED infection.

Self Assessment Questions:

1. Which of the following is a guideline recommendation for high risk patients undergoing CIED implantation?

- A. Post-operative antibiotics
- B. Intra-operative antibiotic wash
- C. Antibiotic envelope
- D. Securing envelope

Which of the following is a potential benefit of withholding post-operative antibiotics in CIED implantation?

- A. Reduced health care costs
- B. Higher rates of antibiotic resistance
- C. Increased antibiotic use
- D. Lower incidence of CIED infection

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-529-L01-P

A Survey of Pharmacists on Naloxone Prescribing: Where to Next?

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Purpose: In 2021, there were 80,411 reported overdose deaths involving opioids in the United States, and among U.S. Veterans, drug overdose mortality rates increased by 53% from 2010-2019. Naloxone is FDA approved for the rapid reversal of the effects of opioid overdose. Expanding access to naloxone is key to preventing opioid-involved overdose deaths, and pharmacists are uniquely positioned to prescribe and counsel patients to expand the distribution of this lifesaving medication. The purpose of this study is to identify the barriers and concerns that pharmacists have with prescribing naloxone to Veterans in order to create and implement targeted interventions to prevent overdose deaths.

Methods: A voluntary and anonymous survey of pharmacists practicing at eight VA medical centers and clinics in Veterans Integrated Service Network 10 (VISN 10) was distributed in October 2023; participants were given 30 days to respond. The survey assessed pharmacists' attitudes and beliefs (6 items), comfort (5 items), knowledge (6 items), fear of consequences (4 items), and time and resources (2 items) associated with naloxone and prescribing of naloxone under a standing order or protocol using a 5-point Likert scale. The primary outcome is overall group attitudes toward independent naloxone prescribing under a standing order or protocol. Secondary outcomes include self-identified barriers not addressed in the survey and the difference in the question domains based on the presence of a standing order at the facility, years in practice as a licensed pharmacist, length and type of post-graduate pharmacy training, and percentage of time spent in direct patient care.

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

Learning Objectives:

Identify patients receiving care at VA medical centers and clinics who should be offered naloxone.

Discuss barriers that pharmacists may have to prescribing naloxone under a standing order.

Self Assessment Questions:

Which group of patients should be offered naloxone per Veteran Health Administration guidelines?

- A. Patients who are prescribed benzodiazepines
- B. Patients at high risk for opioid overdose
- C. Patients who are discharged from the surgical intensive care unit
- D. Patients with a substance use disorder diagnosis

What did pharmacists practicing at VA medical centers and clinics in VISN 10 indicate was the largest barrier to naloxone prescribing under a standing order or protocol?

A. Attitudes and Beliefs

- B. Lack of Comfort
- C. Lack of Knowledge
- D. Time and Resources

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-844-L08-P

Leaping Into Leapfrog: Implementing Processes to Improve Survey Completion and Medication Histories

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Transitions of care is the time at which patients are most vulnerable to medication errors due to medication changes, lack of patient education, and changes in providers. To minimize these errors, hospitals have processes in place to collect medication histories at admission. Transitions of care are evaluated as a part of some safety surveys. One such survey is the Leapfrog Hospital Survey, in which a pharmacist completes the Medication Reconciliation Section. This was a process improvement (PI) project that targeted completion of this survey section while also evaluating the process for obtaining medication histories. The survey was completed once prior to the PI project, with instructions from Leapfrog. The survey was then completed a second time after implementing several process improvements. The two groups were then compared. This project addressed the implemented process and how this may impact the survey results, while also easing the medication history collection process. Additionally, the medication history portion was closely reviewed for any opportunities for improvement and then re-evaluated. Themes discussed will include the Leapfrog Medication Reconciliation survey, medication histories, and patient safety.

Learning Objectives:

Identify opportunities to improve completion of medication histories.

Define Leapfrog nomenclature.

Self Assessment Questions:

Which of the following patients should be included in the survey?

- A. 17- year-old female admitted to a medical unit
- B. 50-year-old male admitted to a med-surg unit
- C. 60-year-old male admitted to the intensive care unit
- D. 80- year-old female admitted to medical unit who expires prior to discharge

What is the Gold Standard Medication List?

- A. The best medications for patients based on the guidelines.
- B. List of medications the patient is taking at discharge.
- C. List of medications the patient is taking before admission.
- D. List of medications the provider orders on admission.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-806-L05-P

Effect of SSRI/SNRI's on Bleeding Rates Following Partial Hepatectomies

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Purpose: Partial hepatectomies are a surgical resection of the liver in which intraoperative blood loss greatly predicts morbidity and mortality. Little is known regarding the risk of bleeding in patients using selective serotonin reuptake inhibitors (SSRIs) and serotonin/norepinephrine reuptake inhibitors (SNRIs) perioperatively. The purpose of this study is to assess the impact of serotonin reuptake inhibitor use perioperatively on intraoperative blood loss during partial hepatectomy.

Methods: This is a retrospective cohort study of all patients across Indiana University Health who underwent partial hepatectomy procedures from January 1, 2018 to January 1, 2023. Exclusion criteria included procedures aborted for reasons other than bleeding, recipients or donors of a liver during the indexing admission, compliance status of not taking home medication list, and/or multiple operative surgeries done during the indexing event. Patients were grouped based on use or lack of use of SSRI/SNRI prior to the procedure. The primary outcome is differences in intraoperative blood loss between groups. Secondary outcomes include the differences in hospital lengths of stay, hospital mortality, and changes in hemoglobin. Continuous, parametric data will be compared with a t-test, while nonparametric, continuous data will be analyzed with a Mann Whitney U test. Categorical data will be compared with a Chi-square test or Fisher's exact test.

Results and Conclusion: Data collection and analysis are currently in progress. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize a comprehensive understanding of the mechanisms by which serotonin modulating agents impact hemostatic function.

Review the available data to draw conclusions on the risk of intraoperative bleeding when utilizing SSRI/SNRI's.

Self Assessment Questions:

Which of the following mechanisms characterizes the impact of serotonin modulating agents on hemostatic function?

- A. Increases in intracellular serotonin, increased secretion of platelet factors, and increased expression of membrane receptors in platelet activation.
- B. Enhanced secretion of platelet factors promoting aggregation.
- C. Augmented expression of membrane receptors involved in platelet activation.
- D. Depletion of intracellular serotonin, reduced secretion of platelet factors, and decreased expression of membrane receptors involved in platelet activation.

Based on past meta-analyses and systematic reviews, which of the following interventions is most appropriate for the safe management of SSRI/SNRI's and bleeding risk in the perioperative period?

- A. SSRI/SNRI's should always be discontinued prior to the perioperative period
- B. SSRI/SNRI's should always be continued in the perioperative period
- C. SSRI/SNRI continuation should be individualized based on each patient's risk/benefit ratio
- D. SSRI/SNRI's should be slowly tapered preoperatively to avoid withdrawal syndrome

Q1 Answer: D Q2 Answer: C

Effects of Early Venous Thromboembolism Prophylaxis on Intracranial Hemorrhage Outcomes in Traumatic Brain Injury Patients

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This will be a retrospective single-center non-inferiority study comparing the incidence of intracranial hemorrhage progression in traumatic brain injury with early venous thromboembolism prophylaxis initiation (< 48 hours after arrival) versus initiation ≥48 hours after arrival. Patients are included if they are ≥16 years with traumatic intracranial hemorrhage and received prophylaxis with unfractionated heparin or low molecular weight heparin within 168 hours from arrival. Exclusion criteria are direct admission from another hospital, death/discharge within 48 hours of arrival, no signs of life at initial evaluation, head abbreviated injury scale >5, head abbreviated injury scale >2 in a region besides the head, pregnancy, lack of repeat head CT, or bleeding disorder prior to injury. The primary outcome is a composite of worsening in follow-up head CT, development of new head bleed, or need for unplanned operation due to intracranial hemorrhage. Secondary outcomes are in-hospital mortality or discharge to hospice, incidence of venous thromboembolism, length of hospital stay, length of intensive care unit stay, duration of ventilation, and change in discharge disposition. Due to low incidence of the composite outcome of worsening in follow-up head CT, development of new head bleed, or need for unplanned operation due to intracranial hemorrhage and limited sample size, the statistical analysis will consist of descriptive summaries. There will be approximately 550 eligible patients in Trinity Health Ann Arbor's trauma patient population.

Learning Objectives:

Explain why trauma patients are at increased risk for VTE.

Recall the recommended time to VTE prophylaxis after traumatic brain injury.

Self Assessment Questions:

Why does venous thromboembolism occur at higher rates in trauma patients?

- A. Frequent need for surgical interventions
- B. Extended hospital length of stay
- C. Immobility
- D. All of the above

Most TBI guidelines suggest initiating VTE prophylaxis within 24-72 hours of _____.

- A. Stable head CT
- B. Stable head MRI
- C. Neurosurgical intervention
- D. Admission

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-602-L01-P

Is Less More? Low vs Standard dose Induction during RSI

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Background

Adverse events are frequent in critically ill patients undergoing rapid sequence intubation (RSI). Some clinicians suggest lowering the dose of induction in shock state patients to mitigate these risks. More specifically, and despite the lack of supporting data, free open-access medical education (FOAM) blogs advocate for halving the induction dose and doubling the paralytic dose in critically ill patients to reduce the incidence of cardiac arrest. This study aims to assess the differences in outcomes, if any, between these dosing strategies.

Methods

This was a retrospective cohort study evaluating safety outcomes related to the dosing of induction and paralytic agents during RSI in the emergency department (ED) at UI Health. Data was obtained by chart review of patients undergoing RSI between 2020-2023. Patients were excluded if they were aged <18 years, received only one RSI agent, were intubated following cardiac arrest, or for incomplete vital signs. Outcomes were compared between patients who received standard and low-dose induction (etomidate <0.25 mg/kg, ketamine <1 mg/kg, propofol <1.5 mg/kg, midazolam <0.2 mg/kg). The primary endpoint was cardiac arrest within 60 minutes of drug administration. Secondary endpoints included indicators of hemodynamic instability.

Results

A total of 504 patients were screened and 223 were included in the final analysis. Most patients received etomidate (74%), ketamine (13%), or midazolam (13%). Induction with standard doses was more common than low doses (68% vs 32%, respectively). For the primary outcome, there was no difference in association with cardiac arrest (6.6% vs 4.2%, respectively; P=0.76). For the secondary outcome, there was no difference in association with new onset hypotension (19.1% vs 12.7%, respectively; P=0.24).

Conclusion

Low-dose induction was not associated with a reduced incidence of cardiac arrest or hemodynamic instability.

Learning Objectives:

Identify common misconceptions with induction agents during RSI

Classify standard versus low doses of induction agents for RSI

Self Assessment Questions:

Studies have expressed concerns with standard doses of etomidate during RSI in which patient population?

- A. Pulmonary Arterial Hypertension
- B. Septic Shock
- C. Heart Failure
- D. Kidney Transplant

Which of the following is considered low dose ketamine for induction during RSI?

- A. 1.6 mg/kg
- B. 1.2 mg/kg

C. 0.8 mg/kg
D. Both B and C

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-861-L01-P

Negative Predictive Value of Methicillin-resistant Staphylococcus aureus Nares Screening in Adults Following Nasal Decolonization Swab

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Purpose: Universal methicillin-resistant Staphylococcus aureus (MRSA) nasal decolonization with ethyl alcohol was recently implemented at UofL Health to combat MRSA infection. Although successful in prevention of these infections, the impact on reliability of MRSA nares polymerase chain reaction (PCR) tests has been questioned. Limited data exists regarding the effect ethyl alcohol swabs have on the negative predictive value (NPV) of MRSA nares screening. This study aims to evaluate if ethyl alcohol nasal decolonization affects the NPV of MRSA nares screening in various infection types at UofL Health.

Methods: This single-center, retrospective cohort study evaluated adults admitted to UofL Health between September 2022 to September 2023. Included patients had a diagnosis of a skin and soft tissue infection, bone and joint infection, intraabdominal infection, and/or pulmonary infection, including bacteremia, who received both MRSA nares screening and nasal decolonization. Blood, bone, tissue, wound, and/or respiratory cultures were required. Patients were excluded if they had contraindications to decolonization, a history of MRSA infection in the last 90 days, were receiving linezolid, vancomycin or daptomycin for an infection caused by organisms other than MRSA, received MRSA nares screening before decolonization, had conflicting MRSA nares results, or if pregnant or incarcerated.

Study groups were divided into two arms: a baseline NPV of MRSA nares screening obtained from existing literature and the NPV of MRSA nares screening at UofL Health after receiving nasal decolonization. The primary outcome was the composite difference in NPV at UofL Health compared to literature for all infection types. Secondary outcomes included the NPV of each infection type compared to literature and duration of anti-MRSA antibiotics.

Results/Conclusions: Final results and conclusions to be shared at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the differences between MRSA PCR tests and standard nasal cultures for MRSA screening.

Define negative predictive value.

Self Assessment Questions:

Which of the following is true of MRSA PCR tests for MRSA screening compared to standard nasal cultures?

- A. There are delayed results (1-5 days)
- B. Allows bacteria to grow in or on a medium in a controlled setting
- C. Equal or higher sensitivity than nasal cultures
- D. Can only detect genetic material from viable organisms

Which statement correctly identifies negative predictive value?

- A. The ability of a test to identify the presence of a disease or illness correctly
- B. The probability that a negative screening result can accurately identify true negatives
- C. The ability of a test to identify the absence of a disease or illness correctly
- D. The probability that a positive screening result can accurately identify true positives

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-687-L01-P

Impact of a Clinical Pharmacist in a Multidisciplinary Team on Racial Hypertension Disparities within a Health System Using Remote Patient Monitoring (iHeart)

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Purpose/Background: Uncontrolled hypertension is a major risk factor for cardiovascular disease and is the leading cause of death in the United States. While there have been multiple advancements in strategies to control high blood pressure, there continues to be disparities in hypertension among Black adults. On average, Black adults have higher rates of hypertension and poorer outcomes compared to White adults. In 2023, Indiana University (IU) Health created an initiative to address disparities in health outcomes through telehealth services in a program labeled "iHEART". Three IU Health primary care clinics were included in this stage of the iHeart program because these clinics served the highest proportion of Black patients. Enrollment included a home blood pressure monitor, registration for texting services, and telehealth appointments with a pharmacist and a community health worker. The purpose of this study is to describe the effects of pharmacist-led telehealth services on blood pressure control to reduce disparities in care among Black patients.

Methods: This study is an IRB-exempt quality improvement project. Patients were included if they were outreached by a pharmacist from 8/16/23 to 12/31/2023. The primary outcome is whether Black patients achieved their goal blood pressure from enrollment to either discharge from pharmacist services or the end of the study period. Secondary outcomes included the rate of blood pressure control among White and Black patients before and after intervention and the reduction in disparities between both groups, average change in systolic and diastolic blood pressure, average time taken to achieve goal blood pressure, and the number of antihypertensives prescribed before and after pharmacist intervention.

Results/Conclusion: Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize guideline recommended first line treatment options for hypertension.

Describe race and ethnic differences in the treatment of hypertension.

Self Assessment Questions:

A patient has hypertension with the most recent BP being 145/82 mmHg and a resting heart rate of 85 BPM. Current eGFR is 31 mL/min/1.73m². They are already taking amlodipine 10 mg/valsartan 320 mg once daily. What is the most appropriate next step in therapy?

- A. Chlorthalidone 12.5 mg daily
- B. Carvedilol 6.25 mg twice daily
- C. Spironolactone 12.5 mg daily
- D. Clonidine 0.1 mg twice daily

Which of the following is true regarding race and hypertension?

- A. Black patients have a greater risk of angioedema with angiotensin receptor blockers when compared to White patients
- B. Calcium channel blockers (CCB) were more effective at reducing heart failure compared to angiotensin converting enzyme inhibitors (ACEi) in Black patients
- C. Thiazide monotherapy reduced more CVD events compared to ACEi monotherapy in Black patients with no comorbidities
- D. Spironolactone is recommended as a first line therapy above ACEi's and ARB's for Black patients

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-728-L01-P

Perception of Pharmacists to the Public in Film and Television Media Between 2013 and 2023

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Purpose: The pharmacy profession has exponentially grown over the past century, and this growth has been accompanied by an evolution in the pharmacist's role. Traditionally, pharmacists have been defined by their role in medication dispensing and management in the community setting, but now pharmacists provide a variety of clinical and non-clinical services that have evolved outside of this traditional role. This growth is well-documented within the profession and other areas of healthcare; however, it has not been widely translated to the public. Modern film/television media continues to portray pharmacists in their traditional roles, rather than depicting the ever-evolving profession. There is a growing need to characterize the public's perceptions of pharmacists, to help guide advocacy efforts, and modify policies aimed at promoting the profession.

Methods: We conducted a retrospective review of pharmacist appearances in film and television (TV) media published in English between August 2013 and October 2023. A comprehensive search of the Internet Movie Database (IMDb) was conducted using key search terms including (but not limited to) "pharmacist" and "pharmacy". Included media titles were movies, TV series/episodes, shorts, specials, and documentaries that had a pharmacist character portrayal. Eligibility for this review was determined by two independent reviewers using a standardized screening tool. Once included, the scene featuring the pharmacist was characterized as positive, neutral, or negative. The overall character status of the pharmacist was characterized as either hero, victim, or villain based on their overall actions in the portrayal. The primary outcome of this study is the perceptions of pharmacists in film and television.

Results and Conclusions: As of January 2024, 152 media items were identified for inclusion. Data collection and analysis is currently in progress, with results and conclusions being presented at the Great Lakes Conference.

Learning Objectives:

Describe the portrayal of pharmacists and the pharmacy profession in film and television.

Discuss the impact of pharmacist portrayals and identify ways to promote positive public perceptions of pharmacists and the pharmacy profession.

Self Assessment Questions:

Which of the following is true regarding pharmacist perception in previously published literature?

- A. Perception was primarily neutral
- B. Perception was primarily positive
- C. Perception was primarily negative
- D. Previously literature did not look at pharmacist perception

Which of the following media types were included in this study?

- A. Music videos
- B. Television Specials
- C. News Segments
- D. Vine video clips

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-854-L99-P

Initiation of a Pharmacy-Driven Medication History Program

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Purpose: To improve inpatient medication history accuracy from current standard of care by initiating a pharmacy-led medication history program on medical-surgical units at Lutheran Hospital.

Methods: This study has been approved by the Community Health Systems Institutional Review Board. Patients eligible for inclusion in this quality improvement project were 18 years or older and were admitted to medical surgical unit(s) within Lutheran Hospital. Nurse-conducted medication histories (standard of care) were assessed and compared to pharmacy-conducted medication histories (intervention). For both groups, patient medication histories were retrospectively reviewed for accuracy and completeness by comparing admission medication histories to the admission medication reconciliation, outpatient pharmacy refill logs available within the electronic medical record, outpatient provider notes, and electronic prescriptions. Chart review was completed for 100 patients (50 per group) admitted in the months of September and October 2023. To assess intervention efficacy, the number of errors per patient, the type of error, and length of stay were tracked within each group. Types of errors that were recorded include omission of medication, incorrect component of medication order, additional medication listed, and inappropriate dose range listed.

Results/Conclusions: Results and conclusions of this project will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the estimated frequency of inpatient medication history errors in the healthcare system as a whole.

Recognize improvements individuals with pharmacy training are able to provide to the inpatient medication history process.

Self Assessment Questions:

According to some estimates, what percent of hospital inpatients have at least one medication history error upon admission?

- A. 0.33
- B. 0.5
- C. 0.67
- D. 0.9

What was the percent reduction in the average number of medication history errors in the pharmacy group compared with the standard of care group?

- A. 0.083
- B. 0.302
- C. 0.645
- D. 0.917

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-809-L05-P

Impact of Pharmacist Integration into the Denosumab Administration Services Workflow

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Purpose: Osteoporosis affects millions in the United States, leading to debilitating fractures. Per AACE/ACE guidelines, denosumab is considered for individuals who have previously experienced a fracture, are at a high risk of fractures, have poor renal function or are unable to tolerate bisphosphonates. Denosumab is a suitable option for patients with poor adherence due to its six-month in-office dosing schedule. The purpose of this study is to evaluate the impact of pharmacist integration into Denosumab Administration Services on patient compliance with recommended supplementation and lab monitoring. Methods: This study employs a retrospective and prospective cohort design to assess the impact of pharmacist integration into Denosumab Administration Services at a single community health system. An electronic medical record report will identify patients with denosumab administered subcutaneously by a healthcare provider. The retrospective cohort includes patients that received denosumab administered with no pharmacist insights between November 1, 2022, and January 31, 2023. In comparison, the prospective cohort will have a pharmacist integrated into the workflow of denosumab administrations. The prospective data collection will include administrations between November 1, 2023, and January 31, 2024. For patients in the prospective cohort, providers will place a referral order for pharmacists when ordering denosumab. Pharmacists will assist with ordering, scheduling, and monitoring denosumab in addition to ensuring therapy is appropriate and affordable. Data will be reviewed to evaluate if patients are compliant with calcium and vitamin D supplementation. The investigator will also evaluate if patients are compliant with lab monitoring parameters, by checking if patients had labs drawn 14 days after denosumab administration. Patient compliance will be compared between the retrospective and prospective cohorts. Findings will inform policy development, optimize patient care and reduce fracture risk in patients with osteoporosis. Results/Conclusion: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference 2024.

Learning Objectives:

Discuss which patients are ideal candidates for denosumab.

Identify opportunities for ambulatory pharmacists to optimize denosumab prescribing and monitoring parameters.

Self Assessment Questions:

Which patient(s) population should be screened for osteoporosis?

- A. Post-menopausal women
- B. Pre-menopausal women
- C. Men aged 50-69
- D. All of the above

What opportunities are there for ambulatory pharmacists to optimize denosumab prescribing?

- A. Identify and address lab abnormalities
- B. Ensure therapy is affordable
- C. Optimize patient supplementation
- D. All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-696-L01-P

HIT or Miss? Comparing Bivalirudin and Argatroban for Heparin-Induced Thrombocytopenia

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Purpose: Heparin-induced thrombocytopenia (HIT) is a prothrombotic adverse drug reaction secondary to anticoagulation therapy with heparin products. The American Society of Hematology (ASH) and American College of Chest Physicians (CHEST) guidelines recommend initiating non-heparin anticoagulants, such as injectable direct thrombin inhibitors (DTI), to prevent thromboembolic complications. Given the importance of achieving rapid therapeutic concentrations, DTI selection is a subject of significant debate. Efficacy for bivalirudin compared to argatroban have been described in multiple studies with inconsistent results. Henry Ford Health (HFH) implemented bivalirudin as the DTI of choice for HIT treatment on 9/1/22. The purpose of this study is to compare the efficacy and safety of argatroban and bivalirudin in patients with known or suspected HIT before and after protocol implementation. Methods: This was a multi-center, retrospective quasi-experimental study. The before implementation period was defined as 11/1/21 - 8/31/22 and the after period as 11/1/22 - 8/31/23. Patients included were $\geq$ 18 years of age and on argatroban or bivalirudin for suspected or known HIT during their HFH admission. Vulnerable populations were excluded along with patients who had an allergy to either DTI, did not reach therapeutic goal within 48 hours of DTI initiation, or received either DTI for an alternative indication. The primary outcome was the time to therapeutic activated partial thromboplastin time (aPTT). Secondary outcomes included the number of dose adjustments made to reach therapeutic aPTT, number of aPTT tests drawn before reaching therapeutic aPTT, cost of total DTI administration per patient, number of thrombotic events, and number of significant bleeding events. Continuous data was analyzed using an unpaired t-test or Mann-Whitney U test. Categorical data was analyzed using a Chi-square test or a Fisher's exact test. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss guideline recommendations for the treatment of heparin induced thrombocytopenia
Identify the different pharmacokinetic properties between argatroban and bivalirudin

Self Assessment Questions:

Which of the following statements are recommendations from the CHEST and/or ASH guidelines?

- A. Both guidelines suggest argatroban or bivalirudin over fondaparinux or a direct oral anticoagulant (DOAC) when selecting a non-heparin anticoagulant.
- B. The ASH guideline panel suggests transitioning to warfarin rather than a DOAC.
- C. For bivalirudin, both guidelines recommend targeting an aPTT of 1.5-2.5 times baseline.
- D. For argatroban, both guidelines recommend targeting an aPTT of 1.5-3.5 times baseline.

Which of the following is a characteristic of bivalirudin?

- A. Bivalirudin primarily undergoes renal elimination.
- B. Bivalirudin has a shorter half-life compared to argatroban.
- C. Bivalirudin and argatroban are in different drug classes.
- D. Bivalirudin does not cause a false INR elevation.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-650-L01-P

Daptomycin versus Beta-Lactam Based Therapy for the Treatment of Enterococcal Endocarditis

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Purpose: Enterococcal infective endocarditis (EIE) accounts for 10% of infective endocarditis cases and is associated with significant morbidity and mortality. First line EIE treatment is beta-lactam based; however, increasing drug resistance, adverse effects, and beta-lactam allergies prompt the need for alternative agents.

Daptomycin is favored for vancomycin-resistant Enterococcus bloodstream infections due to once daily dosing, tolerability, and activity against Enterococcus.

However, it is considered a last line EIE agent due to limited evidence supporting its use for this indication. This study aims to investigate outcomes of daptomycin-based therapy compared to beta-lactam based therapy in the treatment of EIE.

Methods: A retrospective study of patients admitted to OSUWMC inpatient facilities from November 1, 2011, through August 31, 2023, with international classification of diseases (ICD) 9 or 10 code corresponding to infective endocarditis plus at least one positive Enterococcus blood culture or ICD 9 or 10 code corresponding to EIE was conducted. Adult patients with documented EIE diagnosis and treatment with daptomycin or beta-lactams were included. Exclusion criteria included prisoners, receipt of target antibiotics for < 50% of the treatment course, index culture with in vitro resistance to definitive antibiotics, polymicrobial endocarditis, daptomycin dosed <6 mg/kg, or death within 48 hours of EIE treatment initiation. The primary outcome was clinical failure (composite of inpatient infection-related mortality and progression of disease leading to change in therapy). Baseline demographics, clinical data and outcomes are reported through descriptive statistics. A multivariable logistic regression model evaluated the primary outcome and clinical response between treatment groups. Study protocols were submitted and approved by the institutional review board prior to data collection.

Results/Conclusion: Data analysis in progress. Results and Conclusion will be presented at Great Lakes Pharmacy Residency Conference

Learning Objectives:

Recall current first line treatment options for Enterococcal infective endocarditis

Identify potential advantages of daptomycin over first line treatment options

Self Assessment Questions:

Which of the following are guideline-based first line treatment options for Enterococcal infective endocarditis in the setting of no drug allergies or resistance?

- A. Vancomycin + gentamicin
- B. Ampicillin + ceftriaxone
- C. Penicillin + ampicillin
- D. Daptomycin

Which of the following is an advantage of daptomycin therapy?

- A. Twice daily dosing and tolerability
- B. Potent activity against Enterococcus and twice daily dosing
- C. Potent activity against Enterococcus and once daily dosing
- D. Once daily dosing and oral option

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-670-L01-P

Evaluation of Post-Transplantation Cyclophosphamide, Tacrolimus, and Mycophenolate for Graft vs. Host Disease Prophylaxis in Patients Undergoing Allogeneic Stem Cell Transplant

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Hematopoietic stem cell transplantation is a strategy used to treat many malignant and non-malignant hematologic diseases. Both types of transplants have a myriad of risks, but patients who receive an allogeneic stem cell are specifically at risk for graft vs host disease (GVHD). This occurs when the donor T-cells attack the host cells, leading to tissue damage. Various studies estimate that up to 50% of patients who have undergone an allogeneic stem cell transplant will experience some degree of experience GVHD. Historically, tacrolimus and methotrexate have been used to prevent GVHD. However, more transplant centers are starting to favor a regimen containing cyclophosphamide, tacrolimus, and mycophenolate. The primary outcome of this study is to compare the 1-year GVHD free survival between patients receiving post-transplantation cyclophosphamide, tacrolimus, and mycophenolate vs those receiving tacrolimus and methotrexate. Secondary endpoints include but are not limited to acute GVHD of any grade, time to any grade of acute GVHD, chronic GVHD rates, time to engraftment of platelets and neutrophils, rate of infection, progression free survival, transplant related mortality, and overall survival. Institutional Review Board approval has been obtained, and data analysis is ongoing.

This single-health system, retrospective, observational study will be conducted at the University of Cincinnati Medical Center. Participants to be included must be at least 18 years who have undergone an allogeneic bone marrow transplant without active GVHD at the time of transplant, and have received either cyclophosphamide, tacrolimus, and mycophenolate or tacrolimus and methotrexate as their GVHD prophylaxis regimen. Exclusion criteria include active pregnancy and incarceration.

Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Residents Conference in April 2024. A conclusion will be forthcoming based on results.

Learning Objectives:

Recognize risk factors that may increase the risk of GVHD.

Describe the clinical impact these results may have on GVHD prophylaxis moving forward.

Self Assessment Questions:

Which of the following is a risk factor for GVHD?

- A. Reduced intensity conditioning regimens
- B. HLA mismatch
- C. Umbilical cord blood
- D. Cryopreservation of the marrow

Which of the following is the primary objective of this research project?

- A. 1-year GVHD free survival
- B. Incidence of hemorrhagic cystitis
- C. Rate of mortality
- D. Rate of relapse

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-644-L01-P

Impact of Pharmacist Intervention on Oral Antimicrobial Prescribing at Discharge: Assessing Adherence to Guidelines

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Purpose: The objective of this study was to assess the impact of pharmacist intervention on antimicrobial prescribing at discharge for community-acquired pneumonia (CAP), urinary tract infections (UTI), skin and soft tissue infections (SSTI), and intra-abdominal infections (IAI). The outcomes were compared to historical data in patients with similar baseline characteristics to assess the magnitude of pharmacist intervention.

Methods: For a 5-week period from October 30, 2023 to December 1, 2023, a pharmacy resident was dedicated to the evaluation of discharge antibiotics. Patients aged 18 years and older were included based on the diagnosis of uncomplicated CAP, uncomplicated or complicated UTI, asymptomatic bacteriuria, non-purulent or purulent SSTI, diabetic foot infection, or IAI with the need to transition to oral antibiotics upon discharge to complete their course of therapy. The pharmacist reviewed each patient's electronic medical record (EMR) to classify the type of infection, assess discharge orders, and intervene as necessary to recommend appropriate antimicrobial treatment regimen and duration based on facility-specific guidelines.

Results: Sixty patients were included in the pre-intervention and post-intervention groups. The most common diagnoses across both groups were CAP and UTI. In the pre-intervention group, 10% (6/60) of patients were discharged with optimal antimicrobial therapy. In the post-intervention group, 98% (59/60) of patients were discharged with optimal antimicrobial therapy. Pharmacist intervention was responsible for 70% (42/60) of optimized regimens in the post-intervention group. Overall, pharmacist intervention demonstrated an absolute increase of 60% in optimal prescribing at discharge.

Conclusions: The findings of this quality improvement study further demonstrate the importance of pharmacist involvement in antimicrobial prescribing at discharge. Increase in optimal prescribing can prevent adverse effects, decrease development of drug-resistant organisms, and potentially decrease readmission rates. The future goal of this study is to follow patients with optimized antimicrobial regimens and evaluate long-term outcomes.

Learning Objectives:

Identify the role of a pharmacist in antimicrobial stewardship efforts at discharge

Recognize the importance of pharmacist involvement in supporting antimicrobial stewardship efforts

Self Assessment Questions:

Which aspect of prescribing demonstrates the largest opportunity for pharmacist intervention in supporting antimicrobial stewardship efforts at discharge?

- A. Optimization of dosing
- B. Optimization of therapy duration
- C. Optimization of drug choice
- D. Optimization of drug route

In which of the following areas are antimicrobial stewardship efforts historically lacking where pharmacist involvement would provide benefit?

- A. Consideration of patient cost
- B. Inpatient setting
- C. Transitions of care (i.e., discharge)
- D. They are not lacking

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-630-L01-P

Cockcroft-Gault versus CKD-EPI Creatinine-Cystatin in Estimating Renal Function

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Background: Cockcroft-Gault remains the standard for estimating renal function in the inpatient setting despite known limitations. Serum creatinine, a direct by-product of muscle metabolism, is influenced by various patient-specific factors, potentially leading to inaccurate estimation of renal clearance. This has led to research for alternative biomarkers, such as cystatin C (cys-C), a cysteine protease inhibitor solely regulated by the kidneys. CKD-EPI Creatinine-Cystatin (CKD-EPIcr-cys) was developed to ameliorate limitations of both biomarkers when used individually. As a result, CKD-EPIcr-cys is preferred in various scenarios in the outpatient setting. This study aims to assess the accuracy of Cockcroft-Gault and CKD-EPIcr-cys equations in the inpatient setting to determine scenarios in which cys-C should be included in clearance estimations.

Methods: This is a single-center, retrospective review including data from June 5th, 2021, to December 31st, 2022. Data were collected from UK HealthCare Enterprise Data Warehouse via the Center for Clinical and Translational Science. Patients 18 years or older with serum cys-C and creatinine collected within 24 hours of admission were included. Patients who were pregnant or receiving renal replacement therapy prior to admission were excluded. The primary endpoint was to identify patient-specific factors associated with an overestimation of renal clearance by Cockcroft-Gault when compared to CKD-EPIcr-cys.

Results: Of 235 eligible encounters, 80 had a > 25 mL/min difference between Cockcroft-Gault and CKD-EPIcr-cys clearance estimations. Multivariate regression identified the following factors as independent predictors of Cockcroft-Gault overestimation: age < 58 years (OR 3.61; 95% CI 1.904-6.844), weight > 118 kg (OR 9.221; 95% CI 3.794-22.411), ICU admission (OR 2.487; 95% CI 1.225-5.048) and paralysis (OR 3.835; 95% CI 1.44-10.214).

Conclusion: The current study suggests that CKD-EPIcr-cys is the preferred equation for inpatient renal clearance estimation in patients who are < 58 years old, weigh >118 kg, admitted to ICU, or paralyzed.

Learning Objectives:

Recognize patient-specific factors that influence serum creatinine

Identify patients who may benefit from renal clearance estimation that incorporates serum creatinine and cystatin C

Self Assessment Questions:

Which of the following are known to influence serum creatinine levels?

- A. Sex
- B. Smoking History
- C. Fluid resuscitation with lactated ringers
- D. Malnutrition

Based on the current study's findings, in order to avoid overestimation of renal clearance, CKD-EPIcr-cys should be preferred in patients with which of the following characteristics?

- A. Supratherapeutic drug levels
- B. Increased protein consumption
- C. Diagnosis of quadriplegia
- D. Recent use of piperacillin/tazobactam (Zosyn)

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-676-L01-P

Retrospective Review Of Asthma Control Following Initiation Of Inhaler Therapy In Outpatients With Mild Asthma

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In 2019, the Global Initiative for Asthma (GINA) published guidelines recommending use of low-dose inhaled corticosteroid (ICS)-long acting beta-agonist (LABA) inhalers over short acting beta-agonist (SABA) monotherapy for relief in patients with mild asthma. Existing literature suggests ICS-based therapies have improved outcomes in patients with asthma, but either does not address patients in GINA Step 1, or fails to highlight a difference in outcomes in adherent patients. This study seeks to substantiate the claim of improved outcomes in patients with mild asthma by retrospectively comparing the effect of as-needed ICS-LABA and SABA inhalers on rates of asthma exacerbations.

This retrospective chart review will include adult outpatients with a new clinical diagnosis of mild asthma who were initiated on inhaler therapy at the time of diagnosis. Exclusion criteria include those with COPD, patients using an ICS-LABA and SABA inhaler concurrently, and patients hospitalized 6 months prior to inclusion for a pulmonary-related cause. This research looks to compare outcomes in patients receiving either an ICS-LABA or SABA inhaler monotherapy for management of mild asthma. The resulting data will be compiled to assess the primary outcome of composite asthma exacerbation occurrence at 1 year defined as ED visit or hospital admission for exacerbation, or outpatient prescription for oral steroids secondary to worsening asthma symptoms. The secondary outcome is a composite of escalation of therapy, defined as need for increased dose or frequency of existing inhalers, need for non-inhaler asthma therapy, or treatment of a non-specific pulmonary condition. This research is viewed as exploratory, without similarity to available published literature. As such, descriptive statistics will be used to analyze results.

Results and conclusion will be reported at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the mechanisms of action of ICS-LABA and SABA inhalers with regard to pulmonary physiology

Review current literature for the use of ICS-LABA and SABA inhalers in patients with mild asthma and their implementation in clinical guidelines

Self Assessment Questions:

The 2018 study by O'Byrne and colleagues found as-needed budesonide-formoterol to be superior to both as-needed terbutaline and twice-daily budesonide-formoterol. Which outcome was significantly impacted by this intervention?

- A. Reduction in emergency department visits
- B. Improvement in asthma symptom control
- C. Rate of hospital admissions
- D. Need for additional therapy

Which of the following inhaler classes and dosing strategies does the 2023 Global Initiative for Asthma recommend for adult patients with Step 1 or Step 2 asthma?

- A. LABA/LAMA/ICS daily
- B. Low-dose ICS daily
- C. Low-dose ICS-formoterol as-needed only
- D. High-dose ICS-formoterol twice daily

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-678-L01-P

Clinical Efficacy Evaluation of Step-Down Oral Antibiotic Therapy for Streptococcal and Enterococcal Bloodstream Infections

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Purpose: Recent literature suggests that oral-step down therapy may be effective for streptococcal and enterococcal bloodstream infections; however, only small studies comparing outcomes to intravenous (IV) therapy have been done and more data is needed. The purpose of this study is to evaluate how outcomes for streptococcal and enterococcal bloodstream infections treated with oral step-down antibiotic therapy compare with those treated with IV antibiotic therapy. Establishing the efficacy of oral step-down antibiotics for these bloodstream infections may allow patients to avoid risks associated with extended durations of IV antibiotics.

Methods: In this single-center, retrospective, observational study, patients who had positive blood cultures for Streptococcus or Enterococcus species between September 1, 2018 and August 31, 2023 were evaluated. Adult patients were included if they had a positive blood culture for Streptococcus or Enterococcus and received active antibiotics within 48 hours. Patients were excluded if they had endocarditis, osteomyelitis, or central nervous system infections, if they had a polymicrobial infection with an organism other than Streptococcus or Enterococcus, if they had a prior bacteremia caused by the same organism in the last 90 days, if culture was ruled a contaminant, if they received less than 48 hours of antibiotics, or if they were pregnant. Once patients were identified for inclusion, the primary investigator collected data related to the primary and secondary outcomes. The primary outcome was a treatment failure composite outcome, defined as occurrence of one or more of the following: 90-day all-cause mortality, 90-day infection-related readmission, or 90-day recurrence of bloodstream infection with the same organism. Secondary outcomes included hospital length of stay and the individual components of the composite primary outcome. The two groups were compared using Chi Square or Student's T test.

Results/Conclusions: Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe relevant literature regarding the use of oral step-down antibiotic therapy to treat streptococcal and enterococcal bloodstream infections.

Identify the theoretical benefits of using oral antibiotics rather than intravenous (IV) antibiotics for the treatment of bloodstream infections.

Self Assessment Questions:

Which of the following is true regarding existing evidence on the use of oral step-down antibiotic therapy for streptococcal and enterococcal bloodstream infections?

- A. Randomized controlled trials have established intravenous (IV) antibiotics as superior to oral antibiotics
- B. Guidelines specifically recommend the use of IV antibiotics only for streptococcal and enterococcal bloodstream infections
- C. Oral antibiotics are incapable of reaching therapeutic levels in the blood to treat bloodstream infections
- D. Case series from decades ago established efficacy of intravenous antibiotics for bloodstream infections

Which of the following is a possible advantage of using oral antibiotics rather than IV antibiotics for the treatment of bloodstream infections?

- A. Oral antibiotics are associated with longer durations of treatment
- B. Parenteral administration of antibiotics is associated with potential for complications such as thrombosis and line-related infections
- C. Oral antibiotics are always better tolerated than IV antibiotics
- D. Oral antibiotics have more favorable pharmacokinetics than IV antibiotics

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-558-L01-P

Cisatracurium versus Atracurium in the Management of Non-COVID-19 Acute Respiratory Distress Syndrome

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Purpose (Max 100 words):

Acute Respiratory Distress Syndrome (ARDS) is seen in approximately 15% of Intensive Care Unit (ICU) patients and 23% of mechanically ventilated patients, with a mortality rate of 32-45%. ARDS practice guidelines recommend the use of Neuromuscular Blocking Agents (NMBAs) with either cisatracurium or atracurium. Due to lack of comparative studies, little evidence exists regarding which of these agents should be considered a first line agent. This study aims to compare cisatracurium to atracurium for neuromuscular blockade in patients with ARDS.

Methods (Max 225 words):

This multi-center, retrospective cohort study will identify patients hospitalized between January 1st, 2018 and January 1st, 2023 who meet pre-specified inclusion criteria: age $\geq$ 18, diagnosis of non-COVID-19 related ARDS, and use of either cisatracurium or atracurium for neuromuscular blockade. Patients will be excluded if they are pregnant, incarcerated, receiving extracorporeal membrane oxygenation (ECMO), have severe liver disease categorized as Child-Pugh class C, have myasthenia gravis, or documentation of a positive COVID-19 test within 7 days of NMBA administration. Additionally, patients will be excluded if arterial blood gas documentation was not completed, or if they received both study drugs during their course of treatment. The primary outcome for this study is 90-day mortality rate. Secondary outcomes include change in oxygenation status determined by PaO₂ to FiO₂ ratio, length of ICU stay, rate of adverse events associated with NMBA use, and overall healthcare cost estimated using current average wholesale pricing for both agents. A sample size of 536 patients with 268 in each group will be used to reach 80% power. A multivariable logistic regression will be performed to identify and evaluate any significant interaction between variables.

Results:

Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Conference

Learning Objectives:

Review the available literature comparing atracurium and cisatracurium as neuromuscular blocking agents for use in acute respiratory syndrome

Discuss the study design to demonstrate safety and efficacy of atracurium in patient with acute respiratory distress syndrome within the intensive care unit

Self Assessment Questions:

Which of the following was the primary outcome for this study?

- A. Oxygenation status
- B. Rate of adverse events
- C. Mortality benefit
- D. Overall medication costs

Which of the following is true regarding acute respiratory distress syndrome (ARDS)?

- A. Mortality rate is dependent on severity of ARDS
- B. Cisatracurium is the preferred agent for neuromuscular blockade in ARDS
- C. 75% of ARDS cases are considered mild
- D. ARDS is rarely seen in mechanically ventilated patients

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-737-L01-P

Evaluation of insulin dose after changing from a GLP-1 agonist to a dual GIP/GLP-1 agonist in patients with type 2 diabetes mellitus

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Purpose: With the recent approval and clinical implementation of tirzepatide, many patients with type 2 diabetes mellitus (T2DM) are transitioning from a glucagon-like peptide 1 (GLP-1) receptor agonist to a dual gastric inhibitory polypeptide (GIP)/GLP-1 receptor agonist, like tirzepatide, to optimize glucose management. There is a lack of guidance on dose adjustments for patients concurrently using insulin when starting tirzepatide. In clinical trials, tirzepatide has shown a greater A1c reduction and glucose-lowering effects compared to GLP-1 receptor agonists such as semaglutide. This suggests a potential elevated risk of hypoglycemia, necessitating proactive adjustments in insulin dosages to mitigate the risk of low blood sugar levels.

This study aims to assess the changes in insulin requirements when transitioning patients from a GLP-1 receptor agonist to tirzepatide to promote safer practices and minimize the risk of hypoglycemia. The primary outcome of this study is the change in total daily insulin dose at 6 months after starting tirzepatide.

Methods: This retrospective single-center cohort study has received approval from the institutional review board at the University of Kentucky. This study includes patients with T2DM who transitioned from a GLP-1 receptor agonist to tirzepatide between June 5, 2021 and July 31, 2023, all while concurrently using insulin therapy (basal with or without bolus or premixed insulin). Patients with the following characteristics were excluded: type 1 diabetes, tirzepatide discontinuation before 3 months of therapy, GLP-1 receptor agonist discontinuation before 6 months of therapy, or lack of a follow-up appointment with a diabetes care provider within 6 months after starting tirzepatide.

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

Learning Objectives:

Review mechanism and efficacy of GIP/GLP-1 receptor agonists.

Translate findings of this study to optimize insulin dosing for patients starting GIP/GLP-1 receptor agonist therapy.

Self Assessment Questions:

How does tirzepatide differ from previous GLP-1 receptor agonists?

- A. It combines dual agonism at GLP-1 and GIP receptors
- B. It has a lower potential for inducing hypoglycemia
- C. It is administered orally
- D. It is associated with an increased risk of weight gain

In the SURPASS-2 trial, how much did tirzepatide reduce HbA1c levels of participants?

- A. 0.0-0.5%
- B. 0.5-1.0%
- C. 1.0-1.5%
- D. 2.0-2.3%

Q1 Answer: A Q2 Answer: D

Comparison of Tigecycline in Combination with Standard of Care versus Standard of Care in the Treatment of Clostridioides Difficile Infections in the Community Hospital Setting

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The purpose of this study is to evaluate the clinical cure rate of tigecycline in combination with standard of care agents compared to standard of care agents in Clostridioides difficile infection (CDI). This study is an Institutional Review Board approved single center, retrospective chart review. Patients were identified by the electronic health record during the study period of July 1, 2019 to August 31, 2023. Patients 18 years of age or older, who tested positive for CDI and received either tigecycline plus standard of care or standard of care alone for the treatment of CDI were eligible for inclusion. This study included patients who received tigecycline only for the indications of intra-abdominal infections or CDI. Any patients who received tigecycline or standard of care agents for less than 48 hours, had a history of greater than or equal to two CDI recurrences, were pregnant or a prisoner were excluded. Data collected includes patient demographics, severity of CDI, age, temperature, leukocytosis, albumin, systemic concomitant antibiotic use, Charlson Comorbidity index, vasopressor use, bezlotoxumab use, fecal microbiota transplantation, length of stay, colectomy, previous CDI, death, and treatment duration. The primary outcome is to evaluate the clinical cure rate of tigecycline in combination with standard of care agents compared to standard of care agents in CDI. Secondary outcomes include evaluation of CDI recurrence, hospital and intensive care unit length of stay, colectomy rate, and in-hospital mortality. Data collection and statistical analysis will be completed by April 2024. Final results with conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the guideline-recommended agents for the treatment of CDI.

Recall the proposed role of tigecycline in the treatment of CDI.

Self Assessment Questions:

What agent is considered first line for patients with severe CDI?

- A. Fidaxomicin
- B. Bezlotoxumab
- C. Metronidazole
- D. Tigecycline

What agent has the lowest MIC90 values against Clostridium species isolates?

- A. Clindamycin
- B. Tigecycline
- C. Meropenem
- D. Metronidazole

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-622-L01-P

Rhythm and Rhyme Behind "POEM" Pharmacist Involvement with Oral Anticancer Agents

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Statement of Purpose: Oral anticancer agents (OAAs) medication errors can lead to significant morbidity and mortality. With the increasing number of OAAs and regimen complexity, pharmacists are instrumental in improving patient outcomes. Michigan Oncology Quality Consortium and Michigan Institute for Care Management and Transformation created the Pharmacists Optimizing Oncology Care Excellence in Michigan (POEM) initiative, whose purpose is to improve oncology patient outcomes across Michigan. POEM positions were implemented within the established Oral Chemotherapy Management Program (OCMP) at Henry Ford Health (HFH) in 2021.

Statement of Methods: This is a single institution, dual-site, retrospective review and analysis, to be completed at Henry Ford Medical Center and Henry Ford Cancer Center in Macomb in Michigan. Study data will be collected through the electronic medical record and REDCap for patients enrolled into OCMP between 12/1/2021 through 11/30/2023, which will be compared to a subset of patients enrolled into OCMP before POEM implementation. Up to 200 patients with an encounter completed by a POEM pharmacist at either HFH site will be included post-implementation. Interventions will be characterized based on overall number, type, impact, and where in the point-of-care the intervention was made (prescribing, follow-up, consult). Patient baseline characteristics will be summarized to include for the post-implementation group: age, biological sex, cancer type, OAAs, overall number of medications, comorbidity score based on Charlson Comorbidity Index and National Institute of Health-National Cancer Institute Comorbidity Index, and performance status. Study results will be utilized to evaluate pharmacist interventions and to perform a gap analysis.

Summary of Results: Data collection and analysis are currently in progress.

Conclusions Reached: Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the role of pharmacist integration in direct patient care of oncology patients receiving treatment with oral anticancer agents.

Identify interventions made by POEM pharmacists at HFH.

Self Assessment Questions:

Which of the following are NOT outcomes associated with integration of clinical pharmacist specialists in direct patient care of oncology patients receiving treatment with oral anticancer agents?

- A. Improved medication adherence
- B. Improved adherence to laboratory monitoring
- C. Increased costs for the patient and healthcare system
- D. Reduced length of hospital stay

Currently at HFH, POEM pharmacist roles do NOT include which of the following tasks?

- A. Initial and final verification of IV chemotherapy

- B. Medication reconciliation
- C. Toxicity assessment
- D. Ordering laboratory monitoring

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-798-L05-P

Impact of Preemptive Mycophenolate Dose Reduction on Leukopenia Post-Liver Transplant

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Purpose: Mycophenolate mofetil (MMF) is one of the standard immunosuppressants utilized in the post-transplant phase to decrease the risk of acute rejection in liver transplant recipients. One of the most prominent adverse effects associated with MMF is leukopenia. A previous quality improvement project done at University of Michigan Health (UMH) included 45 adult liver transplant recipients and found that 53% developed leukopenia. The median time to leukopenia occurred around post-operative day (POD) 60. As a result of these findings, an institutional protocol change was implemented in October 2021. In patients with non-immunologic causes of end-stage liver disease, an empiric MMF dose reduction from 1000mg to 500mg twice daily was implemented by POD 30. To evaluate the impact of this empiric MMF dose reduction, the objective of this study is to compare the incidence of leukopenia in patients pre- versus post-protocol change.

Methods: This single-center retrospective study includes adult liver transplant recipients (≥18 years old) transplanted at UMH between April 1, 2020 and March 1, 2023. Patients with end-stage liver disease from an immunologic cause or fulminant hepatitis, received a multiorgan transplant, or survived less than 30 days post-transplant will be excluded. Patients will be categorized into two groups, those that were transplanted before (4/10/2020-9/23/2021) and after (10/2/2021-2/27/2023) the protocol change. The primary outcome is incidence of leukopenia defined as WBC<3000 IU/L. Secondary outcomes will include incidence of cytomegalovirus (CMV) infection and disease, rejection, neutropenia (ANC<1500 IU/L), medication interventions for management of leukopenia, MMF dose modifications and time to dose reductions, and assessment of protocol adherence. The primary and secondary outcomes will be evaluated from time of transplant through 6 months post-transplant. Independent t-test and Chi-square or Fisher's exact tests will be used to evaluate continuous and nominal variables, respectively.

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

Learning Objectives:

Describe the common side effects seen with mycophenolate mofetil use in post-liver transplant patients.

Identify medication interventions to help mitigate leukopenia while on immunosuppressive therapy with mycophenolate mofetil.

Self Assessment Questions:

Which of the following adverse effects is associated with mycophenolate mofetil?

- A. Leukopenia
- B. Renal toxicity
- C. Thrombocytosis
- D. None of the above

Which of the following are potential interventions to help manage leukopenia in a post-liver transplant patient?

- A. Evaluating if valganciclovir dose is appropriate for renal function and dose adjusting as appropriate
- B. Use of G-CSF if ANC threshold is met
- C. Dose reducing mycophenolate mofetil
- D. All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-651-L01-P

Comparison of Fatal and Non-Fatal Bupropion Exposures Reported to Poison Centers

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Purpose:

Bupropion is a common exposure reported to poison centers and is responsible for a growing number of deaths and negative clinical outcomes. Recently, it was reported that the rate of increase in single substance bupropion exposures is second only to SSRIs. Unlike SSRIs, however, bupropion overdose has the potential to cause life-threatening seizures and cardiovascular toxicity. Critically, bupropion-induced seizures can present in a delayed fashion, sometimes as late as 24 hours after ingestion. The public health burden to hospitals and emergency departments created by the continued rise in bupropion overdoses demonstrates the need for a better method of predicting which patients should be triaged to a higher level of care. This is especially true for those who have an unknown or unreliable history of bupropion exposure and those who are asymptomatic or mildly symptomatic on presentation. A risk assessment tool to identify patients that have a higher risk of decompensation and/or death based on demographic or clinical variables would be beneficial when triaging these patients upon initial presentation to a medical center or call to a poison center.

Methods:

This was a retrospective, observational study of all cases of single-agent bupropion ingestion that were followed to a known outcome that were reported to US poison centers between January 1, 2017, and December 31, 2022. Cases were stratified into two groups, fatal and non-fatal exposure, for analysis. Cases with missing age, sex, or weight were excluded from analysis. The primary endpoint was clinical effects after exposure, namely seizures, CNS depression, hemodynamic dysfunction, and cardiac dysfunction. The secondary endpoint was differences in clinical and demographic characteristics associated with medical outcome.

Results:

Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall symptoms associated with bupropion overdose

Recognize the therapy of choice for seizure management associated with bupropion toxicity

Self Assessment Questions:

Which of the following symptoms is typically associated with single-substance bupropion exposure?

- A. Miosis
- B. Transaminitis

- C. Tachycardia
- D. Prolonged QTc

Which of the following medications would be the best choice for seizure management following a massive bupropion ingestion?

- A. Levetiracetam
- B. Phenobarbital
- C. Phenytoin
- D. Valproic acid

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-718-L01-P

Comparison of Asynchronous Self, Peer, Near-Peer, and Faculty Assessment of a High-Stakes Patient Counseling Training Simulation in a Pharmacy Skills Lab

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Purpose: Performance-based assessments (PBAs) are high-stakes, skills-based assessments that aid in the evaluation of student progression toward practice readiness. PBAs are traditionally evaluated by faculty, and there is currently no literature regarding the use of self, peer, and near-peer evaluation in preparation for a PBA. Given the high-stakes nature of the assessment, the addition of a simulated PBA could provide students a practice opportunity to familiarize themselves with the assessment structure and reduce stress related to the PBA. The purpose of this study was to compare asynchronous self, peer, near-peer, and faculty assessments of a simulated patient counseling PBA station designed to prepare students for a PBA.

Methods: Second-year professional pharmacy students in a pharmacy skills laboratory course participated in a simulated PBA or Training PBA three weeks prior to their PBA. The Training PBA was identical in structure to the PBA with different scenarios for each station. Student performance at the patient counseling station was recorded. The student, a peer classmate, a near-peer volunteer, and a faculty member evaluated the recorded video using a standardized analytical checklist. Scores were collected and analyzed for differences between groups. Additionally, a 46-item survey was distributed to students, and responses related to stress as well as perceived benefit of the Training PBA were evaluated.

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

Learning Objectives:

Recognize mean differences observed in evaluations (Self or Peer or Near-Peer vs. Faculty) for a high-stakes patient counseling training stimulation in a pharmacy skills lab

Discuss student perceptions of the accuracy of evaluations received (Self vs. Peer vs. Near-Peer vs. Faculty) for a high-stakes patient counseling training stimulation in a pharmacy skills lab

Self Assessment Questions:

In the data presented, which evaluator type displayed no statistically significant difference in evaluation scores when compared to faculty members?

- A. Self
- B. Peer
- C. Near-Peer
- D. All of the Above

Which evaluator type did students perceive to be the most accurate in assessing their patient counseling performance?

- A. Self
- B. Peer
- C. Near-Peer
- D. Faculty

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-850-L99-P

Retrospective Review of Urine Drug Screening/Testing in a Primary Care Clinic at a VA Medical Center

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Purpose

Chronic pain is among the most common and disabling chronic medical conditions in the US. Long-term opioid therapy (LTOT) is used in certain instances when benefits outweigh risks to maximize quality of life for patients with chronic pain. For patients on LTOT, urine drug screening (UDS) and urine drug testing (UDT) are used as methods to monitor patient adherence and identify misuse. Communication of UDS/UDT results between patients and providers should be documented in the electronic medical record (EMR). The purpose of this study is to investigate the incidence of UDS, UDS with confirm, and UDT within a primary care clinic at Veteran Health Indiana (VHI), to determine presence of EMR documentation of provider/patient discussion of UDS/UDT results, and to identify areas of improvement for UDS/UDT at VHI.

Methods

This study is a retrospective electronic chart review of patients prescribed LTOT. Patients were included if they were receiving LTOT (> 90 days of opioid use) from a VHI provider in the Green primary care team between 10/1/2022 and 9/30/2023. Patients were excluded if their LTOT was managed by an outside provider, resided at a long-term care facility, were followed by palliative care, or were enrolled in hospice. The primary outcome of this study is to determine the presence of EMR documentation of UDS/UDT. The secondary outcomes are the incidence of UDS/UDT within the designated time frame, the presence of illicit substances and/or unexpected findings on UDS/UDT, treatment changes made based on UDS/UDT results, and opportunities for improvement with the UDS/UDT process at VHI. Data was obtained using the patients' EMRs and was reviewed for enrollment based on the inclusion and exclusion criteria. Data collected was de-identified with VA RedCap. Patients were not contacted.

Results and Conclusions

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

Learning Objectives:

Outline the main differences between each type of UDS/UDT utilized at VHI.

Identify the requirements for a patient on LTOT, within the VA, regarding patient consent for UDS/UDT, patient notification of test results, and EMR documentation.

Self Assessment Questions:

What are the advantages of UDS (immunoassay) compared to LCMS?

- A. Inexpensive
- B. Fast return of lab results
- C. Highly sensitive and specific
- D. Both A and B

Which are true regarding UDS/UDT monitoring for a patient on LTOT?

- A. UDS/UDT results requiring action must be communicated to patients within 14 calendar days
- B. UDS/UDT is required if LTOT is to be initiated or continued
- C. A certified letter may be sent to a patient to communicate test results when attempts to contact the patient have not been successful
- D. Both B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-841-L01-P

A Retrospective Study of Obesity and Overweight Treatment and Outcomes in Primary Care

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Purpose: Rising levels of obesity in the United States has led to increased drug development for weight management. Pharmacist led weight management services have aided in patient success with weight management therapies. The purpose of this study is to assess a pharmacist-managed weight loss collaborative agreement across Community Health Network, in coordination with the nurse care navigators.

Methods: This study is designed to be a retrospective chart review. The primary objective of this study is to determine the change in total body weight lost (% change) in patients seen by clinical ambulatory care pharmacist for weight loss vs those seen only by their PCP vs those seen for initial visit by a clinical ambulatory care pharmacist and followed by nurse care navigators. Key secondary objectives, to be compared across 3 groups (physician, pharmacist, or care navigator) are to analyze change in weight, lipid parameters, blood pressure, and A1c. Additional key secondary endpoints include percent of patients meeting >5% baseline weight loss at 3 and 6 months and barriers to weight loss. Patients will be identified based upon reports for patients seen for weight management at Community Physician Group offices between 5/1/23 to 11/24/23. Patients will be eligible for inclusion if they are greater than or equal to 18 years of age on pharmacologic weight management therapy, and have a body mass index ≥ 30 kg/m², or ≥ 27 kg/m² with weight-related complications (hypertension, hyperlipidemia, type 2 diabetes, or obstructive sleep apnea). Key exclusion criteria include patients who are pregnant. The results of this study will be analyzed using ANOVA test and descriptive statistics.

Results and Conclusion: to be presented at Great Lakes Pharmacy Resident Conference

Objectives

Recall clinical practice guidelines recommendations for weight management therapy.

Recognize common barriers to accessing weight management pharmacologic treatment.

Learning Objectives:

Recall clinical practice guidelines recommendations for weight management therapy.

Recognize common barriers to accessing weight management pharmacologic treatment.

Self Assessment Questions:

Which of the following is a barrier to accessing weight management pharmacologic treatment?

- A. Lack of insurance coverage
- B. cost
- C. Backorder/supply chain issues
- D. All of the above

The American Gastroenterological Association clinical practice guidelines recommend the use of pharmacologic weight loss therapy in:

- A. All patients who have a BMI ≥ 30 kg/m²
- B. Overweight patients without comorbidities
- C. Patients with obesity or overweight with weight-related complications, who have an inadequate response to lifestyle intervention
- D. Any patient who desires to lose weight

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-660-L01-P

Evaluation of the Implementation of an Inpatient Clinical Pathway for the Treatment of Community Acquired Pneumonia (CAP) in Pediatric Patients

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Purpose: Community-acquired pneumonia (CAP) in pediatric patients is a common and potentially serious respiratory infection that affects children in community settings. It typically arises from the inhalation of bacteria or viruses, leading to inflammation and infection within the lung tissue. It is primarily caused by viral or bacterial pathogens, with *Streptococcus pneumoniae* and respiratory syncytial virus (RSV) being leading culprits. Pediatric CAP can be categorized into two groups, simple or complex pneumonia. Complex pneumonia involves significant effusion, empyema, severe or impending respiratory failure, and necrotizing pneumonia. Vaccination, particularly with the *Streptococcus pneumoniae*, *Haemophilus influenzae* type b, and influenza vaccines, plays a vital role in preventing CAP and in the treatment approach in pediatric patients. Currently, the American Academy of Pediatrics (AAP) guidelines recommend treating patients admitted to the hospital with simple CAP, requiring intravenous therapy, who are fully vaccinated with ampicillin or penicillin G and patients who are not fully vaccinated with ceftriaxone. Because guideline-directed therapy for simple CAP was not consistently followed at LUMC, a pathway was developed to aid healthcare providers in classifying and managing pediatric patients with CAP.

Methods: This study is a single-center, observational, retrospective, cohort study conducted on patients admitted to the general pediatric and pediatric intensive care units with a diagnosis of CAP from January 2022-December 2023 at LUMC Children's Hospital. The purpose of this study is to evaluate the implementation of the inpatient clinical pathway for community acquired pneumonia (CAP) in infants >60 days to pediatric patients <18 years old at Loyola University medical Center Children's Hospital. The primary outcome was the effectiveness of the pathway in reduction of ceftriaxone prescribing in pediatric patients with CAP.

Results /conclusion: In progress

Learning Objectives:

Recall the American Academy of Pediatrics (AAP) pneumonia guidelines for inpatient treatment

Review the literature supporting the development, implementation, and utilization of pathway directed therapy

Self Assessment Questions:

What vaccination will protect a patient from developing CAP?

- A. H. Influenzae type B (HIB)
- B. Rotavirus
- C. DTap
- D. Varicella

What is a first line agent for simple CAP in a pediatric patient?

- A. Ampicillin
- B. Ceftriaxone
- C. Penicillin G
- D. A and C

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-546-L01-P

Penicillin Allergy De-labeling: Evaluating a Health System's Implementation of the PEN-FAST Tool within an Infectious Disease Clinic

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Purpose: It is estimated that around 10% of US patients report an allergic reaction to a penicillin class antibiotic, and that <1% have a true IgE mediated reaction with approximately 80% losing their sensitivity after 10 years. The standard of care to remove the penicillin allergy label in adults is a specialized process involving intradermal skin testing followed by an oral challenge with a penicillin. The cost of skin testing and unnecessary use of allergy-directed broad-spectrum antibiotics results in increased healthcare costs, antibiotic resistance rates, and suboptimal antibiotic therapy. The PALACE trial compared a monitoring tool called PEN-FAST to identify low-risk patients to standard of care skin testing, followed by an oral challenge. These findings confirmed the tool's translation to skin tests as the risk of a positive allergic reaction was determined to be similar and validated the PEN-FAST's negative predictive value of ~96% in scores <3. The purpose of this study is to evaluate the number of patients with a penicillin allergy who can become de-labeled to aid in reducing costs related to skin testing and increasing antimicrobial stewardship. **Methods:** This research involved evaluating an infectious disease clinic's use of the PEN-FAST tool in patients with a documented penicillin allergy as a retrospective chart review. Patients ≥ 18 years with a penicillin class or drug allergy were included and patients with an incomplete PEN-FAST score were excluded. Primary outcome was the number of patients classified as "very low and low risk" classified as a PEN-FAST score ≤3 to become de-labeled. Secondary outcomes were evaluating the organization's feasibility of the PEN-FAST by number of oral penicillin challenge post-documentation, skin test use pre-documentation, and number of patients with a documented severity, reaction, and non-penicillin allergy. **Results/Conclusions:** Data results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain how the PEN-FAST score translates to skin testing

Describe penicillin allergy characteristics that would qualify a patient's penicillin allergy to become de-labeled.

Self Assessment Questions:

According to clinical trials, a negative predictive value of 96% was associated with what PEN-FAST score?

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

A 58-year-old patient reports an allergy to amoxicillin in childhood with a reaction of hives where he was then switched to a different antibiotic. If a skin test was performed today, what risk category of a positive skin test result would this patient fall based on the PEN-FAST?

- A. Very low risk
- B. Low risk
- C. Moderate risk
- D. High risk

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-636-L01-P

Understanding Changes in Post-Operative Pain Control from Day to Night in Pediatric Patients

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Pain can be very difficult to treat despite availability of countless non-pharmacologic and pharmacologic options. Treating pain in pediatric patients is even more challenging, though, as the pharmacologic options are limited compared to those available for adults. Additionally, pediatric patients often have difficulty expressing their pain. There is little evidence to support how to appropriately manage pain in pediatric patients through a standardized process. The purpose of this study is to evaluate the difference between pain control through the day and night for pediatric patients in order to determine if the current approach to pain management in pediatric surgery patients requires modification for better pain management outcomes.

This is a novel, retrospective study to determine if patients are receiving different levels of pain control in the morning (0700 â€” 1459) compared to the nighttime (2300 â€” 0659) in pediatric patients. Data was electronically collected and analyzed to determine a difference in numerical pain scores between time frames. Patients between 5 and 17 years of age who underwent an isolated bone or appendix surgery were considered for evaluations if they received at least one analgesic medication and had at least one pain score evaluation. Patients who had non-isolated bone injuries or multiple operations during the same surgery timeframe were excluded. The primary outcome is the difference in pain score between morning and nighttime. A secondary outcome is the difference in the number of pain assessments between morning and nighttime.

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

Learning Objectives:

Identify challenges with treating pain in pediatric patients.

Describe limitations of using numerical pain rating scales in pediatrics.

Self Assessment Questions:

What is a unique challenge to treating pain in pediatrics compared to adults?

- A. Some dosage forms are unavailable for certain patients to use effectively.
- B. Younger aged patients have difficulty expressing pain correctly.
- C. Pain is subjective.
- D. Pain score evaluations are difficult to assess appropriately when the patient is asleep.

Which of the following is a limitation of numerical pain rating scales in pediatrics?

- A. Medication regimen intensity can be determined based on the number reported.
- B. There is a true zero and maximum limit to the scale.
- C. It causes pain evaluations to have an objective result.
- D. The ability to quantify and report pain varies widely in pediatric patients.

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-819-L08-P

Analysis of letters of recommendation for predictive factors for admission into a professional pharmacy curriculum

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Anecdotally, narrative letters of recommendation are referred to as one of the most important parts of an application to a residency program, university, or employer. However, despite extensive research into the most effective and fair ways to rate these letters, application committees are still largely utilizing subjective scoring methods based upon the judgment of individual reviewers. The purpose of this study is to analyze the letters written in support of students applying to the professional pharmacy curriculum of a large university, looking for standout words, thematic references, or linguistic scores that correlate with a higher probability of admission.

Data collection will occur as a manual, retrospective review of individual letters of recommendation written for students applying to the pharmacy curriculum during the 2022-2023 academic year. The rubrics for application scoring will be reviewed, as will individual comments left by reviewers regarding the letters being scored. Students who were removed from the application process for whatever reason before admission determination was made will be excluded from this study. Demographic data will be collected, including a randomly-assigned study identification number, cis-gender identification, residency status, minority status, and a binary assessment of socioeconomic indicators. The primary outcome will be the difference in the scores assigned to the letters of recommendation written for those admitted to the program contrasted to those who were denied admission. Relevant secondary outcomes will be the difference in the use of standout words as defined by previous studies performed, the difference in linguistic scores as analyzed by a third-party linguistic inquiry software, and the difference in the studentsâ€™ campus affiliation. Descriptive statistics, studentâ€™s t-test, and Wilcoxon rank sum test will be used to analyze the data, as appropriate.

Learning Objectives:

Identify objective methods to evaluate narrative letters of recommendation.

State the outcome-based importance of narrative letters of recommendation.

Self Assessment Questions:

Which of the following is a language inquiry software package that can aid in the processing and scoring of narrative letters of recommendation?

- A. LIWC-22
- B. Luke 22:46
- C. VancoPK
- D. Catch-22

What advice should be given to students regarding the best way to seek out letters of recommendation?

- A. Letter writers should write as little as possible.
- B. Having more letters of recommendation improves your chances of admission.
- C. Those who complete letters of recommendation should be counseled that filling out the pre-populated questions does not constitute a completed letter.
- D. You have to have at least one person with a pharmacy background complete a letter of recommendation for you.

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-755-L04-P

Tenecteplase vs Alteplase for Acute Ischemic Stroke in the Emergency Department

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Purpose: Intravenous thrombolytics are the standard of care for treating patients with acute ischemic stroke within the 4.5-hour window from the time they were last known normal. Alteplase is the tissue plasminogen activator (tPA) recommended in the most recent guidelines and has been the most commonly used agent.

Tenecteplase has pharmacokinetic advantages compared to alteplase and has simpler preparation and administration requirements. The aim of this study was to compare the efficacy and safety outcomes of alteplase and tenecteplase in adult acute ischemic stroke in the Emergency Department.

Methods: In this retrospective cohort study, we evaluated patients at Bronson Methodist Hospital treated with intravenous thrombolytics for acute ischemic stroke in the Emergency Department from December 12, 2021 to December 12, 2023. Eligible patients were aged 18 years or older with confirmed or suspected acute ischemic stroke who received alteplase or tenecteplase in the Emergency Department. Patients were excluded if they were a protected patient population (pregnant, aged less than 18 years, incarcerated), did not present to the Emergency Department for acute ischemic stroke, had symptoms resolve while in the Emergency Department, or received a thrombolytic for an indication other than acute ischemic stroke. The primary endpoint was the proportion of patients who received thrombolytics within 15 minutes of completion of non-contrast head computerized tomography (CT) scan. Secondary endpoints included door-to-needle time, change in National Institutes of Health Stroke Scale (NIHSS), and change in Modified Rankin Scale (mRS). Safety outcomes included incidence of intracranial hemorrhage, incidence of major bleeding, and incidence of minor bleeding.

Results/Conclusion: Data analysis is currently being performed. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the pharmacokinetic and administration advantages of tenecteplase over alteplase.

Review the dosing and administration requirements of alteplase and tenecteplase for acute ischemic stroke.

Self Assessment Questions:

Which of the following is a correct statement regarding the pharmacokinetic profile of tenecteplase compared to alteplase?

- A. The oral bioavailability is 100%, whereas alteplase is only 50% bioavailable.
- B. The fibrin specificity of tenecteplase is about half that of alteplase.
- C. The initial half-life of tenecteplase is about four times longer than alteplase.
- D. Variable antithrombin-dependent binding affinities require alteplase to be dosed in units, whereas tenecteplase can be dosed in milligrams.

Which of the following is the correct dosing for thrombolytics in acute ischemic stroke?

- A. Alteplase 15 mg bolus, followed by 50 mg infusion over 30 minutes, then 35 mg over 1 hour (maximum dose 100 mg).
- B. Alteplase 50 mg IV bolus over 2 minutes, followed by repeat 50 mg IV bolus 15 minutes later.
- C. Tenecteplase 0.25 mg/kg (maximum 25 mg) administered via IV push.
- D. Tenecteplase 0.4 mg/kg (maximum 40 mg) administered via IV push.

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-577-L01-P

Impact of Elexacaftor/Tezacaftor/Ivacaftor Dose Modifications on Outcomes in Pediatric Cystic Fibrosis Patients

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Purpose: Elexacaftor/Tezacaftor/Ivacaftor (ETI) is a cystic fibrosis transmembrane conductance regulator (CFTR) modulator used in people with cystic fibrosis (PwCF).

With its approval for ages 2 and up, many children now have access to a CFTR modulator for the first time. ETI has been a breakthrough drug in treating PwCF by improving lung function and weight. However, some PwCF experience side effects requiring dose reductions. There are currently no studies looking at dose modifications in pediatric patients on ETI. The objective of this study was to compare the highest percent predicted forced expiratory volume in 1 second (ppFEV1) of pediatric PwCF in the 6 months before and 6 months after dose modification of ETI.

Method: This IRB approved retrospective study included pediatric PwCF on ETI from October 1st, 2019-July 31, 2023. The primary endpoint was comparing the highest ppFEV1 in 6 months prior to ETI dose adjustment compared to the highest in the 6 months after dose modification. Patients were included in this study if they were ages 2-18 years, had a diagnosis of CF, were followed at Riley Hospital for Children CF clinic, were receiving ETI where the dose had been modified due to side effects, and maintained a dose modification for at least 3 months. Exclusion criteria included receiving a lung transplant, patients who did not have a ppFEV1 while on ETI before and/or after dose modifications, and patients who were initially started on a modified ETI dose that wasn't adjusted further. Nominal data will be analyzed via a Chi-squared test with a paired t-test analyzing normally distributed continuous data and the Mann-Whitney U-test analyzing non-normally distributed continuous data.

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

Learning Objectives:

Review dosing for Elexacaftor/Tezacaftor/Ivacaftor (ETI) and potential dose modifications in pediatric people with cystic fibrosis.

Discuss side effects of ETI that can lead to dosing modifications

Self Assessment Questions:

What initial dose of ETI is most appropriate for an 11-year-old PwCF who is 31 kg with normal baseline lab results and the F508del mutation?

- A. Two (2) elexacaftor 50 mg/tezacaftor 25 mg/ivacaftor 37.5 mg tablets in the morning and one (1) ivacaftor 75 mg tablet in the evening
- B. Two (2) elexacaftor 100 mg/tezacaftor 50 mg/ivacaftor 75 mg in the morning and one (1) ivacaftor 150 mg tablet in the evening
- C. Two (2) elexacaftor 50 mg/tezacaftor 25 mg/ivacaftor 37.5 mg tablets in the morning
- D. Two (2) elexacaftor 100 mg/tezacaftor 50 mg/ivacaftor 75 mg in the morning

Which of the following is a side effect that may lead to dose modifications of ETI?

- A. Acute Kidney Injury
- B. Diabetes
- C. Mood Changes
- D. Hypotension

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-548-L01-P

Enoxaparin Dosing and Monitoring in Morbidly Obese Medicine Patients

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Background: Obesity (defined by the World Health Organization as body mass index (BMI) of at least 30 kg/m²) is an independent risk factor associated with a 6.2-fold increased risk of venous thromboembolism (VTE). Enoxaparin is often used in the inpatient setting due to ease of administration and lack of frequent lab monitoring. Physiological changes with obesity, such as increased adipose tissue and decreased tissue perfusion, can lead to variable concentrations of hydrophilic drugs, including enoxaparin. The optimal dosing strategy of enoxaparin remains unclear in morbidly obese patients, and previous studies are limited to small sample sizes. The purpose of this study is to evaluate the efficacy of the current enoxaparin dosing protocols based on anti-Xa levels in medically ill, morbidly obese patients.

Methods: This single-center, retrospective, observational study includes adult (> 18 years) morbidly obese patients (weight > 120 kg or BMI > 40 kg/m²), who were admitted to a medicine primary team between January 1, 2018 to July 31, 2023, had achieved steady-state enoxaparin, and at least one appropriately drawn anti-Xa level. Patients are excluded if they are pregnant or have baseline creatinine clearance of less than 30 mL/min. The primary outcome is the percentage of initial anti-Xa levels at goal. The goal anti-Xa ranges are 0.2-0.4 for prophylaxis and 0.5-1.0 for treatment of VTE at Eskenazi Health. Secondary outcomes include the percentage of subtherapeutic and supratherapeutic initial anti-Xa levels, final dosing regimen (in mg/kg) that resulted in goal anti-Xa range, and incidence of VTE occurrence and clinically significant bleeding events during the admission. Of note, all outcomes will be stratified into three BMI groups (40-49 kg/m², 50-59 kg/m², > 60 kg/m²).

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

Learning Objectives:

Describe the gaps in literature surrounding VTE prophylaxis and treatment with enoxaparin in morbidly obese, medically ill patients.

Discuss the efficacy and safety outcomes of the current enoxaparin dosing strategies in morbidly obese, medically ill patients.

Self Assessment Questions:

One of the gaps in current literature surrounding enoxaparin use in morbidly obese medicine patients involves:

- A. Optimal dosing strategy is not well-defined.
- B. Optimal dosing is 0.5 mg/kg/day for VTE prophylaxis.
- C. Optimal dosing is 2 mg/kg/day divided Q12H for VTE treatment.
- D. Large sample size studies.

Which of the following condition(s) need to be met to be included in this study?

- A. Patients must have received at least 3 consecutive, consistent doses of enoxaparin.
- B. Anti-Xa level drawn 6-8 hours after the first dose.
- C. Anti-Xa level drawn 3-5 hours after the steady-state dose.
- D. Both A & C.

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-674-L01-P

Intravenous Iron Dextran: Evaluation of Infusion Related Reactions With and Without Premedication

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Purpose: Intravenous iron dextran is historically associated with infusion related reactions. It is unclear if routine premedication is helpful in reducing the risk of infusion reactions. Practices vary between institutions regarding premedication prior to full dose iron dextran administration. This study aims to compare rates of iron dextran infusion reactions in patients with and without premedication.

Methods: This is a multicenter, retrospective cohort study of patients receiving iron dextran in the outpatient setting. Per study site policies, all patients at Indiana University Simon Comprehensive Cancer Center (IUSCCC) receive premedication with hydrocortisone and diphenhydramine while patients at Eskenazi Health Infusion Center (EHIC) do not receive premedication. Patients included in the study consist of adult patients who received at least one dose of iron dextran as an outpatient at either site between 10/1/2016 and 12/31/2022. Exclusion criteria include patients at EHIC who received premedication, patients at IUSCCC who did not receive premedication, and patients who reacted to the test dose. The primary endpoint is the rate of infusion-related reaction, defined by administration of diphenhydramine, any glucocorticoid, famotidine, albuterol, additional IV fluid administration, or epinephrine during the same outpatient encounter. Key secondary endpoints include rate of serious adverse events, defined by administration of epinephrine, and rate of infusion related reactions compared by the rate of iron dextran infusion and total dose of iron dextran. Data will be analyzed using descriptive statistics and confidence intervals of the rates of infusion related reactions at each site, with categorical variables reported with numbers and percentages.

Results and Conclusion: Data collection is still ongoing. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the process of administration of intravenous iron dextran and treatment of infusion related reactions

Discuss the utility of premedication in preventing infusion related reactions with intravenous iron dextran

Self Assessment Questions:

Which medications would be most appropriate as premedication prior to administration of intravenous iron dextran to prevent infusion related reactions?

- A. Albuterol and famotidine
- B. Diphenhydramine and hydrocortisone
- C. Diphenhydramine and epinephrine
- D. Albuterol and hydrocortisone

Thirty minutes into an iron dextran infusion, a patient develops shortness of breath, bronchospasm, and urticaria. The patient is treated with albuterol, famotidine, and epinephrine, and requires hospitalization for further treatment to fully resolve symptoms. Which CTCAE grade of infusion related reaction did the patient experience?

- A. Grade 1
- B. Grade 2
- C. Grade 3
- D. Grade 5

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-538-L01-P

Evaluation of the Impact of Steroid Choice on Vasopressor Requirements during a Hydrocortisone Shortage

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According to the 2021 Surviving Sepsis Guidelines, corticosteroids are indicated for adults with septic shock and an ongoing requirement of vasopressor therapy. The guidelines recommend initiating hydrocortisone 200 mg per day. In March 2023, the Food and Drug Administration (FDA) announced an IV hydrocortisone and IV methylprednisolone shortage. Due to this shortage, Loyola University Medical Center (LUMC), utilized dexamethasone 8 mg IV daily (equivalent to 213 mg hydrocortisone) for septic shock, with or without fludrocortisone according to provider preference. However, there is a paucity of data on alternative steroid choice and dosing in the setting of shock. We aim to investigate the effect of dexamethasone on vasopressor requirements and resolution of shock during a hydrocortisone shortage. This is a single center, observational, retrospective, cohort, pre-post study of patients admitted to an intensive care unit (ICU) at LUMC, who presented with septic shock requiring vasopressor and corticosteroid treatment. The pre group were patients treated with hydrocortisone 50 mg intravenously every six hours from March 1, 2022 to August 31, 2022. The post group were patients treated with dexamethasone 8 mg intravenously daily from March 1, 2023 to August 31, 2023. The primary outcome is shock resolution, defined as vasopressor free period of at least 24 hours. Secondary outcomes include time to septic shock resolution, ICU mortality, 28-day all-cause mortality, length of ICU stay, and length of hospital stay. The primary outcome will be assessed using stepwise multivariate logistic regression analysis. The secondary outcome of time to shock resolution will be estimated with the Kaplan Meier method and compare groups with a log-rank test. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the Surviving Sepsis Guideline recommendations for corticosteroid use in the management of septic shock.

Identify pharmacologic differences between hydrocortisone and dexamethasone.

Self Assessment Questions:

According to the 2021 Surviving Sepsis Guidelines, which corticosteroid and what dose should be initiated for patients in septic shock?

A. Methylprednisolone 100 mg IV daily

B. Hydrocortisone 50 mg IV Q6H

C. Dexamethasone 8 mg IV Q8H

D. Hydrocortisone 50 mg/day IVPB continuous infusion

In which patient would steroids be initiated for septic shock?

A. 45 year old male started on norepinephrine 0.01 mcg/kg/min

B. 30 year old male receiving 0.9% NaCl 500 mL IV bolus

C. 67 year old female on norepinephrine 0.45 mcg/kg/min and vasopressin 0.03 units/min

D. 80 year old female presenting for acute mental status changes

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-505-L01-P

Ketorolac for Pancreas Transplant Pain

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Purpose: Patients who undergo pancreas transplantation are at risk for post-operative ileus given underlying diabetic gastroparesis in combination with increased opioid requirements. Optimizing pain control through a multimodal approach may decrease opioid requirements and subsequently decrease one's risk for paralytic ileus. Non-steroidal anti-inflammatory drugs (NSAIDs) are typically avoided in the transplant population given risk for acute kidney injury (AKI) with concomitant nephrotoxic immunosuppressants. The pancreas transplant alone (PTA) population is unique in that their renal function is good at baseline with a requirement for estimated glomerular filtration rate > 80 mL/min/1.73m² for PTA eligibility. This study aims to evaluate the safety and efficacy of scheduled ketorolac, an intravenous NSAID, in the PTA population.

Methods: PTA order sets were updated to include the following: ketorolac 15 mg IV once near end of procedure (intraoperative order set) and ketorolac 15 mg IV every 6 hours for 24 hours (postoperative order set). Patients were included if they were 18 years or older and received a PTA at UW Health from 8/1/21 to 8/31/23 (historical control group) or 9/1/23 to 4/1/24 (intervention group). Retrospective chart review was done on historical control group and an interim chart review was done on the intervention group. The primary outcome was a composite of the following safety outcomes at index admission: AKI (KDIGO definition), bleeding (gastrointestinal and intraabdominal), and anastomotic leak. Secondary outcomes included pain control, length of stay, and graft survival.

Results: Will be presented at GLPRC

Conclusion: Will be presented at GLPRC

Learning Objectives:

Discuss the limitations of pain management strategies in the pancreas transplant population

Identify the impact of ketorolac in pancreas transplant alone recipients compared to a historical control group

Self Assessment Questions:

Which of the following contribute to one's risk for developing post-operative ileus following a pancreas transplant?

A. Diabetic gastroparesis

B. Diabetic nephropathy

C. Increased opioid requirement

D. Both A and C

The purpose of incorporating ketorolac into the pain management plan for PTA surgeries is to decrease which of the following?

A. Rejection

B. Opioid use

C. Bleeding risk

D. Kidney injury

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-820-L08-P

Association of Urine pH and Nitrofurantoin Resistance Patterns in Acute Cystitis

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Statement of purpose: Urinary tract infection, specifically acute uncomplicated cystitis, is a prevalent issue in hospital emergency departments. Patients often present with symptoms like dysuria, increased urinary frequency, malodorous urine, and suprapubic discomfort. Common pathogens include *Escherichia coli*, *Klebsiella*, *Proteus mirabilis*, and *Staphylococcus saprophyticus*. According to the 2010 guidelines from the Infectious Diseases Society of America, nitrofurantoin is the optimal treatment for acute uncomplicated cystitis due to its low resistance rates. Despite its efficacy, certain strains, like *Proteus Mirabilis*, have developed mechanisms, such as urease production, to counteract nitrofurantoin. In our study, we aim to investigate localized clinical outcomes, focusing on nitrofurantoin use in acute cystitis cases, especially when urine pH results are readily available.

Statement of methods used: The study protocols underwent approval from the institutional review board prior to data collection. This retrospective cohort study spans from August 2019 to August 2023 at Loyola University Medical Center (LUMC). It involves a chart review of patients diagnosed with acute cystitis in the emergency department, specifically those discharged with nitrofurantoin. The primary focus is on clinical outcomes post the initial nitrofurantoin prescription, emphasizing urine pH >8 and resistance in culture data, including emergency department readmission, worsening symptoms, and antibiotic changes. Secondary endpoints include the proportion of susceptibilities to nitrofurantoin categorized by urine pH and bacterial species.

Results: Results and conclusions will be showcased at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the nitrofurantoin resistance within the context of elevated urine pH, detailing the underlying mechanisms that impede the drug's efficacy. Identify and discuss the clinical outcomes observed in patients upon discharge with nitrofurantoin, with a specific emphasis on the influence of urine pH on treatment results.

Self Assessment Questions:

Which of the following is an antibiotic of choice for treating uncomplicated acute cystitis?

- A. Nitrofurantoin
- B. Meropenem
- C. Ampicillin/Sulbactam
- D. Vancomycin

Which organism among these exhibits a resistance mechanism leading to urine alkalization through urease-catalyzed urea hydrolysis?

- A. *Klebsiella pneumoniae*
- B. *Acinetobacter baumannii*
- C. *Pseudomonas aeruginosa*
- D. *Proteus Mirabilis*

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-580-L01-P

Clinical Practice Guideline Approval and Updating Process Implementation

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Purpose: Clinical practice guidelines are developed within health systems to assist professionals in making appropriate decisions for specific clinical circumstances. Currently, there is lack of consensus as to when and how guidelines should be reviewed and updated and what types of authors and reviewers are needed. A survey of over 100 international institutions has shown most system-based guidelines are updated every 3 to 5 years; however, no studies have been published examining the outcomes associated with a longer timeframe between guideline updates. Froedtert and the Medical College of Wisconsin has developed clinical practice guidelines made available to all staff via an intranet page. Currently there are no baseline requirements for a guideline to be eligible for initial Pharmacy and Therapeutics Committee (P&T Committee) approval, nor minimum standards for ongoing review once posted on the intranet page.

Methods: The primary objective of this cross-sectional assessment with pre (current state)/post outcomes is to design and implement a process to assure guidelines eligible for approval by P&T Committee are evidence-based, multidisciplinary, up to date, and appropriate for use at all sites across the health system. Key pre and post intervention data points include number of guidelines updated/approved within 3 years and percentage of guidelines with authorship from multiple disciplines. A best practices document including recommendations on when and how to update guidelines within the institution is being developed.

Preliminary Results: Preliminary results show that 56 out of 130 (43%) guidelines have not been updated in the past 3 years and 94 out of 130 guidelines (72%) currently include authors from multiple disciplines. Additional results and development of the intervention will be presented at the Great Lakes Residency Conference.

Conclusions: Standardized guideline development and review within a health system is important to encourage safe practices and optimize patient outcomes.

Learning Objectives:

Explain the benefits of developing guidelines within a health system.

Describe best practices for developing and updating guidelines within an institution.

Self Assessment Questions:

Which is a NOT benefit of developing guidelines within a health system?

- A. Increase variation in care
- B. Enhance formulary adherence
- C. Encourage safe practices
- D. Optimize patient outcomes

2. Which best describes what current literature shows is the average amount of time for institutions to update and review guidelines?

- A. 1-3 years
- B. 3-5 years
- C. 5-7 years
- D. None of the above

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-866-L04-P

The Impact of Embedding a Pharmacy Clinical Specialist on a General Medicine Nursing Unit: A Quality Improvement

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Background: Nurses' ability to provide quality patient care heavily relies on pharmacy services. Delays in routine medication delivery, misplaced drugs, and inadequately stocked automated dispensing cabinets (ADCs) can result in nursing dissatisfaction, suboptimal care, and strained interprofessional relationships. Centralized pharmacy models are limited by physical distance from nursing units and variation in staff. Embedding a dedicated clinical pharmacy specialist (CPS) directly on a nursing unit addresses the physical distance between pharmacy and nursing while providing consistent pharmacy staff to nurses.

Statement of Purpose: The study aims to assess the impact of integrating a CPS within a nursing unit at a large academic medical center.

Methods: A pre-intervention and post-intervention retrospective analysis from January 2023-July 2023 and August 2023-January 2024 will be performed to assess data points representing patient outcomes and nursing satisfaction at a 1,032-bed quaternary care academic medical center. The primary endpoint is the difference in patient outcomes as measured by total redispense requests, critically timed medications administered >2 hours from the scheduled time, reported pharmacist interventions, safety reports, and number of medications withdrawn from the ADC. The secondary endpoint is the change in nursing satisfaction with pharmacy services. Satisfaction will be calculated using the results of surveys completed by nurses. This survey includes a numerical ranking system with free text boxes for additional feedback. Data will be analyzed using descriptive statistics. Inclusion criteria for patient chart review include patient admissions on the study floor within the selected timeframe. Data will be excluded if the patient is <18 years of age or >89 years of age. Inclusion criteria for the secondary outcome involves all registered nurses who worked over three shifts within 30 days on the study floor and completion of one survey.

Results/Conclusion: Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Classify a medication error using the National Coordination Council for Medication Error Reporting and Prevention (NCC MERP) medication error index.

Identify how clinical pharmacy specialists impact patient care and interprofessional relationships

Self Assessment Questions:

Patient Presentation: 71-year-old female is hospitalized for a COPD exacerbation. In the emergency department the patient was A&Ox4, GCS = 14, and her kidney function was at baseline (CrCl ~70 mL/minute). **Hospital Course:** Her home dose of gabapentin 600mg PO 3 times daily was resumed on admission. On day 3, the patient experiences a contrast-induced AKI. On day 6 of, the evening shift nurse notices the patient was unusually lethargic, difficult to arouse, and when able to respond verbally, had incomprehensibly slurred speech (GCS = 8). The nurse called the medical team and upon differential, attributed the cause as acute gabapentin toxicity. Gabapentin was discontinued and the patient was started on hourly vital and neurological checks until the patient's mentation returned to baseline. Classify the type of medication error that occurred with this patient using the NCC MERP medication error index.

- A. Category C
- B. Category D
- C. Category E
- D. Category F

Studies have shown that clinical pharmacy specialists on medical teams improve inpatient care and have no evidence of patient harm.

- A. TRUE
- B. FALSE
- C.
- D.

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-774-L04-P

Frequency of hospitalization for patients receiving oral chemotherapy from health-system specialty pharmacies compared to external specialty pharmacies

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For patients on oral chemotherapies, medication adherence is critical to achieving adequate therapeutic response. However, there are many barriers to achieving good adherence and positive outcomes. Previous research has shown that filling oral oncolytic prescriptions at a pharmacy associated with the prescriber's health-system positively correlates with adherence, however there is little data assessing the effects of using an internal health-system pharmacy on rate of hospitalization. This study builds on previous research by assessing frequency of hospitalization within 30 days of filling an oral oncolytic prescription. Adherence also is being evaluated as three separate secondary outcomes including time to initiate treatment, medication possession ratio ≥80%, and proportion of days covered ≥80%. A retrospective chart review is being performed for patients who filled a prescription for oral chemotherapy written by a Bronson Health Group provider between 04/01/2018 and 08/31/2023. Outcomes of patients who filled their prescription at a Bronson specialty pharmacy are being compared to those who used an external specialty pharmacy. **Conclusions:** This study is ongoing. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify clinical factors associated with poor oral chemotherapy adherence.

Identify social factors that negatively correlate with adherence.

Self Assessment Questions:

MW is a 69-year-old male diagnosed with stage 4A prostate cancer. He is retired, widowed, and his only child lives out-of-state. He was prescribed relugolix orally once daily. Since starting this medication, his previously controlled diabetes has become difficult to manage. He now checks blood sugars four times daily and uses both basal and long-acting insulin. When MW picks up his relugolix, the pharmacist notices that MW is over two weeks late to fill this medication. What social factor may be contributing to MW's poor adherence?

- A. Comorbid health conditions
- B. Advanced cancer stage
- C. Marital status
- D. Complex oral chemotherapy regimen

JK is a 48-year-old female diagnosed with metastatic endometrial carcinoma. She is employed full-time as a biology professor, divorced, and has no children. Her doctor prescribed a regimen consisting of tamoxifen 20 mg orally twice daily for three weeks, alternating with megestrol acetate 80 mg twice daily for 3 weeks. JK is admitted to the hospital for pneumonia. When the pharmacy technician completes JK's medication history, they note that JK could not remember if she is currently taking tamoxifen or megestrol and could not recall her last dose. What clinical factor is likely contributing to JK's poor adherence?

- A. Age
- B. Complex oral chemotherapy regimen
- C. Marital status
- D. Employed full-time

Q1 Answer: C Q2 Answer: B
ACPE Universal Activity Number 0121-9999-880-L01-P

Teamwork Makes The Dreamwork; The Initiation Of A Pharmacy Practice Council

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Background:

The Magnet Recognition Program® guides nursing excellence through continuous education, development, and autonomy across career stages. Organizations achieving recognition credit nursing practice councils for increased effectiveness, enhanced problem-solving, and improved communication. Inspired by this, University Hospitals (UH CMC) established the Pharmacy Practice Council (PPC) in June 2023. This group is comprised of twenty pharmacists, ten clinical staff, and ten specialists. The PPC serves as a vital sounding board for the department, with the hopes of echoing the success of nursing practice councils. While lacking a direct pharmacy equivalent to Magnet®, the Ohio Society of Health System Pharmacy's OSHP Best Practice Award recognizes innovative health systems aligning with the ASHP Pharmacy Practice Model Initiative (PPMI). Based on the success seen from nursing practice councils, it is our hope to see this set University Hospitals apart when applying for the Ohio Best Practice Award.

Purpose:

The UH CMC pharmacy department is committed to fostering a "One Department. One Team" culture. By establishing the PPC, pharmacy leadership aims to cultivate a department-wide culture that champions excellence.

Methods:

To foster continuous improvement, all pharmacists a part of the Cleveland Medical Center inpatient pharmacy department will be asked to participate in this single centered survey study administered through Redcap®. This anonymous survey will be administered three separate times. The first survey will reflect the time period before the establishment of the PPC. A second and third study will be collected to assess the departments' satisfaction from implementing the PPC. The primary objective of this study is to evaluate pharmacist's satisfaction with this ongoing quality improvement project. With a secondary endpoint on changes made within the department at the recommendation of the PPC.

Results and Conclusions will be presented at The Great Lakes Pharmacy Conference.

Learning Objectives:

Define ASHP's Pharmacy Practice Model Initiatives mission and how it can be incorporated into quality improvement initiatives
Identify common areas of improvement within a workplace environment that could affect pharmacist satisfaction.

Self Assessment Questions:

1. How many recommendations does the Pharmacy Practice Initiative 2030 give on providing optimal, safe, and effective medication use? ☐

- A. 59
- B. 15
- C. 73
- D. 25

Which of the following does not promote a positive workplace environment?

- A. Creating Clear Goals
- B. Fostering Collaboration and Diversity
- C. Showing Gratitude and Appreciation
- D. Modeling Negative Behavior

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-771-L04-P

Real-World Evaluation of Outcomes in Histoplasmosis Patients from Michigan

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Background: Histoplasmosis is an invasive fungal disease caused by the dimorphic fungus *Histoplasma capsulatum* that most often causes disease in immunocompromised patients. *Histoplasma capsulatum* is a soil dwelling organism that thrives in areas with moderate climate and humidity and whose growth is accelerated by bird and bat excrement. It is an endemic organism in North America, most commonly found in the Ohio and Mississippi River valleys. Little data exists describing the outcomes of patients with histoplasmosis, and even less explores outcomes of patients who receive alternative therapy. As endemic fungal infections continue to become more common, further understanding of available treatment options and outcomes associated with their use is of utmost importance.

Purpose: This study aimed to describe the outcomes of patients diagnosed with histoplasmosis and the courses of treatment they received at a statewide health system in Michigan. The primary objective was to describe patients diagnosed with histoplasmosis and the courses of treatment they received. Secondary objectives included describing progression of disease, antifungal therapy (changes, duration of therapy, therapeutic monitoring), and diagnosing provider specialties.

Methods: The study was a retrospective, multicenter cohort review of eligible patients diagnosed with histoplasmosis across Trinity Health Michigan. Patients were included if they were ≥ 18 years of age and had an initial diagnosis of histoplasmosis indicated by ICD-10 code between the dates of January 1, 2020, and April 1, 2023. Patients were excluded if they were pregnant, incarcerated, non-adherent to follow up, had a co-infection with another fungal organism, or had insufficient data in the medical record to confirm the diagnosis or treatment of histoplasmosis. Outcomes were analyzed using descriptive statistics.

Results: Results will be presented at the 2024 Great Lakes Pharmacy Residency Conference

Conclusions: Conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference

Learning Objectives:

Describe risk factors for development of histoplasmosis

Identify existing treatment data for histoplasmosis patients treated with FDA approved antifungals

Self Assessment Questions:

Which patient would be at highest risk of developing a histoplasma infection

- A. A patient with HIV and a CD4 count of 840 cells/mm³
- B. A patient who received a renal transplant in 2022
- C. A patient with rheumatoid arthritis not on treatment
- D. An immunocompetent patient with occupational exposure to soil debris

Which azole antifungal is guideline-recommended first line therapy for the treatment of histoplasmosis

- A. Isavuconazole
- B. Posaconazole
- C. Itraconazole
- D. Voriconazole

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-514-L01-P

Establishing a pharmacy-lead medication safety service in primary care

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The most fundamental principle of healthcare services is to *primum non nocere*; however, medication errors have a substantial impact on patient safety. Although ClearSight was utilized at Indiana University (IU) Health to collect both inpatient and outpatient incident reports, there was previously not a consistent process for report follow-up within the outpatient setting. Primarily, there was a need for the development of a standard process to assist with medication error review. Having a standard process in place can provide the opportunity to implement interventions aimed at decreasing the likelihood of future errors, reducing negative effects from errors, and increasing overall patient safety. This quality improvement project describes the implementation of a pharmacist-led outpatient medication safety program.

For this project, a pharmacist reviewed incident reports submitted at IU Health Physician primary care clinics which consisted of more than 30 clinics in the Indianapolis metropolitan area. A total of 80 incident reports submitted from July 1, 2023 to November 2, 2023 were reviewed. Incident reports were categorized into three drug classes: vaccines (44%), analgesics (32%), and miscellaneous (24%). Reports were then further categorized by error type (e.g. wrong drug, wrong dose, wrong patient, etc.) After discussing solutions that targeted the root cause of incident reports submitted and using an impact effort matrix to prioritize proposed solutions, it was decided to focus on interventions to decrease vaccine errors as the most reported error type. These interventions will aid in the reduction of vaccine-based errors. This quality improvement intervention was driven by pharmacy review of outpatient medication incident reports. Pharmacists can play an integral role in reviewing errors, identifying solutions, and implementing changes in response to medication errors.

Learning Objectives:

Recognize the difference between medication errors, adverse drug reactions, and near misses.

Identify examples of medication errors.

Self Assessment Questions:

Any preventable event that may cause or lead to inappropriate medication use or patient harm while medication is in the control of the health care professional, patient, or consumer is considered a(n):

- A. Adverse drug reaction
- B. Medication error
- C. Adverse drug event
- D. Near miss

Which of the following are examples of administration medication errors?

- A. Wrong dose
- B. Wrong medication
- C. Wrong patient
- D. All the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-813-L05-P

Inpatient Sodium-Glucose Cotransporter 2 Inhibitor (SGLT2i) Initiation During Admission for Heart Failure Exacerbation

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Purpose: To analyze the effects of SGLT2i initiation inpatient on the outcomes of HFref patients admitted for acute exacerbation.

Methods: A multi-center, retrospective, cohort study will be conducted to assess the impact of Sodium-Glucose Cotransporter 2 Inhibitor (SGLT2i) initiation in patients admitted for heart failure (HF) exacerbations on length of stay. Data will be collected from patients that are ≥18 years old and meet inclusion criteria with a primary diagnosis code of heart failure (I50.21) admitted for HF exacerbation, not prescribed an SGLT2i prior to admission. Patients with end-stage renal disease (ESRD) or a creatinine clearance (CrCl) <30 ml/min will be excluded. Data will be analyzed to assess length of stay between a treatment group (patients who were initiated on SGLT2i while inpatient) and a control group (those who were not initiated on SGLT2i.) Data will be collected on enough patients to meet an adequate sample size to assess for a difference in the primary outcome. Secondary outcomes will include 30 and 90-day readmission, diuretic usage (furosemide equivalents), 60 day mortality and incidence of acute kidney injury (AKI) (>0.3mL/min increase.) Study timeframe will be April 1, 2022 until now, as the guidelines have recommended SGLT2i for HF since this date.

Learning Objectives:

Recall which medications are recommended for patients with HFref based on the 2022 AHA/ACC/HFSA Heart Failure Guideline.

Discuss the potential benefits of SGLT2i therapy in patients with HF.

Self Assessment Questions:

Which medication is not recommended as GDMT as of the 2022 AHA/ACC/HFSA Heart Failure Guideline?

- A. Losartan
- B. Empagliflozin
- C. Hydralazine
- D. Carvedilol

Which of the following is a potential benefit of adding SGLT2i therapy in patients with HF, based off clinical trials:

- A. Decreased loop diuretic usage
- B. Decreased time to HF event
- C. Decreased Mortality
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-691-L01-P

Impact of A Pharmacist-Led Heart Failure Scoring Tool in Optimizing Guideline-Directed Medical Therapy

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Purpose: Many patients who have heart failure with reduced ejection fraction (HFrEF) are not started on guideline-directed medical therapy (GDMT), which includes angiotensin-receptor blocker/neprilysin inhibitor (ARNI) therapy and sodium-glucose cotransporter 2 inhibitors (SGLT2i). Pharmacists are well-positioned to identify patients who may benefit from therapy undergoing transitions of care. In October 2021, Henry Ford Health implemented an electronic scoring system (ESS) within the electronic health record (EHR) to prioritize pharmacist workflow and identify patients needing interventions. This system is used as standard of care and includes variables with a tiered point-system based on priority. The ESS includes a variable for identifying inpatients being managed for exacerbation of HFrEF who may be eligible for an ARNI or SGLT2i. This study evaluates the ESS variable with respect to discharge prescribing. **Methods:** This is an IRB-approved, retrospective quasi-experimental study that examines patients discharged from general medical wards between November 1st, 2023, to April 1st, 2024. General medical wards were selected for intervention and non-intervention groups. In the non-intervention group, our scoring tool variable will run as a background process and collect data without alerting pharmacy staff. The intervention group will consist of patients admitted to wards where the ESS variable will run as an active process. Our study population will include adult patients with an ejection fraction of 50% or less who receive an intravenous loop diuretic while admitted. The primary endpoint will be the proportion of patients eligible for an SGLT2i or ARNI that had a discharge medication cost inquiry sent by a pharmacist Chi-squared, Student's T, and Wilcoxon rank-sum testing will be used to analyze continuous and nominal data. Multivariate logistic regression will be used to identify pertinent factors contributing to the primary end point other than our scoring tool. **Results & Conclusions:** Results and conclusions will be presented at the conference.

Learning Objectives:

Recognize medications used for guideline-directed medical therapy (GDMT) in management of patients with heart failure with reduced ejection fraction (HFrEF).

List the benefits of utilizing an electronic scoring system in the EHR.

Self Assessment Questions:

In which of the following conditions would a patient be contraindicated for a sodium-glucose cotransporter-2 inhibitor?

- A. Hyperkalemia
- B. Hypertension
- C. Acute kidney injury
- D. Estimated glomerular filtration rate of 40 mL/min

Which of the following is a benefit of using an electronic scoring system in the electronic health record?

- A. Reduced workflow efficiency
- B. Lack of pharmacy interventions
- C. Reduced time spent performing manual chart review
- D. Reduced provider acceptance of pharmacy recommendations

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-851-L01-P

Impact of pharmacist-led hyperlipidemia management in liver transplant patients

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Purpose: To evaluate the outcomes of hyperlipidemia management in liver transplant patients managed by a pharmacist compared with those managed by usual care (non-pharmacist provider). **Methods:** This single-center, retrospective analysis evaluated patients with hyperlipidemia managed by a pharmacist (PharmD) or usual care (UC). Patients were included if they received a liver or simultaneous liver-kidney transplant with a diagnosis of hyperlipidemia at Henry Ford Hospital from 1/2016 to 8/2023. Patients in each group were matched on mammalian target of rapamycin (mTOR) inhibitor use. The primary endpoint was a composite outcome of target lipid (triglyceride [TG] reduction >30% and LDL <100 mg/dL) achievement within 1 year of initial assessment. Secondary efficacy endpoints evaluated proportion of patients reaching TG (<250 mg/dL) and/or LDL (<100 mg/dL) goal within 1 year of initial encounter, and percent change from baseline. Safety outcomes were also evaluated. **Results:** The analysis included 60 patients (30 in each group). There were no differences in baseline characteristics except longer time from transplant in the UC group. Due to the low incidence of LDL management, LDL outcomes were excluded from the final analysis. More patients in the PharmD group achieved the primary TG outcome of 30% reduction from baseline (PharmD vs. UC: 96.7% vs. 43.3%, p<0.001) and TG <250 mg/dL (90% vs. 30%, p<0.001). Patients in the PharmD group also had a more significant reduction in TG from baseline (54.4% vs. 24.8%, p<0.001). There were slightly more adverse events reported in the PharmD group; however, no serious adverse events were reported, and the difference was not statistically significant (26.7% vs. 16.7%, p=0.347).

Conclusion: Hyperlipidemia is a major risk factor for cardiovascular disease, which is a leading cause of mortality in the transplant population. PharmD hyperlipidemia management was beneficial with a significantly higher rate of hyperlipidemia target achievement when compared to UC.

Learning Objectives:

Review risk factors for cardiovascular disease in solid organ transplant recipients

Describe side effects of immunosuppression in solid organ transplant recipients

Self Assessment Questions:

Which of the following is a non-modifiable risk factor for cardiovascular disease?

- A. Hyperlipidemia
- B. Renal impairment
- C. Hypertension
- D. Obesity

Which of the following immunosuppressants used in solid organ transplant recipients has the most significant impact on triglycerides?

- A. Corticosteroids
- B. Tacrolimus
- C. Azathioprine
- D. Mammalian target of rapamycin (mTOR) inhibitors

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-603-L01-P

JUNTOS: Judicious Use of Penicillin G Benzathine in Response to a Medication Shortage Alert

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Background

Patients from underserved communities may be disproportionately affected by medication shortages. Health systems often use medication alerts within electronic health records (EHRs) to conserve resources in response to these shortages. However, it is unclear if these tools promote equitable distribution of scarce medication supplies. The national shortage of penicillin G benzathine is an example of challenges in the treatment of syphilis, a sexually transmitted infection that more commonly impacts patients of ethnic, gender, and sexual minority groups. This study aims to identify differences among patients receiving medications on shortage, investigate the impact of drug shortages among underserved communities, and assess the effectiveness of medication alerts in promoting equitable distribution of scarce medication supplies.

Methods

This is an IRB-approved retrospective cohort study conducted across the Henry Ford Health System (HFH) between May 9, 2023, to February 28, 2024. The study evaluated the use of penicillin G benzathine in response to a medication shortage alert. The cohorts consisted of patients who received optimal and suboptimal use of penicillin G benzathine. Optimal use was defined as treatment for a syphilis diagnosis, and suboptimal use was defined as treatment for any alternative diagnosis. Patients were included if they were 3 months and older, admitted or received care at an HFH facility, and were prescribed penicillin G benzathine after implementing the HFH medication shortage alert. A separate cohort of syphilis patients was evaluated for treatment selection of preferred (i.e., penicillin G benzathine) and alternative therapies. Variables of interest included patient demographics, admission or treatment location, infection characteristics, and social determinants of health. Using a two-tailed alpha of 0.05, 80% power, and an effect size of 12%, a total sample of 542 patients (271 per group) is needed.

Results

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

Learning Objectives:

Describe associations between social determinants of health and treatment of sexually transmitted infections.

Identify alternative therapies for the treatment of syphilis during the national shortage of penicillin G benzathine.

Self Assessment Questions:

Which of the following is NOT considered a social determinant of health domain?

- A. Social
- B. Economical
- C. Educational
- D. Behavioral

Which of the following therapies is approved by the CDC for primary syphilis treatment?

- A. Azithromycin 500 mg PO as a single dose
- B. Linezolid 600 mg PO BID for 7 days
- C. Doxycycline 100 mg PO BID for 14 days
- D. Metronidazole 500 mg PO daily for 28 days

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-528-L01-P

Risk Factors for Ceftriaxone Resistant E. coli or K. pneumoniae Infections in Floor Patients

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Worldwide, antibiotic resistance is changing rapidly. In 2019 alone, there were 1.3 million deaths worldwide that could be directly linked to antimicrobial resistant organisms. The Clinical and Laboratory Standards Institute thus recommends that empiric antibiotics showcase at least an 80% susceptibility to local isolates; however, susceptibilities $\geq 90\%$ of local isolates are recommended for critically ill patients at a higher risk of mortality. Ceftriaxone susceptibilities reflected on the Loyola University Medical Center (LUMC) antibiogram do not meet this benchmark. From 2021-2022, ceftriaxone susceptibilities to *E. coli* and *K. pneumoniae* were 80% and 78%, respectively.

Extended spectrum beta-lactamase (ESBL) Enterobacterales have become a global public health concern due to rapid spread and risk of complex infections in healthy patients. ESBLs are serine beta-lactamase enzymes that exhibit resistance to most beta-lactam antibiotics, including later generation cephalosporins and monobactams. ESBL-harboring bacteria are thus able to hydrolyze and deactivate antibiotics such as ceftriaxone yet remain susceptible to carbapenems. Given rises in ESBL incidence and risk, carbapenem use has increased, therefore resulting in fewer options for drug resistant bacteria.

In this retrospective, single center, observational cohort study, non-intensive care unit (ICU) patients with ceftriaxone resistance via broth microdilution to *E. coli* or *K. pneumoniae* non-urine isolates at LUMC from January 2022 to October 2023 were screened for inclusion. Our study aims to identify risk factors for ceftriaxone resistance that may guide empiric antibiotic selection when *E. coli* or *K. pneumoniae* is suspected or cultured to therefore avoid unnecessary antimicrobial escalation. Eligible patients were generated via MedMined[®], accessed from the electronic health record EPIC[®], collected using REDCap[®], and analyzed via IBM SPSS[®]. Data points collected included patient demographics relative to index culture collection, prior antibiotic use, all-cause mortality, and others. Data analysis is in progress and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the multifaceted impact that increasing antimicrobial resistance has on the future of healthcare and pharmacy.

Recall characteristics of ceftriaxone that designate the antimicrobial as an optimal agent for empiric infection coverage for a multitude of disease states.

Self Assessment Questions:

Which of the resistance genes below is NOT an extended spectrum beta-lactamase?

- A. TEM
- B. CTX-M
- C. AMP-C
- D. SHV

Which of the following microbes does ceftriaxone NOT typically cover?

- A. *Streptococcus pneumoniae*
- B. *Pseudomonas aeruginosa*
- C. *Escherichia coli*
- D. *Klebsiella pneumoniae*

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-886-L01-P

Impact of changing migraine outcome from quality of life to objective outcome on pharmacist interventions for patients in a health-system specialty pharmacy

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Purpose: Migraine guidelines have recently recommended monitoring migraine days per month over quality of life assessments to manage medication regimens.

There are currently no studies comparing the quality of life measures to objective outcome measures on pharmacist interventions in health-system specialty pharmacies. In March 2021, a health-system specialty pharmacy changed the migraine tracking outcome from a quality of life measure to an objective outcome, measured by migraine days per month and number of missed workdays. This study was conducted to determine if changing migraine outcome from quality-of-life measure to an objective measure impacts the number of pharmacist interventions made on migraine regimens.

Methods: Between March 2021 and March 2023, a single-center, retrospective chart review was conducted on adult patients in the patient management program at UofL Health's Specialty Pharmacy. This study was approved by the institution's investigational review board. Adult patients who have filled an abortive specialty migraine medication at least once and a preventative specialty migraine medication at least three times during the study period were included in the study. Patients who had a gap in care of greater than 3 months were excluded from the study. The primary endpoint is the number of pharmacist interventions regarding pharmacologic migraine regimens before and after the outcome change. Key secondary endpoints include appropriateness of migraine regimen measured by change in number of migraine days per month and number of missed days from school, work or planned activities, number of migraine episodes requiring hospitalization, and the number of patients on abortive and/or preventative therapy before and after the outcome change. Nominal variables are reported in number and percentages and analyzed using a chi-square test.

Results/Conclusion: Data collection is ongoing. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss guideline recommendations for assessing appropriateness of therapy for migraine.

Recognize potential advantages/disadvantages of utilizing quality of life vs. objective measures on pharmacist interventions on migraine regimens.

Self Assessment Questions:

Which medication can be used for abortive and preventative treatment in patients with chronic migraine?

- A. Ubrogapant (Ubrvelvy)
- B. Rimegepant (Nurtec)
- C. Erenumab (Aimovig)
- D. Atogepant (Qulipta)

The American Headache Society recommends which measure to assess response to acute migraine treatment?

- A. Number of migraine days per month
- B. Change in monthly migraine days from baseline
- C. Patient-orientated, validated response
- D. Change in moderate to severe headache days per month from baseline

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-860-L01-P

Enhancing Patient Care Outcomes through Pharmacist-Led Pre-Visit Medication Reviews

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Purpose:

Pharmacists play a significant role in patient care by reconciling medication lists, assessing adherence, and recommending immunizations. However, the effectiveness of pre-visit review (PVR) workflows in specialty pharmacies needs more research. This study aims to evaluate the impact of PVRs on appointment adherence, immunization rates, provider acceptance of refill requests, and potential profit from accepted prescriptions.

Methods:

This study is a retrospective analysis evaluating the effectiveness of PVR services conducted by pharmacists at a tertiary academic health system (University of Kentucky HealthCare; UKHC). Participants were included in this study if they were 18 years or older, have a scheduled annual office visit or physical appointment at one of two primary care clinics at UKHC, and a staff member from University of Kentucky Specialty Pharmacy (UKSP) attempted to contact them for a PVR within the period of May 1, 2023, to July 31, 2023. Data was collected by chart review and summarized with descriptive statistics.

Results:

UKSP pharmacists attempted to contact a total of 1,399 patients to perform a PVR during the study period. Out of these, 796 (56.9%) patients completed the PVR process, while 603 (43.1%) did not. Appointment adherence was higher with 696 (87.4%) among those who completed the PVR, compared to only 359 (59.5%) patients who did not complete the review (27.9% difference). Furthermore, medications and immunizations were pre-charted for 438 (55.0%) and 325 (40.8%) patients, with 394 (89.9%) and 197 (60.6%) approved by their provider. 65 (90.3%). Patients who completed a PVR transitioned to a UKHC Pharmacy with a mean gross margin of \$1774.04 per patient.

Conclusion:

The findings suggest that pharmacist-led PVR services improve appointment adherence and are well-received by healthcare providers for medication therapy recommendations. Given these positive outcomes, the implementation of PVR services in various clinical outpatient settings is recommended to enhance patient care and medication management.

Learning Objectives:

Describe the impact of Pharmacist Pre-Visit Reviews on appointment adherence

Identify and Classify Provider Responses to Pre-Charted Medications and Immunizations

Self Assessment Questions:

Based on the study's findings, what was the difference in appointment adherence rates between patients who completed the pre-visit review and those who did not?

- A. Both groups had similar adherence rates.
- B. Patients who did not complete the pre-visit review had higher adherence.
- C. Patients who completed the pre-visit review exhibited a 27.9% higher attendance rate for their appointments compared to those who did not complete a PVR..
- D. There was no significant difference in adherence rates.

In the context of the pre-visit review project, how did providers typically respond to pre-charted medications?

- A. Most pre-charted medications were rejected by providers
- B. Providers often modified the majority of pre-charted medications.
- C. A majority of patients with pre-charted medications were approved by providers.
- D. Providers did not review the pre-charted medications.

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-887-L04-P

Maximizing state-of-the-art unit-dose medication packaging technology within a centralized pharmacy distribution model

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Purpose: University of Wisconsin (UW) Health's current oral-solid, unit-dose medication packager utilizes outdated technology and will no longer be compatible with the organization's pharmacy inventory software when it is upgraded in the coming months. This prompted leaders at UW Health to analyze packaging options and identify a better option that could meet the institution's needs. A new packaging option was selected and is due to be implemented into the packaging workflow during the Spring of 2024. This new and innovative unit-dose medication packaging technology will enhance efficiency in the areas of time, cost, and space by allowing for increased output, smaller packaging, and robot-ready doses. With this new addition, the pharmacy department should be able to reduce the number of commercially available unit-dose medications purchased and save money through more-efficient, bulk packaging of products in-house.

Methods: Machine, software, and maintenance contracts were comprehensively evaluated and finalized to ensure specific yet timely machine production. While the machine was in production, physical and technological requirements for machine install were confirmed or established if necessary. The machine was then installed, and staff were trained on the mechanics and software components. Next, the machine will be incorporated into the packaging workflow. Continuous process evaluation and refinement regarding workflow and technician responsibilities will take place throughout the months post workflow incorporation.

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

Learning Objectives:

Recognize the benefits of implementing high-volume medication packaging technology.

List the key steps to implementation of new, state-of-the-art packaging technology within a centralized pharmacy distribution model.

Self Assessment Questions:

1. Which of the following is a benefit of implementing new, high-volume medication packaging technology within a centralized pharmacy distribution model?

- A. Decreased drug expenditure
- B. Decreased efficiency
- C. Elimination of manual labor
- D. Decreased XR2 robot inventory space

Which of the following is a key step to implementation of new packaging technology?

- A. Create a project timeline and define objectives
 - B. Confirm machinery transportation and delivery logistics
 - C. Draft ideal operational workflows with a go-live date
 - D. All of the above
- Q1 Answer: A Q2 Answer: D
ACPE Universal Activity Number 0121-9999-785-L04-P

Evaluation of Intermittent vs Extended Dosing of Cefepime

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Purpose: Many beta-lactam antibiotics, including cefepime, can be administered using a prolonged infusion time to maximize key pharmacokinetic parameters, reduce total drug exposure, and reduce risk of resistance development. However, therapeutic drug monitoring of cefepime within our institution revealed higher probability of exceeding toxic thresholds of cefepime using extended infusion. This led to a change in protocol to exclusively use intermittent infusions for cefepime administration. The purpose of this study is to compare clinical and microbiological outcomes of cefepime administered as an extended infusion vs intermittent infusion.

Methods: This is a retrospective, multi-center study evaluating outcomes when using either extended or intermittent infusion times of cefepime. Patients in extended infusion group were collected from August 2022 through September 2022. Patients in the intermittent infusion group were collected from August 2023 through September 2023. This time period was selected to reflect the changes made to the institutional cefepime dosing policy from extended infusions to intermittent infusions, which was implemented in July 2023. Inclusion criteria was as follows: adult patients at Indiana University Health Adult Academic Health Center that received at least 5 days of cefepime therapy within the study timeframe. Exclusion criteria included: patients that received cefepime with any infusion time other than 30 minutes or 4 hours or with discordant infusion times outside of the institutional protocol, patients that received a previous treatment course of cefepime within study timeframe, patients from the Bone Marrow Transplant, Hematology, and Oncology service lines as these patients were never included in the extended infusion dosing protocol, and patients with multiple sources of infection. The primary objective of this study is all cause 30-day mortality. Secondary objectives include microbiological failure, microbiologic relapse, clinical failure, and total days of cefepime therapy.

Results / Conclusion: Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review current data regarding pharmacokinetics of infusion times of cefepime.
Discuss findings related to clinical and microbiological outcomes and cefepime infusion times.

Self Assessment Questions:

What is the pharmacokinetic/pharmacodynamic target associated with efficacy of cefepime?

- A. Peak:MIC
- B. AUC:MIC
- C. Time > MIC
- D. AUC:MIC

Which of the following outcomes has been demonstrated in previous studies, specifically for Pseudomonas infections, when using extended infusion compared to intermittent infusion of cefepime?

- A. Increased length of stay
- B. Decreased mortality
- C. Reduced risk of neurotoxicity
- D. Higher patient satisfaction

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-549-L01-P

Efficacy and safety of four-factor prothrombin complex concentrate with vitamin K antagonist-associated intracranial hemorrhage in patients weighing over 100 kg.

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Purpose:

Four-factor prothrombin complex concentrate (4F-PCC) is the standard of care for emergent reversal of vitamin K antagonists (VKA) for life-threatening hemorrhages. Current FDA labeling recommends a weight-based dosing strategy determined by an international normalized ratio (INR) and the patient's actual body weight capped at 100 kg. Prospective clinical trial data are limited to patients with a BMI < 27 kg/m². The purpose of the study is to report outcomes in patients weighing more than 100 kg.

Methods:

This study was a retrospective chart review of adult patients admitted from January 1st 2017 through December 31st, 2022 who had a warfarin reversal order set activated, received 4F-PCC for VKA reversal due to an INR ≥ 1.5 and an intracranial hemorrhage (ICH) based on ICD-10 codes. Patients were excluded if they had lack of CT/MRI follow-up, received neurosurgical intervention, or had primary epidural or intraventricular hemorrhage. Patients were subsequently grouped by weight into one of two groups (< 100 kg or > 100 kg). The primary outcome was percent achievement of effective hemostasis within 24 hours. Secondary outcomes were percent achievement of coagulopathy reversal, occurrence of thromboembolic events during hospital stay, length of stay, and in-hospital mortality. A Chi-square test will be utilized for the primary outcome and for other categorical variables. For continuous variables a t-test or Mann Whitney U test will be utilized.

Results & Conclusion:

Data collection and analysis is on-going. Full results will be presented at the Great Lake Pharmacy Residency Conference in April 2024.

Learning Objectives:

Review optimal strategies for managing intracranial hemorrhages in patients on warfarin.

Discuss literature regarding four-factor prothrombin complex concentrate dosing in obese patients.

Self Assessment Questions:

Based on the AHA/ASA guidelines for the management of intracerebral hemorrhage, which of the following would be the best option for warfarin reversal with an INR greater than 2?

- A. Aminocaproic acid
- B. Fixed-dose 4F-PCC
- C. Fresh frozen plasma
- D. Weight-based 4F-PCC

A 67 year-old, 110 kg male presents to the emergency department with a severe headache. He is on warfarin for a history of atrial fibrillation and has an INR of 2.7. His head CT shows an acute subarachnoid hemorrhage. He has already received 10 mg of intravenous phytonadione. Which of the following is the optimal reversal strategy for his elevated INR?

- A. 4F-PCC 2,000 units IVPB
- B. 4F-PCC 2,500 units IVPB
- C. 4F-PCC 2,750 units IVPB
- D. 4 units Fresh frozen plasma

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-513-L01-P

Identifying Prescribing Quantity and Trends of Potentially Inappropriate Medications in a Rural Federally Qualified Health Center Patient Centered Medical Home

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Purpose: The American Geriatrics Society Beers Criteria® is utilized by practitioners to identify potentially inappropriate medications (PIMs) for adults 65 years and older and guide pharmacologic selection to promote safe and effective medication use in this population. As people age, individuals are at an increased risk of polypharmacy and PIM exposure due to the development of chronic conditions throughout the lifespan. The objective of this study is to identify the quantity of PIMs being prescribed for older adults in a federally qualified health center. Methods: A retrospective chart review will be conducted at four nurse practitioner-run Federally Qualified Health Centers in rural Indiana. Inclusion criteria for this study includes all patients who were seen by a medical provider at any of the four clinic locations in the 2022 calendar year that were 65 years and older by December 31, 2022. A chart review will be conducted to determine the number of medications prescribed to older adults that are listed on the Beers Criteria®. Medications in the review will include: antihistamines, anti-infectives, cardiovascular and antithrombotics, central nervous system, endocrine, gastrointestinal, genitourinary, and pain medications. Demographic information to be collected include: race, ethnicity, sex, gender identity, age, insurance status, clinic facility, and primary provider. The primary outcome of this study is to quantify the number of PIMs being prescribed for older adults in one calendar year. The number of PIMs per patient will be calculated. Demographic comparisons on the occurrence of PIMs will be performed using t-tests or ANOVA. The secondary outcome is to identify if there is a need to establish a pharmacist-led deprescribing service in addition to the current pharmacy collaborative practice agreements. Results: In progress. Pending IRB review and approval through Purdue University. Conclusion: In progress.

Learning Objectives:

Define polypharmacy and describe the risks associated with polypharmacy.

Identify potentially inappropriate medications as listed on the American Geriatrics Society 2023 Beers Criteria®.

Self Assessment Questions:

Polypharmacy is most commonly defined in the literature as the concurrent use of how many medications?

- A. Two
- B. Five
- C. Ten
- D. Twenty-One

Which of the following medications is listed as a potentially inappropriate medication on the 2023 Beers Criteria®?

- A. Alprazolam
- B. Fluoxetine
- C. Lisinopril
- D. Sumatriptan

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-659-L01-P

Impact of Adjunct Phenobarbital in Management of Alcohol Withdrawal Syndrome

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Purpose: First-line treatment for alcohol withdrawal syndrome (AWS) includes benzodiazepines. Phenobarbital may be used as adjunct therapy to manage severe AWS. In August 2022, Baptist Health Louisville added an option for scheduled phenobarbital, in addition to symptom triggered lorazepam, for patients experiencing AWS. The purpose of this study is to evaluate hospital length of stay (LOS) in patients who did not receive phenobarbital compared with patients who received phenobarbital.

Methods: This single-center, retrospective, pre-post intervention cohort study included adult patients admitted to Baptist Health Louisville for AWS with a Clinical Institute Withdrawal Assessment for Alcohol revised (CIWA-Ar) score ≥ 8 , who were initiated on symptom triggered lorazepam for treatment of AWS between August 2021 and July 2022, or were initiated on the phenobarbital protocol in addition to symptom triggered lorazepam between October 2022 and September 2023. Patients were excluded if they were pregnant, breastfeeding, experienced death from any cause, or left against medical advice. Data points collected included demographic information, mechanical ventilation, LOS, cumulative lorazepam administered, total days of phenobarbital therapy received, and any seizure experienced during admission. The primary outcome is the difference in hospital LOS between the two groups. Secondary outcomes include CIWA score, mechanical ventilation use, ICU admission, and cumulative amount of lorazepam administered. A sample of 78 total patients is needed to achieve 80% power with an alpha level of 0.05 for the primary outcome.

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

Learning Objectives:

Describe the role of phenobarbital as adjunctive therapy in alcohol withdrawal syndrome

Identify appropriate candidates for adjunct phenobarbital therapy in alcohol withdrawal syndrome

Self Assessment Questions:

Which of the following are differences between phenobarbital and lorazepam?

- A. Phenobarbital suppresses excitatory glutamate receptors and lorazepam does not
- B. Phenobarbital has a shorter half-life compared to lorazepam
- C. Phenobarbital enhances GABA activity and lorazepam does not
- D. Phenobarbital is more likely to cause paradoxical agitation and delirium compared to lorazepam

Which of the following patients is the best candidate for adjunct IV phenobarbital to treat AWS?

- A. 32 year-old with no history of prior seizures and CIWA score that has decreased from 6 to 2 with IV lorazepam
- B. 46 year-old with history of migraines and CIWA score of 5 after last having a drink 2 days ago
- C. 58 year-old with history of alcohol-withdrawal seizures and delirium tremens and current CIWA score of 16
- D. 26 year-old with history of epilepsy and a CIWA score of 1

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-735-L01-P

Empiric Antifungal Treatment in Critically Ill Patients with Decompensated Cirrhosis

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Background: Empiric antifungal treatment for invasive candidiasis (IC) is reserved for patients with established risk factors. Risk factors associated with the development of IC do not specifically address risk in patients with cirrhosis. The 1-3 month risk of mortality is significantly higher in patients presenting to an intensive care unit (ICU) with acute decompensated cirrhosis while infection independently increases mortality 4-folds with bacterial infections being more common than fungal. The study aims to evaluate the impact of empiric antifungal therapy in critically ill patients with decompensated cirrhosis. **Methods:** This retrospective cohort study included patients admitted to UK HealthCare between May 2021 to June 2023 who were ≥ 18 years of age with cirrhosis, admitted to the ICU, and received ≥ 72 hours of antibiotics. cirrhosis. Patients were excluded if there was a previous diagnosis of fungal spontaneous peritonitis, history of systemic fungemia, or death within 24 hours of admission. Comparative study arms consisted of patients who received empiric antifungal therapy (case) versus those who did not (control). The primary outcome was the composite of all-cause hospital mortality. Secondary outcomes included hospital and ICU length of stay, clinical invasive candidiasis scores, incidence of positive fungal cultures, and risk factors independently associated with IC in cirrhotic ICU patients. **Results:** A multivariate analysis found patients who did not receive empiric antifungal therapy had a 64% lower all-cause hospital mortality (0.361; 95% CI 0.214 and 0.610; $P=0.0001$) and a 2.3% reduction of mortality with every 1 day of hospital length of stay (0.977; 95% CI 0.963 and 0.992; $P=0.009$). The overall incidence of positive fungal cultures from sterile sites was sixteen (7.8%) in the case arm and four (1.4%) in the control arms, respectively ($P=0.01$). **Conclusion:** Overall, this study found no mortality benefit with empiric antifungal treatment in patients with decompensated cirrhosis.

Learning Objectives:

Describe current literature gaps surrounding the utility of empiric antifungal therapy in decompensated cirrhosis

Identify when patients are appropriate candidates for empiric antifungal therapy

Self Assessment Questions:

Which of the following is not considered a risk factor for invasive candidiasis?

- A. Total parenteral nutrition
- B. Neutropenia
- C. Cerebral vascular accident
- D. Central venous access

Which of the following cultures is considered positive for invasive candidiasis?

- A. Candida auris, Axillary swab
- B. Candida tropicalis, Peritoneal fluid
- C. Candida glabrata, Urine
- D. Candida albicans, Perirectal swab

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-567-L01-P

Implementing Pharmacy Automation and Standardizing Inventory within an Ambulatory Surgery Center

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Automation is used across the UW Health system to ensure standardization, provide visibility to inventory, and manage inventory storage. Madison Surgery Center (MSC) is a multi-specialty outpatient surgery center in partnership with UW Health. In current state, MSC's inventory management is semi-manual. The first phase of automation was completed three years prior with the installation of XT cabinets in the Pre/Post areas. The second phase is to update current software, install six XT cabinets, a controlled substance manger, and six anesthesia workstations. Substantial risk areas for diversion include surgery center, anesthesia, and operating rooms where additional monitoring measures should be considered. The purpose is to install automation to improve inventory management of both control and non-controlled medications which will create a clear chain of custody and optimize workflow.

To match needs of the surgery center, key stakeholders will be involved to create rotation of inventory to avoid stock outs, design drawer configuration, and establish documentation requirements for controlled substance purchasing and transferring. To train staff, education materials will be created and coordinate with vendor to focus on specific changes in workflow. To prepare for the implementation, the functionality of space and plan for pre-stocking of inventory will be assessed. A new technician shift will be created based on the stocking needs of automation and OR schedule. Inventory data will continue to be assessed one month post go live to adjust stock, quantity, and location for workflow optimization. Decrease in diversion risk will be assessed with a direct comparison from an internal audit from 2017 to a planned Spring 2024 audit.

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

Learning Objectives:

Explain process and steps to implement automation into an Ambulatory Surgery Center

Discuss key aspects during implementation to ensure successful go-live

Self Assessment Questions:

Per ASHP Guidelines on Preventing Diversion of Controlled substances, which of the following are considered high risk areas for diversion:

- A. Surgery Centers
- B. Inpatient Unit Floors
- C. Anesthesia and Procedural Areas
- D. A and C

ISMP Guidelines for the Safe Use of Automated Dispensing Cabinets states that the quantity of vials/ampules/tablets/syringes and variety of drug concentrations of medications stored in ADCs should be specifically restricted in:

- A. Profiled ADCs
- B. Non-profiled ADCs
- C. ADCs in Medication Rooms
- D. No restrictions are needed

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-760-L04-P

Appropriate escalation of therapy by inpatient service for urinary tract infections

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Purpose: Urinary tract infections (UTIs) are the fifth most common healthcare-associated infection. The most common organism in UTIs is *Escherichia coli*, however other Enterobacterales species (*Klebsiella*, *Serratia*, *Citrobacter*, *Enterobacter*, *Proteus*), *Pseudomonas aeruginosa*, Gram positive cocci, and *Enterococcus* species have also been shown to cause UTIs. Ceftriaxone is a third generation cephalosporin with gram-negative coverage including *Escherichia coli*, *Proteus mirabilis*, *Proteus vulgaris*, *Morganella morganii*, and *Klebsiella pneumoniae*. Both, Cefepime, a fourth generation cephalosporin, and piperacillin-tazobactam, a penicillin with a beta lactamase inhibitor, offer similar gram negative and gram positive coverage as ceftriaxone, however have the addition of *Pseudomonas* sp. Coverage. Cefepime and piperacillin-tazobactam can be used to treat UTIs. There is currently a lack of studies regarding appropriate escalation of antibiotic therapy. Baghdadi et al conducted a retrospective cohort study identifying factors associated with escalation of empiric gram-negative antibiotics. They identified that escalation of therapy was more likely when narrow-spectrum empiric antibiotics were selected. Patients were more likely to have escalation with UTIs (HR 1.26; 95% CI: 1.25-1.38). The purpose of this study is to identify whether providers are appropriately escalating therapy from empiric ceftriaxone in the emergency department (ED). Methods: This is a retrospective, single-center, observational study from January 1, 2019, to August 31, 2023 after receiving one dose of empiric ceftriaxone in the emergency department (ED) for a urinary tract infection, and then was escalated to cefepime or piperacillin-tazobactam by the inpatient service within twenty-four hours. The primary outcome is percentage of patients appropriate escalated to cefepime or piperacillin-tazobactam. Secondary outcomes include organisms identified on urine culture, hospital length of stay, and any adverse reaction to antimicrobials. Conclusions: Data collection is ongoing; results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review common causative pathogens associated with urinary tract infections

Discuss if empiric escalation of intravenous antibiotics was appropriate

Self Assessment Questions:

What is the most common pathogen associated with urinary tract infections?

- A. *Pseudomonas aeruginosa*
- B. *Proteus miralis*
- C. *Klebsiella pneumoniae*
- D. *Escherichia coli*

What additional pathogen coverage do patients receive if they escalate from ceftriaxone to cefepime or piperacillin-tazobactam?

- A. *Pseudomonas aeruginosa*
- B. *Proteus miralis*
- C. *Klebsiella pneumoniae*
- D. *Streptococcus*

Q1 Answer: D Q2 Answer: A

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

A Post-Implementation Evaluation of Suppression of Drug-Allergy and Allergy Drug Alerts for Beta-Lactam Antibiotics and Phenanthrene Derivative Opioid Agonists

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Purpose: The vast majority of drug-allergy and allergy-drug alerts that fire at Indiana University Health System are overridden, indicating that many of these alerts do not align with clinical practice. In response to new research about the true risk of an allergic reaction in patients with a documented penicillin allergy and cephalosporin antibiotics, the Pediatric Antimicrobial Stewardship (PAS) Team and Riley Allergy/Immunology at Indiana University Health created a document to guide which beta-lactams were considered safe to prescribe to patients with a documented penicillin allergy. Similarly, many patients in our health system also have allergies coded for phenanthrene derivative opioid agonists and often received drug-allergy alerts for other phenanthrene derivative opioid agonists. To better align our alerting system with our health-system's clinical practice, a project was implemented in 2022. This project suppressed drug-allergy and allergy-drug alerts for specified beta-lactam antibiotics based on the guidelines written by the Riley teams. It also suppressed phenanthrene derivative opioid agonist allergy alerts between different phenanthrene derivative opioid agonists. Now, we are performing a post-implementation analysis of the impact these changes had on the quantity of alerts seen by providers and pharmacists.

Methods: Data was pulled from Indiana University Health's Cerner LightsOn dashboard for May 2022 and May 2023, which occurred before and after the implementation of the suppression project respectively. Data on incidents of drug-allergy and allergy-drug alerts involving the drugs of interest was filtered from the larger pool of data. The resulting list items were then assessed to ensure that the products and allergies were relevant to the investigation, allowing an analysis of the volume of alerts reduced by this project.

Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the impact of provider and pharmacist alert fatigue on patient safety.

Report the impact of a project implemented to decrease the number of alerts encountered by providers and pharmacists

Self Assessment Questions:

In the pre-implementation data set from Indiana University Health, what percentage of drug-allergy alerts were overridden?

- A. 0.552
- B. 0.777
- C. 0.915
- D. 0.882

When discussing the effect of alert fatigue, a Patient Safety Network article from 2019 focused on the three main findings from available literature. Which of the following was one of these main findings?

- A. Alerts are only modestly effective at best.
- B. Alert fatigue decreases with growing exposure to alerts.
- C. The majority of critical alerts are not overridden.
- D. The decrease of prescribing errors after CPOE implementation is largely because of alerts.

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-885-L01-P

Prevention of Hospital Visits Using the RSV Vaccine in Adults Oncology Patients

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Oncology patients are vulnerable to infections due to their compromised immune systems resulting from cancer treatments, such as chemotherapy and radiation therapy. RSV can pose a serious risk to these individuals, potentially leading to severe respiratory illness and hospitalization. With the new RSV vaccine being introduced to our formulary we wanted to look at how vaccination in our oncology patient population affected hospitalization for RSV. Studying the hospitalization rates in this specific patient population can help assess the real-world impact of the RSV vaccine on a high-risk group. This study will be a retrospective chart review over 5 months looking at RSV vaccination status and hospital visits caused by RSV confirmed by a respiratory panel. Patients will be separated into groups based on their RSV vaccination status and data will be collected about any hospital visits, including emergency department visits and hospitalizations, caused by or related to a confirmed RSV infection. Specific data relating to patient age, gender, diagnosis, treatment type, and type of visit will also be collected and analyzed.

Learning Objectives:

Discuss the efficacy of the RSV vaccine

Recognize the acceptance of the RSV vaccine in our population of eligible adults

Self Assessment Questions:

What was the efficacy of the RSV vaccine in our population?

- A. 1
- B. 0
- C. 0.01
- D. 2-99%

What was the acceptance rate of the RSV vaccine in our population

- A. 1
- B. 2-99%
- C. 0.01
- D. 0

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-815-L06-P

Evaluation of time to administration of intravenous push versus intravenous piggyback levetiracetam

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Purpose: Levetiracetam is a commonly used antiepileptic medication which has traditionally been administered via intravenous piggyback (IVPB). Levetiracetam administered by intravenous push (IVP) is potentially advantageous and may accelerate urgent management of seizures. However, high doses of levetiracetam have been associated with hypotension and bradycardia, and there is limited research comparing the incidence of adverse effects between IVP and IVPB administration. In 2022, Bronson Methodist Hospital changed adult levetiracetam intravenous administration to IVP. The purpose of this study is to compare the time from order to administration and safety profile of IVP versus IVPB levetiracetam.

Methods: This is a retrospective chart review of adult patients at Bronson Methodist Hospital who received a dose of levetiracetam greater than 1000 mg via IVP or IVPB from January 1, 2020 to December 31, 2023. Patients were excluded if their systolic blood pressure was below 90 mmHg within 2 hours prior to the first dose of levetiracetam and/or heart rate was below 50 beats per minute within 2 hours prior to the first dose of levetiracetam. Protected populations (patients under 18 years old, pregnant, prisoners) were also excluded. The primary outcome of this study is a comparison of time from physician order to administration between IVP and IVPB levetiracetam. Secondary outcomes include incidence of infusion site reactions, incidence of hypotension and/or bradycardia within 2 hours of levetiracetam administration, incidence of a second antiepileptic drug administered within 12 hours of levetiracetam, and incidence of any benzodiazepine administered in the time between levetiracetam order verification and administration.

Results: Data analysis is currently being performed. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the difference in time from physician order to administration between IVP and IVPB levetiracetam

Describe the clinical and logistical benefits of IVP levetiracetam compared to IVPB administration

Self Assessment Questions:

Which of the following is a benefit of IVP levetiracetam administration over IVPB?

- A. Increased fluid volume administered
- B. Shorter time from order to administration
- C. Slower administration time
- D. Decreased infusion site reactions

Published literature has demonstrated that IVP levetiracetam is safe up to what dose?

- A. 2500 mg
- B. 3000 mg
- C. 4500 mg
- D. 7000 mg

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-652-L01-P

Predictability of Heparin-Induced Thrombocytopenia Using Heparin Expert Probability and 4T Scoring Tool in Cardiovascular Surgery Patients

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Heparin-induced thrombocytopenia (HIT) is a potentially life-threatening, immune-mediated complication with a reported incidence of 1% to 5% in the post-surgical cardiovascular population. The 4T score, a gold standard risk stratification tool for HIT, has limitations in its applicability in this population; thus, the Heparin Expert Probability (HEP) scoring tool was developed to consider more cardiovascular and critical care-related features. The objective of this study is to assess the predictability of the 4T and HEP scoring tools in post-surgical cardiovascular patients. This is a single-center, retrospective, case-control study in adult post-surgical cardiovascular patients suspected of HIT admitted to the Cardiovascular Intensive Care Unit (CVICU) between September 20, 2020 to September 30, 2023. Patients 18 years and older suspected of HIT with ordered Enzyme Linked Immunosorbent Assay (ELISA), and Serotonin Release Assay (SRA) tests (if available), will be included in the study. Thoracic patients, lung transplant recipients, hemodialysis patients, and patients with missing ELISA results will be excluded. Risk stratification for HIT will be conducted by calculating the 4T and HEP scores and compared to the ELISA/SRA laboratory test results to determine the primary outcome of accuracy of each scoring tool. Secondary outcomes will assess the association between positive Optical Density (OD) values (cutoff <1 and >1) and confirmatory SRA tests with the presence/absence of thrombosis. Safety outcomes will assess bleeding episodes, thrombotic events, and blood product utilizations. Patients will be identified using DataDirect from the electronic medical records. Descriptive statistics and Chi-Squared tests will be utilized to characterize predictive values and analyze baseline characteristics. Scoring tools will be compared using the McNemar's test. Data collection in progress with anticipated data analysis completion in March 2024. Final Study results will be discussed.

Learning Objectives:

Recognize the different criteria used in each risk stratification tool to calculate a HIT risk score.

Identify the appropriate laboratory tests for diagnosing cardiovascular surgery patients with heparin-induced thrombocytopenia.

Self Assessment Questions:

Which of the following is NOT a criterion used to calculate the probability of HIT in the 4T Scoring Tool?

- A. Magnitude of platelet count fall
- B. Use of indwelling intra-arterial devices
- C. Timing of platelet count fall
- D. Presence of thrombosis

EB is a 45-year-old male who was admitted to the cardiovascular intensive care unit six days ago following aortic valve repair. His platelets dropped more than 65% with other laboratory values remaining relatively stable. EB's ELISA test yielded a result with an optical density (OD) of 0.9 AU cm⁻¹. Which test should be ordered to confirm HIT?

- A. CRP
- B. PSA
- C. SRA
- D. BMP

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-743-L01-P

Apixaban vs Warfarin for the Treatment of Venous Thromboembolism in Patients with Severe Renal Impairment: A Multicenter Study

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Purpose: Venous thromboembolism (VTE) is a vascular disorder affecting approximately 10 million patients annually with a heavy economic burden on the United States healthcare system. The 2020 American Society of Hematology guideline suggests the use of direct-acting oral anticoagulants (DOAC) over warfarin for unprovoked VTE in patients with normal renal function. Due to the lack of national guidance and clinical data to guide the use of anticoagulants for VTE treatment in patients with severe renal insufficiency, this study aims to evaluate the efficacy and safety of apixaban versus warfarin for VTE treatment in patients with severe renal impairment. **Methods:** This multi-center, retrospective, observational cohort study will be conducted at 21 Ascension Health sites including Ascension Genesys Hospital. This study aims to obtain and analyze data from eligible patients. Inclusion criteria: chronic kidney disease stage four and five and end stage renal disease including recipients of renal replacement therapy, admitted for a new VTE diagnosis, received at least one dose of apixaban or warfarin with the drug prescribed at discharge. Exclusion criteria includes patients with mechanical valve replacement, moderate or severe mitral valve stenosis, pregnancy, history of coagulopathy or severe liver disease, receiving contraindicated interacting medications or continuous renal replacement therapy. The primary outcome is time to first major bleeding or clinically relevant non-major bleeding (CRNMB) event, secondary outcomes include time to first major bleeding event, time to CRNMB events, recurrent VTE events, mortality, anticoagulant-related readmissions or ER visits. For adequate statistical power, a sample size of 1610 patients is required to detect a 6.3% difference in bleeding events between apixaban and warfarin groups. Analysis methods involve Kaplan-Meier curves, log-rank tests, and subgroup analyses to assess outcomes in different dialysis groups and bleeding incidents. **Results/Conclusions:** Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the American Society of Hematology 2020 guidelines recommended oral anticoagulants and duration for VTE treatment.

Review literature on the use of direct-acting oral anticoagulants (DOACs) for venous thromboembolism (VTE) treatment in patients with severe renal impairment.

Self Assessment Questions:

According to the American Society of Hematology 2020 guidelines for management of VTE, which of the following is the recommended treatment for uncomplicated unprovoked VTE in previously well patients with normal renal function?

- A. Direct oral anticoagulants (DOAC) for 6 months
- B. Direct oral anticoagulants (DOAC) indefinitely
- C. Warfarin for 6 months
- D. Warfarin indefinitely

In a retrospective study conducted by Ellenbogen et al, comparing the efficacy and safety of apixaban to warfarin for the treatment of VTE in patients with end-stage kidney disease, which of the following outcomes exhibited a significantly reduced risk in the apixaban group?

- A. All-cause mortality
- B. Anticoagulation-related ED visits
- C. Major bleeding
- D. Recurrent VTE

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-596-L01-P

Shock and Awe: An Angiotensin II Clinical Outcomes Assessment

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Purpose: The rate of septic shock is increasing in the United States by approximately 9% per year, and mortality rates of 30-50% necessitate evidence-based, individualized treatment. Society of Critical Care Medicine guidelines currently recommend norepinephrine as the first-line vasopressor agent with the addition of vasopressin and epinephrine as 2nd and 3rd line vasopressors. Due to low-quality evidence, angiotensin II is not recommended as a first-line agent but may have a role as adjunctive therapy. Angiotensin II is effective at increasing mean arterial pressure, but clinical trials are lacking to evaluate improvements in clinical outcomes (e.g., mortality, length of stay). This study's purpose was to assess angiotensin II use compared to other high dose vasopressor regimens, and to evaluate clinical outcomes related to its use in septic shock. It took place within a large community hospital where it is used for patients on two maximally dosed vasopressors and stress dose steroids. **Methods:** A retrospective cohort study was conducted at Parkview Regional Medical Center (PRMC). The study included all patients who had received angiotensin II from January 1, 2017 to October 22, 2023, matched 1:1 (by month and year) to control patients who did not receive angiotensin II. Inclusion criteria were age at least 18 years, use of at least 0.5 µg/kg/min norepinephrine equivalents (NEE) at the time of inclusion, use of 3 or more vasopressors, and the primary cause of shock to be infection (identified by a diagnosis of sepsis or antibiotics within the first 24 hours of admission). The primary outcome of interest was ICU-free days through day 30. Secondary outcomes included hospital length of stay, 30-day mortality, change in NEE, duration of mechanical ventilation, and progression to renal replacement therapy. **Results/Conclusions:** Data analysis is pending. Results will be presented at the Great Lakes Pharmacy Conference.

Learning Objectives:

List guideline directed therapies for adult patients with septic shock

Discuss outcomes of angiotensin II treatment demonstrated in literature

Self Assessment Questions:

In the Angiotensin II for the Treatment of Vasodilatory Shock (ATHOS-III) trial, a statistical difference was found in which of the following endpoints:

- A. 7-day mortality
- B. Mean arterial pressure (MAP) response at hour 3
- C. 28-day mortality
- D. Ventilator-free days

According to the Society of Critical Care Medicine which of the following vasopressors should be avoided in adult patients with septic shock?

- A. Angiotensin II
- B. Dopamine
- C. Phenylephrine
- D. Terlipressin

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-594-L01-P

Implementation of Central Fill for Community Pharmacies within a Health-System

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Across the country, health-systems are afflicted by struggles with recruitment and retention, drug shortages, and increasing costs of providing care with no clear end in sight. As such, healthcare organizations need to find alternative ways to maintain and advance patient care and operations. One potential solution to solve problems arising from acute crises of personnel is by employing a centralized fill model. Central fill is a solution that can leverage automation and standardized workflows to improve efficiency and support community pharmacies during staffing constraints. A central fill may free up pharmacist and technician time to perform alternative tasks.

A central fill model will be implemented at University of Wisconsin Hospitals & Clinics (UW Health) Pharmacy Services across its community pharmacies. The purpose of this project is to improve efficiency by leveraging automation in the prescription refilling process.

A pilot site for central fill was selected by reviewing fiscal year 2023 dispensing data from the outpatient pharmacy dispensing software. Data was reviewed to identify volumes of non-controlled, non-refrigerated prescription refills requested the day prior to planned pickup at UW Health community pharmacies. A central fill module was created within the outpatient pharmacy dispensing software. Testing was conducted to ensure appropriate prescription routing and transparent communication and tracking between filling and dispensing sites. Policies and standard operating procedures were updated to guide operations regarding prescription fulfillment at filling sites, delivery integrity to the dispensing site, and receiving orders at the dispensing site. Staff education will be created and disseminated prior to central fill implementation.

Outcomes anticipated spring 2024 following implementation of central fill. The primary outcome of this project is data collection for assessing efficiency, financial performance, and FTE reallocation to determine viability of central fill expansion.

Learning Objectives:

Discuss the benefits of a central fill model in a health system, including operational efficiency, cost-effectiveness, and the positive impact on patient experience and quality of care.

Outline the methods for implementing a central fill model at one's own institution.

Self Assessment Questions:

Which of the following is a potential key benefit associated with the implementation of a central fill model in a health system?

- A. Improved staff training
- B. Increased administrative workload
- C. Enhanced operational efficiency
- D. Higher medication costs

What is a crucial component for introducing a central fill model within one's own institution?

- A. Ensuring regulatory compliance
- B. Guaranteeing process compatibility using existing technology
- C. Maximizing stakeholder involvement
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-766-L04-P

Implementation of Emergency Department Discharge Prescription Capture at an Academic Medical Center

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Background: In 2023, the Centers for Medicare and Medicaid Services (CMS) implemented regulations requiring 70% of Part D beneficiaries receive Schedule II-V controlled substance prescriptions electronically. Froedtert Hospital (FH) is a 766 bed academic medical center with a level one trauma Emergency Department (ED) with over 72,000 emergency visits annually. The ED has historically generated approximately 30,000 prescriptions annually. Less than 1% of these prescriptions were filled at Froedtert pharmacies, with 4% E-prescribed (2017 to 2022), creating an opportunity to increase prescription capture and E-prescription rates, given new CMS regulations. The primary objective was implementation of a process to capture ED discharge prescriptions at Froedtert Pharmacy #050.

Methods: An educational intervention delivered to ED providers February through April 2023 detailed CMS E-prescribing requirements, pharmacy #050 hours, and logistical details pertinent to successful E-prescribing. Three months of pre- and post- intervention prescribing data were evaluated (12/23/22 to 3/23/23; go live 4/3/23 to 7/3/23). The primary outcome was the number and percent of ED prescriptions filled at pharmacy #050.

Results: The number and percent of prescriptions filled at pharmacy #50 changed from 152 (4.9%) before the intervention to 159 (3.6%) after the educational intervention. The percentage decreased as more prescriptions were generated during the post-implementation period, 3,133 prescriptions before vs 4,429 prescriptions after.

Conclusion: The primary outcome showed no difference in prescription capture pre- and post-implementation at pharmacy #050. Prescription capture increased at pharmacy #075 (not the pharmacy the intervention was intended to promote, but which had just become a 24-hour location) during the post-intervention phase. Major barriers to successful implementation were a physical barrier between the ED and pharmacy #050 and operational complexity preventing implementation of a proposed Epic enhancement to default prescriptions from the "print" mode to E-prescription and the default destination to an FH pharmacy.

Learning Objectives:

Recognize the fraction of schedule II-V prescriptions required to be electronically prescribed for Medicare Part D beneficiaries by the The Centers for Medicare and Medicaid Services (CMS) Final Rule for Electronic Prescribing of Controlled Substances which was implemented in 2023

Recall the change in the number of prescriptions filled at pharmacy #50 before and after the educational intervention occurred

Self Assessment Questions:

The Centers for Medicare and Medicaid Services (CMS) implemented the Final Rule for Electronic Prescribing of Controlled Substances in 2023, requiring what percent of Part D beneficiaries receive Schedule II-V controlled substance prescriptions electronically?

- A. 0.5
- B. 0.7
- C. 0.9
- D. 1

What was the qualitative change in the number of prescriptions captured at pharmacy #50 before and after the intervention?

- A. Minimally increased
- B. Significantly increased
- C. Minimally decreased
- D. Significantly decreased

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-789-L04-P

Out of the Clinic, Into the Pharmacy: Long-acting Injectable Antipsychotics

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Purpose: Expanding access to vulnerable patient populations is a constant focus for health systems. Limited availability within clinics can create barriers for patients to receive important clinic-administered intramuscular (IM) medications. The retail pharmacy setting is well-positioned to offer IM medications due to their convenience and existing infrastructure for providing vaccines to patients. University of Wisconsin (UW) Health currently has 11 retail pharmacies within the greater Madison, WI area. The objective of this project is to expand access to care for UW Health patients by creating a pathway to allow pharmacists to administer IM medications within retail pharmacies. Methods: A workgroup was formed to pilot a retail pharmacist-driven injection service. Medications for the pilot were identified from a list of clinic-administered IM medications and narrowed based on pharmacy benefit coverage, volume, and complexity of administration. A delegation protocol was created to allow pharmacists to authorize and administer IM medications within the pharmacy for patients on maintenance therapy. Operational workflows and infrastructure within the electronic health record were developed. Pharmacists were trained on the clinical and operational aspects of the new delegation protocol, as well as proper administration technique. The results of the project aimed to assess clinic availability, quality of care, pharmacy reimbursement for the pursued medications, and patient adherence rates. Results: Long-acting paliperidone and aripiprazole were identified as the medications of interest for the pilot, contributing to 57% of all long-acting injectable antipsychotic administrations in calendar year 2023. Payor composition for these patients included 35% commercial, 33% Medicaid, and 32% Medicare insurance types. In comparison of the medical benefit, a \$200,000 annual margin enhancement would result from an injection service within the retail pharmacy space. Conclusion: To be presented at the Great Lakes Resident Conference.

Learning Objectives:

Identify considerations for health system retail pharmacies when implementing a non-vaccine intramuscular injection service.

Describe the current limitations of a retail pharmacist-driven injection service.

Self Assessment Questions:

What are elements that a health system pharmacy department should consider prior to implementing a retail pharmacist-driven injection service?

- A. Pharmacy benefit coverage
- B. Medical benefit denials
- C. Route of administration
- D. All the above

True or false: non-vaccine intramuscular medications are covered under the pharmacy benefit for all insurances.

- A. TRUE
- B. FALSE
- C. -
- D. -

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-773-L04-P

Monitoring Effectiveness and Safety of Implementing Pharmacist Guided Heparin Management in Achieving Time to Therapeutic anti-Xa Levels Versus Nursing Protocol per aPTT Levels

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Purpose: Heparin is an anticoagulant that must be monitored when used for treatment in various disease states. At our institution we have several heparin nomograms based on specific indications and patient specific factors. Current indications include acute coronary syndrome, deep vein thrombosis/pulmonary embolism, bridging, and atrial fibrillation. Our current nomogram is mainly based on anti-Xa levels compared to the previous activated partial thromboplastin time (aPTT) for any rate titration that is needed. Prior to having a pharmacist guided protocol we relied on nursing to manage the patient's heparin drip. The purpose of this study was to determine how effectively the current pharmacist guided heparin protocol compared to the previous nurse driven protocol when it comes to getting a patient to therapeutic levels and keeping them free of adverse events. Methods: Single-center, retrospective and prospective chart review study conducted at Baptist Health Corbin. Data was collected from the electronic health record from December 1, 2022 to December 31, 2023. The nurse driven protocol ran from December 2022 to May 2023, then the pharmacist guided protocol ran from July 2023 to December 2023. Inclusion criteria includes patients 18 and older and received at least 2 days of therapeutic heparin. Patients were excluded if they were minors, pregnant, prisoners or receiving prophylactic heparin. The primary objective of this study was to determine how effectively pharmacists were able to get patients to a therapeutic level (in hours) times two and keep them free of adverse events. A slicer-dicer report was completed during the specified time frame which included roughly 800 patients, and after reviewing patient charts 260 patients were included in the study with 130 patients in each group. Results/conclusions: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the current pharmacist guided heparin protocol and the previous nursing directed heparin protocol

Identify the pros and cons of using anti-Xa versus aPTT monitoring

Self Assessment Questions:

A.E. is a 73-year-old female that comes into the emergency department due to chest pain and currently on Eliquis. Her past medical history includes atrial fibrillation. Her last dose of Eliquis was earlier in the day. The ER physician wants to start the patient on a heparin drip. How would you go about starting the patient on the heparin drip?

- A. Go ahead and start the heparin drip before any labs are collected (including anti-Xa)
- B. Wait for the lab to be collected and resulted, anti-Xa result comes back > 1 , then you hold the heparin drip until the anti-Xa level drops < 1
- C. Wait for the lab to be collected and resulted, anti-Xa result comes back > 1 , then you start the heparin drip
- D. Hold the heparin drip regardless of labs assuming that the patient was compliant with all of her Eliquis dosing

Which one of the following is a benefit of using anti-Xa monitoring compared to aPTT monitoring?

- A. Slower time to reach a therapeutic goal
- B. Different therapeutic range goal at each specific institution
- C. Less physiological variability resulting in a shorter time to therapeutic
- D. More lab tests and more heparin rate changes

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-581-L01-P

Hemorrhaging resources: evaluation of appropriate use of andexanet alfa in the emergency department for factor Xa inhibitor-associated major bleeding

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Purpose: Andexanet alfa is a modified recombinant factor Xa protein indicated for patients taking apixaban or rivaroxaban when reversal of anticoagulation is needed due to life-threatening or uncontrolled bleeding. Andexanet alfa is currently the only FDA-approved agent for factor Xa inhibitor reversal. However, the cost and availability of andexanet alfa greatly limits its use, and many health systems have opted to use alternatives such as four-factor prothrombin complex concentrate. The objective of this study is to evaluate the use of andexanet alfa in the emergency department across the health system. Methods: This is a multi-center retrospective chart review of 131 adult patients who were seen in the emergency department between January 1, 2023 and December 31, 2023 for factor Xa inhibitor-associated major bleeding. MyMichigan and its affiliates provide emergency medicine services across the state of Michigan, and the health system currently has ten emergency departments. Patients who received andexanet alfa from an emergency medicine provider at one of the ten MyMichigan or affiliate emergency departments were included. Patients with andexanet alfa ordered by a non-emergency medicine provider and patients who received andexanet alfa outside our health system prior to transfer will be excluded. The primary analysis will evaluate the appropriate use of andexanet alfa based on the presence of major bleeding, dose of factor Xa inhibitor, time since last dose of factor Xa inhibitor, and dose of andexanet alfa administered. Secondary analyses include cost of inappropriate use, source of bleed, and incidence of thrombotic events and all-cause mortality within 30 days of andexanet alfa administration. The results of this study will be utilized to update our current protocol for the reversal of factor Xa inhibitors and presented to the system-wide Pharmacy and Therapeutics Committee for implementation. Results and conclusions to be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify indications for the use of andexanet alfa based on the drug's label

Select an appropriate dose of andexanet alfa based on the timing and dose of factor Xa inhibitor

Self Assessment Questions:

Which scenario would high-dose andexanet alfa be appropriate to administer?

- A. Apixaban 5 mg BID, last dose unknown, intraocular hemorrhage
- B. Apixaban 10 mg BID, last dose 6 hours prior to arrival, epistaxis
- C. Rivaroxaban 10 mg QD, last dose 6 hours prior to arrival, intracranial hemorrhage
- D. Rivaroxaban 20 mg QD, last dose 24 hours prior to arrival, gastrointestinal hemorrhage

Which of the following indications should use of andexanet alfa be considered?

- A. Apixaban overdose
- B. Pericardial effusion
- C. Chronic anemia
- D. Non-invasive procedure

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-556-L01-P

Determining factors associated with International Normalized Ratio (INR) response to vitamin K dosing in critically ill children

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Purpose: Patients experiencing shock have decreased end organ perfusion. Reduced perfusion to the liver results in decreased production of prothrombotic factors leading to coagulopathy demonstrated by increase in International Normalized Ratio (INR). Vitamin K is a cofactor in the production of active forms of factors II, VII, XI, and X, thus deficiency in vitamin K can contribute to coagulopathy. For patients with acute hepatic failure and elevated INRs, vitamin K has been used as treatment. Data from adult trials show that a single dose of vitamin K can decrease INR by 0.43-0.61. There are limited pediatric studies evaluating appropriate dosing or efficacy of vitamin K use for elevated INR. One study evaluating use of vitamin K in critically ill pediatric patients used doses ranging from 1-10 mg to achieve INR values < 1.2 . This study is designed to evaluate clinical response to a single dose of parenteral vitamin K in critically ill children with elevated INR.

Methods: This study is a retrospective chart review of pediatric patients who received parenteral vitamin K in the pediatric and cardiac intensive care units from 1/1/2017 to 8/1/2023. The primary outcome is achievement of clinical response to a single dose of parenteral vitamin K, defined as INR change from baseline of 0.5 or greater. Secondary outcomes include INR change in response to vitamin K dose, characterization of patients who respond to vitamin K therapy, and signs of clinically relevant bleeding or clotting post vitamin K administration. Clinical response to vitamin K and signs of bleeding or clotting will be assessed by Fisher's exact test. A linear regression will be performed to determine the relationship between vitamin K dose and INR response.

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

Learning Objectives:

Discuss the use of vitamin K in patients with acute hepatic failure and elevated INR.

Recognize common pediatric dosing and side effects of vitamin K.

Self Assessment Questions:

Which factors would IV vitamin K supplementation affect in the coagulation cascade?

- A. Factors II and X
- B. Factors VII and IX
- C. Factors VII, IX, and X
- D. Factors II, VII, IX, and X

According to data taken from the Cincinnati Children's PICU and CICU, which would be the most appropriate starting dose of IV vitamin for coagulopathic patients with acute hepatic failure?

- A. 0.1 mg/kg daily
- B. 1 mg/kg daily
- C. 1-10 mg daily
- D. 25-100 mg daily

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-571-L01-P

Implementation and Evaluation of Busulfan (BU) Pharmacokinetics (PK) in Hematopoietic Cell Transplantation (HCT)

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This project aims to implement outpatient BU PK-based dosing adjustments, assess the safety and efficacy of a test-dose strategy for monitoring BU PK, and standardize PK assessment at UW Health. Patients who underwent a myeloablative HCT with non-PK monitored BU from 2018-2023 will be analyzed to assess efficacy and toxicity including VOD/SOS, other hepatic effects, engraftment, relapse, and death. The toxicity profile results will then be compared with patients who underwent the test-dose strategy from July to December 2023. A weight-based test dose of 0.8 mg/kg was utilized to predict the area under the curve (AUCpred) with a target AUC range of 4800-5300 ÅM*minute (AUCtarget). AUCfirst was then calculated before the first therapeutic dose. The primary outcome is to identify the percentage of patients who achieved AUCtarget within 10%, 15%, and 20% for both AUCpred and AUCfirst. Moreover, this project includes the development and implementation of a standardized workflow, encompassing workflow planning, creating educational materials, screening drug interactions, and establishing a data collection framework. A total of four patients have successfully undergone BU PK monitoring for myeloablative conditioning since July 2023, achieving 100% engraftment with no notable toxicities, such as VOD, reported as of today. PK-guided first dose improves achieving target AUC with ranges of Å± 10% in 75% of patients. Further data collection is warranted to ensure adequate statistical power, with a goal of achieving a 90% target AUC attainment through PK monitoring. Additionally, collaboration with pharmacy operations and informatics continues to improve workflow and build appropriate functionality into the Electronic Health Record.

Learning Objectives:

Explain the significance of adopting a test-dose strategy for busulfan pharmacokinetics.

Recognize the obstacles in implementing and optimizing the workflow for busulfan pharmacokinetics.

Self Assessment Questions:

Which organ is particularly susceptible to toxicity from busulfan?

- A. Kidneys
- B. Liver
- C. Lungs
- D. Pancreas

What potential challenge may arise in implementing a test-dose strategy for busulfan PK monitoring?

- A. Delays in the testing schedule could impact the accuracy of dose recommendations
- B. Relies on effective communication at a complex interdisciplinary level
- C. Variability in data entry and a lack of functionality to track PK monitoring data
- D. All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-749-L01-P

Developing Ambulatory Care Clinical Pharmacy Services in an Obstetrics and Gynecologist Clinic

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Purpose: The mean age of pregnant patients has been rising in the United States, indicating that people are becoming pregnant at older ages. This increase in age comes along with more chronic diseases and higher medication utilization during pregnancy. Ambulatory care clinical pharmacists provide a unique skill set to deliver comprehensive care and management of chronic diseases before, during, and after pregnancy. Currently, there is limited available literature that describes the impact of an ambulatory care clinical pharmacist as part of an interdisciplinary obstetrics and gynecology (OBGYN) team in an underserved community. Therefore, the objective of this study was to evaluate the number and type of interventions made by an ambulatory care clinical pharmacist in the OBGYN clinic within a safety net health system.

Methods: A single center, retrospective, cohort study was conducted for all patients who completed a clinic visit with a pharmacist or had a pharmacist intervention in the OBGYN clinic between January 2024 and April 2024. Patients were excluded if they were less than 18 years old or incarcerated. The primary outcome was overall number and type of interventions for targeted disease states (e.g.; hyperemesis, diabetes, hypertension, etc.) defined as medication regimen optimization, deprescribing, laboratory monitoring, adverse drug effect management, medication access, comprehensive medication review, referrals, and medication reconciliation. Secondary outcomes included pharmacist interventions by month, number of medication histories completed, and billing for services rendered by a pharmacist. Results will be used to evaluate the benefits of ambulatory care clinical pharmacy services in an OBGYN clinic in hopes of demonstrating ongoing sustainability of the service beyond this pilot program.

Results: To be collected.

Conclusions: Data collection is ongoing.

Learning Objectives:

Describe the gaps in literature for pharmacist involvement in obstetrics and gynecology clinics.

Identify potential opportunities for clinical pharmacist involvement within an interdisciplinary obstetrics and gynecology clinic.

Self Assessment Questions:

Which of the following is considered a gap in literature relating to the care of obstetrics/gynecology patients?

- A. Maternal morbidity
- B. Mean age of women during pregnancy
- C. Pharmacist medication management via collaborative practice agreement
- D. Pharmacist contraception management

Which of the following is an opportunity for involvement of a clinical pharmacist in an obstetrics and gynecology clinic?

- A. Analysis of ultrasounds
- B. Review of fetal echocardiograms
- C. Fertility preservation
- D. Hyperemesis assessment and management

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-869-L04-P

Optimizing Antidote Availability in a Multi-Site Health System

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According to the Centers for Disease Control and Prevention, accidental injuries, particularly unintentional poisonings, were the primary cause of death among Americans aged 1-44 in 2020. Since 2016, the Institute for Safe Medication Practices has advised healthcare systems on optimal practices related to antidotes, reversal agents, and rescue agents. These best practice recommendations include appropriate drug availability and utilization of standard protocols and order sets.

Standardizing what antidotes are available or how they can be readily obtained is critical for optimizing patient outcomes and safety.

This single-center, multi-site gap analysis spanned the Froedtert Health enterprise, incorporating inpatient hospitals and outpatient urgent care, surgery, and cancer centers. A list of antidotes was compiled from expert consensus guidelines and Vizient recommendations on essential medications. The drugs were then categorized as needing to be immediately available, available within one hour, or accessible to the hospital via a defined process. Data was collected on antidote availability and utilization from July 1, 2022 through June 30, 2023. Prior facility antidote administrations and risk of future toxin exposure was evaluated. Inventory practices and new workflows for obtaining drugs not currently stocked were updated as a result. The primary outcome of this study was change in the number of antidotes stocked at each site prior to and after project implementation.

A list of 53 drugs were included for inventory stocking. Immediate availability was required for 31 drugs, availability within one hour was required for 17 drugs, and hospital accessibility was required for the remaining five drugs. The finalized list detailing the locations where drugs are stocked and the establishment of a process for antidote sharing among sites are currently in development. Additional detail to be shared at the conference.

Antidote availability is critical to ensure patient safety.

Learning Objectives:

Identify the organization that promotes the need to have antidotes readily accessible for emergency situations.

Outline variables that are important to assess when determining antidote stocking practices.

Self Assessment Questions:

According to the Institute for Safe Medication Practices, what is the risk associated with the delay in antidote administration?

- A. Healthcare associated infections
- B. Patient falls
- C. Serious patient harm and death
- D. No known additional risks

Which of the following is an important variable to consider when assessing which antidotes should be stocked on site?

- A. Drug transport services
- B. Volume of use
- C. Hospital demographics
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-796-L05-P

Implementing a Comprehensive Acute Care Pharmacy Practice Model at a Safety-Net Health-System

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The implementation of an integrated, comprehensive acute care pharmacy practice model at Eskenazi Health was identified as an imperative strategic initiative for the Department of Pharmacy to maintain contemporary services for the evolving role of pharmacy. Despite possessing a budgeted full-time equivalent (FTE) number of pharmacists above the national average, persistent issues such as burnout, absence of cross-coverage during compensatory and paid time off, and a lack of redundancy necessitated a reevaluation of the current model. In addition, significant disparities in engagement and expectations among pharmacists underscored the need for a more cohesive approach. The absence of robust clinical support outside of normal business hours, coupled with gaps in core services, deficiencies in Emergency Department coverage, and the exclusion of pharmacists from transitions of care processes, further emphasized the imperative for change.

This project outlines the assessment and implementation phases of the acute care pharmacy practice model change, guided by a collaboration with an outside pharmacy consulting firm. The primary objective was to address the multifaceted challenges while enhancing pharmacy services to deliver comprehensive care 24/7/365. Notably, the implementation was designed to achieve this transformation while maintaining near net neutral FTEs and ensuring judicious allocation of resources. This research contributes valuable insights into reshaping acute care pharmacy practice, providing a blueprint for organizations seeking to optimize services, improve engagement, and deliver comprehensive patient care services.

Learning Objectives:

Outline drivers for change in an acute care pharmacy practice model

Review the strategic framework and collaborative approach employed to assess an existing acute care pharmacy practice model and transition to an integrated, comprehensive practice model

Self Assessment Questions:

What was a primary driver for change prompting the implementation of the acute care pharmacy practice model change at Eskenazi Health?

- A. Staffing shortages
- B. Facility expansion
- C. Pharmacist burnout
- D. Institutional hiring freeze

How did the acute care pharmacy practice model transformation aim to address challenges in Eskenazi Health's existing acute care pharmacy practice model while attempting to maintain near net neutral FTEs?

- A. Implementing a rigid staffing structure
- B. Ignoring resource constraints
- C. Submitting departmental layoffs
- D. Ensuring a judicious allocation of resources

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-777-L04-P

Evaluation of Triple Therapy Use for COPD

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Purpose: According to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, initiation of a triple-therapy inhaler in Chronic Obstructive Pulmonary Disease is recommended for patients classified as Group E with eosinophils ≥ 300 cells/ μ L. De-escalation is associated with developing exacerbations, making it difficult once triple therapy is initiated. While triple therapy is effective, widespread and prolonged use can be costly. High use of triple therapy was identified as an opportunity for possible utilization reduction within Parkview's value-based contracts. This study assesses the appropriateness of triple-therapy-inhaler initiation in patients with Chronic Obstructive Pulmonary Disease.

Methods: This medication use evaluation was conducted via retrospective analysis. Subjects were required to be an active patient of Parkview Health System and were identified through the electronic health record using an ICD10 diagnosis code of Chronic Obstructive Pulmonary Disease. For inclusion, an active order for an inhaler containing fluticasone furoate, umecclidinium, and vilanterol between July 31, 2022, and July 31, 2023, was also required. Subjects were classified as having appropriate therapy if they were categorized as Group E and had eosinophils ≥ 300 cells/ μ L. Criteria used to exclude subjects consisted of a diagnosis of asthma and/or pneumonia within the electronic health record. Lastly, subjects were assessed to ensure they had pulmonary function tests associated with diagnosis. This was evaluated as a secondary endpoint.

Results and Conclusions: The results and conclusions of this study will be presented at Great Lakes Conference.

Learning Objectives:

Discuss the role of value-based contracts and their impact on healthcare

Identify a patient with COPD who is appropriate for inhaled triple therapy

Self Assessment Questions:

Which component of value-based contracts is most closely related to inhaler use?

- A. Inpatient Admission Rate
- B. STARS Medication Adherence Rate
- C. Skilled Nursing Facility Length of Stay
- D. Prescription Medication Utilization

Which of the following classifications would be appropriate for inhaled triple therapy according to the GOLD guidelines?

- A. Group A classification and eosinophils ≥ 300 cells/ μ L
- B. Group A classification and eosinophils ≥ 300 cells/ μ L
- C. Group E classification and eosinophils ≥ 300 cells/ μ L
- D. Group E classification and eosinophils ≥ 300 cells/ μ L

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-658-L01-P

Bridging Technology and Patient Care: Investigating the Role of Continuous Glucose Monitoring (CGM) in Influencing Health Perspectives of Those Living with Type 2 Diabetes

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Purpose: It is becoming increasingly common for those living with type 2 diabetes who are not on insulin therapy to turn to continuous glucose monitoring (CGM) systems for monitoring purposes. Yet, the specific reasons these patients choose to use or refrain from using CGM have not been thoroughly investigated. This study aims to understand the perspectives of individuals with non-insulin-dependent type 2 diabetes on using CGM. It focuses on comparing attitudes, perceived norms, behavioral control, and intentions towards CGM use between current users and non-users. The cross-sectional survey is based on the Theory of Planned Behavior (TPB), examining how attitudes and perceptions influence health behaviors. The survey items align with TPB constructs, primarily using a Likert scale for responses, and three open-ended questions for additional patient feedback on CGM. Because utilization rates of CGM use in non-insulin dependent patients is an area yet to be extensively explored, the inclusion criteria for participation in the study are as follows: adults over 18 years old with type 2 diabetes, non-insulin dependent, and those who have filled a diabetes-related medication over the last 90 days at an independent pharmacy in New Albany, Indiana. All participants will be invited to participate in the survey through mailed letters containing a QR code for electronic completion and followed up by phone for confirmation and reminders. Data will be gathered using REDCap, an online survey tool, with consent obtained within the platform. Responses from current CGM users and non-users will be statistically compared using paired t-tests. Prior to the main survey, pilot tests will be conducted, and these responses will be excluded from the final analysis. This research could inform future strategies to encourage CGM adoption among all persons living with diabetes. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the potential factors influencing the decision to use or not use CGM systems in patients who are non-insulin dependent.

Explain the Theory of Planned Behavior (TPB) and its application in exploring the use of continuous glucose monitoring (CGM) systems.

Self Assessment Questions:

What is the main purpose of using the Theory of Planned Behavior (TPB) in the study described as it relates to CGM use among non-insulin dependent type 2 diabetes patients?

- A. To assess the effectiveness of CGM devices
- B. To explore how patient attitudes, perceived norms, and behavioral control influence use
- C. To compare the accuracy of CGM devices with traditional glucose monitoring methods
- D. To determine the cost-effectiveness of CGM for non-insulin dependent type 2 diabetes patients

Which of the following can be a potential strategy to encourage CGM adoption among all persons living with diabetes?

- A. Increasing the price of CGM devices to reflect their value
- B. Providing comprehensive education on the benefits and use of CGM
- C. Limiting the availability of CGM devices to only those who are insulin-dependent
- D. Focusing solely on improving the technological specifications of CGM devices

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-840-L01-P

Patient Perceptions of Pharmacist-Led Tobacco Cessation Services at a Federally-Qualified Health Center

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Purpose: Despite continued efforts, tobacco use remains the leading known preventable cause of death in the US. As of 2021, 11.5% of the adult population were current smokers, with lower socioeconomic groups exhibiting higher rates of tobacco use and tobacco-related disease. As a potential strategy to address these health disparities, 17 states have now enacted laws that authorize pharmacists to prescribe tobacco cessation medications, and the role of pharmacists in cessation has continued to expand. Currently, limited data exist that have captured patients' perceptions of their experiences with pharmacist-provided tobacco cessation services, including prescribing. In 2014, patients who received care at Federally- Qualified Health Centers (FQHCs) had a 67% higher smoking prevalence when compared to the US population overall. Pharmacist-led cessation services specifically provided to patients in FQHCs have not been evaluated. The purpose of this study was to apply qualitative methods to (a) assess patient perspectives of these services, and (b) inform the refinement of a recently-developed tobacco cessation service that is being provided to an underserved patient population.

Methods: An interview guide was created to conduct a series of 1-on-1, qualitative, semi-structured interviews until thematic saturation was achieved. Eligible participants were English-speaking patients, 18 years of age or older, who recently completed their post-quit follow-up appointment as part of their enrollment in a pharmacist-provided tobacco cessation service at the FQHC. Interview questions, informed by the SERVQUAL and 5 Rights of Clinical Decision Support models, aimed to characterize patient perspectives on (a) service quality, (b) appropriateness, and (c) related satisfaction with the services they recently received.

Results/Conclusions: Data collection and analyses are currently in progress. Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the differences in tobacco use, quit rates, and medication use among FQHC and non-FQHC patient populations.

Describe the barriers that are commonly faced by patients seeking assistance with quitting smoking.

Self Assessment Questions:

According to the literature, which of the following correctly describes a patient population that is more likely to use tobacco products?

- A. People who live in the southern United States
- B. People of higher socioeconomic status
- C. People with undergraduate college degrees
- D. People with mental health diagnoses

Which of the following is a common barrier that could prevent a patient from receiving proper assistance with quitting smoking?

- A. High health literacy and decreased need for provider assistance
- B. Decreasing prevalence of smoking cessation providers
- C. Lack of access to health insurance and healthcare services
- D. Negative public stigma surrounding tobacco cessation services

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-747-L01-P

Type and frequency of health information requests made by chain community pharmacists

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Purpose:

The purpose of this study is to quantify the frequency and type of patient information requests made by chain community pharmacists during routine practice.

Methods:

This electronic card study is capturing cross-sectional observational data on patient information requests made by pharmacists making interventions during point-of-care. Development of the data collection form was guided by the Relative Advantage construct within the Consolidated Framework of Implementation Research (CFIR). Documentation of information requests via a short, electronic questionnaire will be submitted in real time during routine practice by full-time pharmacists (defined as working a minimum of 32 hours per week) who meet the following eligibility criteria: 18 years of age or older, read English, maintain an active pharmacist license, and employed by a non-specialty Walgreens Co. Pharmacy located in the greater Indianapolis, IN area. A total of 33 pharmacists met eligibility criteria and were contacted for recruitment. Only one pharmacist in a given pharmacy could submit data.

Participating pharmacists were randomized to a two-week data collection period. Prior to data collection, a member of the research team will train each participating pharmacist on how to complete an electronic data collection form. Three practicing community pharmacists pilot tested the data collection form for content and completion time. A member of the research team will contact participating pharmacists on days 1 and 8 of data collection to address potential challenges. Pharmacists will be offered a \$200 professional development reimbursement for participation.

Collected data will be analyzed using descriptive statistics to classify the frequency and types of patient information requests made by chain community pharmacists. All study procedures were approved by the Indiana University Institutional Review Board.

Results:

Results will be presented at the 2024 Annual Great Lakes Pharmacy Resident Conference.

Conclusion:

Conclusions will be presented at the 2024 Annual Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the challenges faced by community pharmacists in receiving patient health information during routine practice

Discuss the preliminary steps taken and partnerships created to make health information exchange (HIE) accessible to community pharmacists in Indiana in the future

Self Assessment Questions:

What information access do most community pharmacists have access to as reported by previous work by Sethman et al.? (Select all that apply)

- A. Immunization registry
- B. Updated medication lists from prescribers
- C. Laboratory test results
- D. Discharge summaries after hospitalization

As of September 2023, how many facilities participate in data contribution to Indiana Health Information Exchange (IHIE)?

- A. 94
- B. 157
- C. 338
- D. 532

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-873-L99-P

Code Blue: Where's My Pharmacist?

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Background: Pharmacist participation in codes is estimated to save over 12,000 lives across the nation annually, and one study documented that medication errors during codes are 51 times more likely to result in death than non-code medication errors. Pharmacists at MyMichigan Medical Center Midland are not yet integrated into the Code Blue Team, but data shows the huge impact pharmacists can have in these critical situations.

Purpose: Assess the impact of pharmacist participation at Code Blue emergencies at MyMichigan Midland.

Methods: Surveys were sent out in September 2023 to identify and address pharmacist concerns about education, comfort level, and coverage for other duties. In November and December 2023, pharmacists were strongly encouraged to attend ACLS certification courses offered by the health system as well as take part in resident-led pharmacy-specific training sessions highlighting code medication pearls and physically preparing medications for administration. The pilot program began in February 2024, emphasizing code participation in intensive care units and in the emergency department, where most codes occur at MyMichigan Midland. In addition to the usual tasks that pharmacists perform during codes such as preparing medications, acting as liaison to retrieve medications from the Main Pharmacy, and reinforcing adherence to ACLS guidelines, they also began leading the post-code debriefing sessions. After attending a Code Blue, pharmacists completed a brief survey to assess personal comfort level, efficacy at that event and areas for future improvement. Data is being collected about specific interventions pharmacists have been able to make, as well as timing and coverage for other duties so we can best allocate the appropriate resources to maximize pharmacist effort and patient care. Results will be reported at the Great Lakes Pharmacy Residency Conference in April 2024.

Learning Objectives:

Discuss the role of a pharmacist on a code team

Identify appropriate dosing for common medications used in acute cardiac events

Self Assessment Questions:

What skills does a pharmacist possess that makes them a great team member during a code?

- A. Detail oriented
- B. Medication expert
- C. Able to multi-task efficiently
- D. All of the above

What dose of epinephrine is appropriate for an adult experiencing cardiac arrest?

- A. 0.3 mg
- B. 0.01 mg/kg
- C. 1 mg
- D. 3 mg

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-776-L04-P

Exploring the relationship between cannabinoid positivity and incidence of seizures in the emergency department

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Purpose: The recent widespread legalization of cannabis for both medical and recreational purposes in the United States has markedly expanded access to cannabinoids. Increased access has led to a notable rise in emergency department visits with cannabinoid positive drug screens. Several case reports have documented a possible correlation between cannabis exposure and incidence of seizures in patients presenting to the ED. However, the exact mechanism to explain this relationship remains enigmatic, leaving uncertainty regarding whether cannabinoids directly contribute to seizures or if the seizures are a result of co-ingested substances. The purpose of this study was to examine if a correlation exists between cannabinoid-positive drug screens and the incidence of seizures within the emergency department.

Methods: We conducted a single-center, retrospective cohort study of patients who presented to the University of Kentucky Chandler Medical Center and Good Samaritan Hospital Emergency Departments with incidence of seizure between June 1, 2021, to September 15, 2023. Subjects were allocated into groups based on cannabinoid or cannabinoid metabolite positive in-hospital mass spectroscopy testing of urine or blood samples. The primary outcome was to explore the correlation of seizures in patients with cannabinoid-positive drug screens.

Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the interplay between cannabinoids and the endocannabinoid system

Identify patient populations where cannabinoid-induced seizures may be more common

Self Assessment Questions:

What is the proposed mechanism of action of cannabinoid-induced seizures?

- A. Agonism at the CB1 receptor
- B. Agonism at the CB2 receptor
- C. Antagonism at the CB1 receptor
- D. Antagonism at the CB2 receptor

In which patient groups have a higher frequency of cannabinoid-induced seizures been observed?

- A. Pediatrics
- B. Adolescents
- C. Adults
- D. Geriatrics

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-595-L01-P

A Culturally Tailored, Pharmacist-led Diabetes Education Intervention for Uninsured Hispanic Patients: An Evaluation of Diabetes Knowledge Enhancement and A1c Improvement

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Purpose

To explore the impact of pharmacist-led, culturally tailored diabetes education on the glycemic control and knowledge enhancement among uninsured, Hispanic adults.

Methods

The study enrolls Hispanic adults aged 18 years or older with uncontrolled diabetes (A1c >7%), and with an annual income of <200% above the Federal Poverty Level and uninsured. Participants are divided into two groups: a comparison group receiving standard diabetes education with an interpreter and an intervention group receiving culturally tailored education with a bilingual pharmacist. Both groups will attend a four-week diabetes education course, conducted once a week. A series of pre- and post-intervention metrics, including A1c levels, 12-DKQ scores, and satisfaction surveys, will serve as the basis for comparison between the intervention and comparison groups.

Expected Outcomes

The study anticipates significant knowledge gain as evidenced by a projected 25% increase in post-intervention 12-DKQ scores, with a retention of 70% at three-month follow-up. Glycemic control is expected to show a 0.5% to 0.75% decrease in A1c levels in the intervention group. Patient satisfaction is hypothesized to score above 4 out of 5, with feedback contributing to program refinement.

Conclusions

This research is expected to validate the importance of culturally and linguistically specific education in diabetes care and to highlight the pivotal role of bilingual pharmacists in this educational process.

Learning Objectives:

Discuss how culturally tailored education affects diabetes management in Hispanic populations.

Recognize the role of bilingual pharmacists in improving patient outcomes through tailored educational interventions.

Self Assessment Questions:

What is the anticipated effect of culturally tailored diabetes education on the 12-DKQ scores among uninsured Hispanic adults?

- A. No significant change.
- B. A slight improvement, but not measurable.
- C. A measurable improvement, specifically aiming for a 25% increase.
- D. Doubling of the baseline scores.

Which statement best reflects the expected role of bilingual pharmacists in this study's intervention group?

- A. Bilingual pharmacists are expected to solely provide medication management.
- B. They are anticipated to enhance the cultural relevance of the education, potentially improving patient outcomes.
- C. Their role is limited to translating materials prepared by non-Spanish-speaking educators.
- D. They will focus on administrative tasks rather than patient education.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-722-L01-P

Impact of Ambulatory Pharmacist Interventions on Anxiety and Depression Scores

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Purpose: Many medical groups provide ambulatory care pharmacy services to help manage chronic disease states and improve patient outcomes by utilization of collaborative practice agreements (CPAs) between pharmacists and licensed medical providers. Given the ongoing provider shortage occurring on a national scale, pharmacists have become the leading interface to manage numerous disease states like diabetes, hypertension, and asthma. Pharmacist management of psychiatric conditions like anxiety and depression has also continued to rise within health systems, but no formal evaluation of these efforts has been found within the available literature. The primary objective of this study is to evaluate the percentage of patients achieving therapeutic response after ambulatory care pharmacist intervention for their depression and/or anxiety. Secondary objectives include evaluating the change in PHQ-9 and/or GAD-7 scores after ambulatory care pharmacist intervention, identifying the percentage of patients achieving partial response or remission from their depression and/or anxiety, describing the pattern of interventions made by the ambulatory care pharmacists regarding depression and/or anxiety, and characterizing the utilization of pharmacogenomic testing in pharmacist-led mental health management. This is a descriptive retrospective cohort study of adult patients who had at least one documented visit with an ambulatory care pharmacist to help manage their diagnosis of depression and/or anxiety. This will be a pre- and post-intervention evaluation of patients who meet inclusion criteria between 02/01/2020 and 08/31/2023. A convenience sample of 180 subjects will be used. Patients will be excluded if they did not have a second PHQ-9 and/or GAD-7 score documented within 3-12 months after the initial visit with the ambulatory care pharmacist, were lost to follow-up, became deceased, or transferred care to a provider for external psychiatric management.

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

Learning Objectives:

Recognize various barriers to ambulatory psychiatric care

Classify changes in the objective scoring tools for the management of anxiety and depression (e.g. PHQ-9 and GAD-7)

Self Assessment Questions:

Which of the following is a contributing barrier to the underutilization of outpatient psychiatric management?

- A. Lack knowledge about available services (e.g. pharmacotherapy and/or cognitive behavioral therapy)
- B. Financial limitations (e.g. lack of insurance coverage)
- C. Ongoing provider shortages (both primary care and psychiatric care)
- D. All of the above

JP is a 23-year-old male suffering from severe anxiety and depression. Since meeting with the pharmacist over the past 4 months to modify his regimen, he has noticed notable symptom management and has begun to return to his routine activities. At Month 0, GAD-7 was 17 and PHQ-9 was 22. At Month 4, GAD-7 was 8 and PHQ-9 was 10. How would you evaluate the change in his PHQ-9 score?

- A. Partial Response

- B. Therapeutic Response
- C. Patient is now in remission
- D. B and C

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-698-L01-P

Alignment of Oncology Infusion Staffing Resources with Workload Demands

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Purpose

Froedtert has a dedicated oncology infusion pharmacy within its oncology infusion center, which handles and prepares hazardous and high-risk compounded medications. The pharmacy staff are heavily involved in patient care in the oncology infusion center, visualized via a process map of the oncology infusion pharmacy. Current labor productivity for the compounding pharmacy utilizes hazardous medication doses dispensed. With the evolution of pharmacy practice and regulatory requirements, hazardous medication doses dispensed is not an ideal metric to measure pharmacy productivity in contemporary pharmacy practice. The purpose of this project is to develop a pharmacy productivity metric to quantify the impacts of pharmacy services being provided and ensure optimal staffing ratios for the oncology infusion pharmacy.

Methods

Data is being retrospectively reviewed and collected using the electronic health record and other financial reporting tools. The data collected includes but is not limited to hazardous and non-hazardous medication doses dispensed, Pyxis and non-Pyxis medication doses dispensed, robot dispenses, time from order release to pharmacist first verification, time from pharmacist first verification to pharmacist second verification, interventions, financial impacts and number of total verifications. The retrospective data collected will then be utilized to determine an appropriate productivity metric.

Summary of Preliminary Results

Between January 2021 and December 2023, the total medication doses dispensed from the oncology infusion pharmacy increased by 22% while the hazardous medication doses dispensed increased by 8%.

Conclusions

Final data and results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify key considerations when assessing the workflows and processes within an oncology infusion pharmacy.

Describe why it is important to validate a new productivity metric and methods to validate the metric.

Self Assessment Questions:

Which of the following are important to consider when assessing the workflows and processes within an oncology infusion pharmacy?

- A. Regulatory standards, such as USP 797
- B. Pharmacy staff involvement in the overall patient experience
- C. Financial situation
- D. All of the above

Which of the following actions are we taking to validate our new productivity metric?

- A. Compare hours earned according to the old productivity metric to hours earned based on the new productivity metric
- B. Compare our productivity metric to a standard productivity metric in this pharmacy setting
- C. Present the new productivity metric to our finance partners
- D. There is no need to validate our new productivity metric

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-790-L04-P

Comparison of direct-acting oral anticoagulation versus warfarin following kidney transplantation: A single center experience

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Direct-acting anticoagulants (DOACs) are used for the treatment of venous thromboembolism (VTE) or the prevention of thrombosis in atrial fibrillation (AFib). Solid organ transplant (SOT) recipients experience VTEs and AFib at a higher rate than the general population. However, there are limited studies describing the use of DOACs in SOT recipients. SOT recipients have unique pharmacokinetic considerations when using DOACs, including sporadic renal function and drug-drug interactions. The purpose of this study is to assess the safety and efficacy of utilizing DOACs in a predominantly obese population.

This is a retrospective cohort study. Patients will be included if they are >18 years old, were prescribed a direct oral anticoagulant agent (DOAC) or warfarin between 1/2018-8/2023, are within 12 months post-kidney transplant and received an isolated kidney transplant at the University of Illinois Health Hospital. Patients who have a mechanical or prosthetic valve, have antiphospholipid syndrome, have an anticoagulant indication other than AFib or VTE, are multi-organ transplant recipients, are pregnant or incarcerated will be excluded. The primary outcome is a composite of major and minor bleeding events that require hospitalization. Secondary outcomes included major bleeding defined by the International Society on Thrombosis and Hemostasis criteria, minor bleeding defined as requiring hospitalization or physician's intervention, the incidence of VTE or stroke, graft survival rates, allograft function represented by eGFR, and patient survival. Statistical analyses of outcomes will be assessed using descriptive, categorical, and continuous data. A multivariate model will be conducted to assess for risk factors of bleeding events. Data collection and analysis is currently in process. Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the risk factors associated with developing venous thromboembolisms (VTEs) following solid organ transplantation.

Define the potential drug-drug interactions associated with solid organ transplantation.

Self Assessment Questions:

1. Which of the following conditions are kidney transplant recipients at increased risk of developing?

- A. Hyperthyroidism
- B. Venous thromboembolism
- C. Atrial flutter
- D. Obesity

What CYP enzymes are direct-acting anticoagulants (DOACs) a substrate of?

- A. CYP3A4
- B. CYP1A2
- C. CYP2C9
- D. CYP2D6

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-550-L01-P

Evaluation of levetiracetam loading dose in adult patients with benzodiazepine-refractory status epilepticus

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Purpose:

Status epilepticus (SE) is a neurologic emergency defined as continued seizure activity greater than five minutes or recurrent seizure activity without return to baseline. Benzodiazepine-refractory SE is continuous seizure activity despite treatment with a benzodiazepine. Treatment for benzodiazepine-refractory SE includes levetiracetam with loading doses ranging from 20 mg/kg to 60 mg/kg up to a maximum dose of 4,500 mg. While levetiracetam has minimal adverse effects, there have been a lack of studies directly comparing the safety and efficacy of various loading doses of levetiracetam. The purpose of this study was to evaluate three loading doses of levetiracetam in the setting of benzodiazepine-refractory SE.

Methods:

This was a single center, retrospective cohort study of adult patients with benzodiazepine-refractory SE who were treated with levetiracetam from April 1, 2016, to August 31, 2023. Patients with documented hypersensitivity to levetiracetam, were pregnant or incarcerated, presented post cardiac arrest, had hyper/hypoglycemia or hyper/hyponatremia identified as the likely cause of SE, and patients who received an alternative antiepileptic drug (AED) prior to levetiracetam were excluded. Patients were divided into three arms based on loading dose of levetiracetam received (20 mg/kg, 21-39 mg/kg or ≥40 mg/kg). The primary endpoint was the rate of seizure termination as defined by lack of need for an additional AED within 60 minutes following levetiracetam administration. Secondary outcomes included the rate of intubation and recurrent seizure activity within 60 minutes to 24 hours post seizure termination as defined by positive EEG results or need for an additional AED. Subgroup analyses were performed to assess the influence of adequate loading doses of benzodiazepines, outpatient levetiracetam use and concomitant use of midazolam or propofol for sedation on seizure termination.

Results/Conclusions:

Data analysis has been completed. Results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define status epilepticus and discuss first line agents used for treatment.

Review current guideline recommendations and literature regarding loading doses of levetiracetam for status epilepticus.

Self Assessment Questions:

Which of the following is the correct definition of status epilepticus?

- A. Continued seizure activity greater than five minutes
- B. Recurrent seizure activity without return to baseline
- C. Continued seizure activity greater than five minutes or recurrent seizure activity without return to baseline
- D. Continued seizure activity greater than ten minutes or recurrent seizure activity without return to baseline

What is the maximum recommended loading dose of levetiracetam in status epilepticus?

- A. 3,000 mg
- B. 4,500 mg
- C. 5,000 mg
- D. 3,500 mg

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-700-L01-P

Evaluating the Risk of Treatment Failure for Purulent Skin and Soft Tissue Infections in Obesity

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Background: Skin and soft tissue infections (SSTIs) are among the most prevalent infections diagnosed in community settings, with most cases treated outpatient with oral antibiotics. Obesity may increase the risk of contracting an SSTI and place patients at greater risk of treatment failure. The lack of antimicrobial dose adjustments in obesity may also play a role in poor clinical outcomes in this population. Treatment outcomes may be a result of altered pharmacokinetic properties in obesity, such as an increased volume of distribution and renal clearance. While obesity is a significant risk factor for failure in obese patients with SSTIs, additional risk factors have yet to be identified in this population.

Purpose: The primary objective of this analysis is to assess risk factors for treatment failure in obese patients with purulent SSTIs treated with oral antibiotics in the outpatient setting within Trinity Health Michigan.

Methods: This is a retrospective, multicenter cohort study reviewing eligible patients who received antibiotic treatment for purulent SSTIs between February 1, 2020, and August 31, 2023, across Trinity Health Michigan locations. Patients 18 years or older with a body mass index (BMI) of $> 30 \text{ kg/m}^2$ and creatinine clearance $> 30 \text{ mL/min}$ who received at least a 5-day course of oral antibiotics for purulent SSTIs were included. Key exclusion criteria include chronic infections, prior antibiotic treatment within the past 30 days of presentation, and those requiring hospital admission. Nominal variables will be analyzed with chi-square or Fisher's exact tests and interval data with student's t-test or Mann Whitney U tests, as appropriate. With a goal of 200 patients included, logistic regression will be performed for variables that met a $p < 0.2$ in the bivariate analysis.

Results: Data collection and analysis are currently in progress.

Conclusions: To be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify common pathogens of skin and soft tissue infections and their empiric treatments.

Describe proposed pharmacokinetic changes in obesity and how they may relate to antimicrobial dosing.

Self Assessment Questions:

A patient presents to the emergency department with an abscess requiring antibiotic therapy. They weigh 115 kg with a BMI of 37 kg/m^2 and a creatinine clearance of 80 mL/min . Which agent would be the most appropriate empiric therapy?

- A. Penicillin VK 500 mg every 8 hours for 5 days
- B. Linezolid 600 mg every 12 hours for 5 days
- C. Cephalexin 500 mg every 12 hours for 5 days
- D. Ciprofloxacin 750 mg every 12 hours for 5 days

Which of the following best describes the pharmacokinetic changes seen in obesity?

- A. Decreased absorption
- B. Increased hepatic clearance
- C. Decreased renal clearance
- D. Increased volume of distribution

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-646-L01-P

Retrospective Study on the Effectiveness of an Institution Specific Patient Risk Stratification Tool for Scheduling of Medicare Annual Wellness Visits with a Pharmacist

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Purpose: As the population of the U.S. ages, more patients become eligible for Medicare due to being age greater than 65 years. To date, no published validated tool exists to determine which patients would benefit the most from having their Medicare Annual Wellness Visit (AWV) conducted by a pharmacist over a different provider type. The primary objective of this study compares rates of "high-priority" patients seen by a pharmacist for their Medicare AWV before and after implementation of an institutional risk stratification tool used during Medicare AWV scheduling.

Methods: This IRB approved retrospective chart review was conducted on Medicare AWV patients and consists of approximately 200 patients seen by Community Health Network pharmacists from 01/01/2023-12/31/2023 for their Medicare AWV. Patients included in the study are adults with Medicare. Patients who were pregnant, incarcerated, or not insured by Medicare were excluded. Patients were deemed "high-priority" for pharmacist lead Medicare AWVs according to the institution specific tool criteria. This "high-priority" classification factors in comorbidities, institution deemed "high-risk" medications, and quantity of prescription medications on a patient's electronic health record medication list. Secondary efficacy outcomes include the number and types of medication interventions completed during the visits, care gaps closed, vaccines administered, and coordination of care interventions (referrals placed, visits scheduled, etc.).

Results: Preliminary results demonstrate an increased number of institutionally defined "high-priority" patients seen by a pharmacist for their Medicare AWV after implementation of the institution specific patient risk stratification tool for scheduling of Medicare AWVs with a pharmacist.

Conclusion: Implementation of a patient specific risk stratification tool is effective in identifying "high-priority" patients who should have their Medicare AWV completed by a pharmacist.

Learning Objectives:

Describe the criteria, as laid forth by Medicare, that allows for a pharmacist-led Medicare Annual Wellness Visit.

Explain the characteristics that constitute a "high-priority" designation for a patient to be seen by pharmacist for their Medicare Annual Wellness Visit.

Self Assessment Questions:

Pharmacists may lead which of the following types of Medicare Wellness visits:

- A. Initial visits, a.k.a. Welcome to Medicare visits
- B. In-person Medicare Annual Wellness Visits
- C. Virtual Medicare Annual Wellness Visits
- D. Both B. and C.

Which of the following is an example of a Care Gap a pharmacist may close during a Medicare Annual Wellness Visit?

- A. Ordering an overdue colonoscopy
- B. Ordering an overdue mammogram
- C. Ordering a cardiac stress test

D. Both A. and B.

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-842-L99-P

Evaluation of insulin/dextrose management for the treatment of hypertriglyceridemia-induced acute pancreatitis

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Hypertriglyceridemia-induced acute pancreatitis (HTG-AP) is a disease with relatively infrequent occurrence generally characterized by triglyceride levels greater than 500 mcg/mL causing acute pancreatitis. The treatment involves the use of fluids and insulin therapy to lower the triglycerides; however, there are no guidelines regarding the insulin infusion rate or other therapies, such as dextrose. This study's objective was to evaluate the efficacy and safety of insulin and dextrose for inpatient treatment of HTG-AP.

This was a multicenter, retrospective review of adult patients admitted for the management of hypertriglyceridemia-induced acute pancreatitis across two health systems in Indiana. Following approval from Indiana University's (IU) institutional review board, a list of patients with a diagnosis of HTG-AP who received insulin or dextrose therapy between January 1, 2017 and May 31, 2023 was created. Patients were excluded if they received an insulin infusion for a different diagnosis, such as diabetic ketoacidosis. The primary efficacy endpoint was the time to resolution of hypertriglyceridemia, and the primary safety endpoint was the rate of hypoglycemia (blood glucose < 50 mg/dL). Secondary endpoints included duration of insulin infusion, rate and concentration of dextrose therapy, length of stay, and readmission within 30 days. Once all endpoints were captured, data was analyzed using measures of central tendency. This study described inpatient treatment practices prior to standardization with a health system protocol for management of HTG-AP. The findings of this study may be used in future research to evaluate pre- and post-protocol standardization for HTG-AP at IU Health or Eskenazi Health hospitals. A random sample of approximately 800 encounters were evaluated for inclusion. Results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Define diagnostic criteria of hypertriglyceridemia-induced acute pancreatitis.

Identify pertinent lab values to monitor during hypertriglyceridemia-induced acute pancreatitis treatment and critical values associated with them.

Self Assessment Questions:

According to literature consensus, hypertriglyceridemia is considered resolved when serum triglycerides are less than what value?

- A. 600 mcg/mL
- B. 550 mcg/mL
- C. 500 mcg/mL
- D. 450 mcg/mL

What blood glucose value is defined as severe hypoglycemia?

- A. ≤ 40 mcg/mL
- B. ≤ 50 mcg/mL
- C. ≤ 60 mcg/mL
- D. ≤ 70 mcg/mL

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-795-L05-P

Intravenous Only Therapy Versus Oral Step-Down Therapy in Simple Source Gram Positive Bacteremia

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Statement of Purpose: To compare the efficacy of oral step-down therapy in gram positive bacteremia to the standard of care.

Methods: This is a multicenter, retrospective cohort study that aims to compare clinical failure in patients that received intravenous (IV) only therapy compared to IV with oral step-down therapy in simple source gram positive bacteremia. Simple source gram positive bacteremia is defined in this study as a bacteremia known to be caused by the following sources: genitourinary, cellulitis or wound, pneumonia, gastrointestinal with source control, or oropharyngeal that clears within 72hrs of therapy initiation. To be included in this study the patient must have been given antibiotics within 48hrs of positive culture and transitioned to oral antibiotics within 5 days if in the step-down group. Exclusion criteria includes patients diagnosed with a complicated infection, polymicrobial or contaminated blood culture, who passed away within 5 days of therapy initiation, and use of incorrect oral step-down agent. The primary endpoint is clinical failure as a composite of the following: 30-day all-cause mortality and readmission due to infection with the same organism or due to reinfection of the original source with same organism. Secondary outcomes will include length of hospital stay, 90-day all-cause mortality and readmission, adverse drug events, and Clostridioides difficile infection.

Results: Our preliminary data shows that there is evidence that clinical failure is not significantly increased in the treatment group compared to the control group. The primary endpoint of this study is a composite of death within 30 days which was 0 (0%) in both groups and readmission within 30 days which was 5 (20%) in the IV to PO group vs 4 (20%) in the IV only group. Finalized results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference in April 2024.

Learning Objectives:

Discuss the evidence behind using oral step-down therapy in simple source gram positive bacteremia

Define simple source bacteremia as stated by our study

Self Assessment Questions:

What is the concern about using oral agents in bacteremia?

- A. The concentration of medication will be lower due to decreased bioavailability
- B. Oral drugs are not able to penetrate into the blood
- C. No type of bacteremia has ever been treated with oral agents
- D. The bioavailability of the medication is increased in oral agents

Which of the following sources would have been considered a complicated bacteremia during this study?

- A. Cellulitis
- B. Oropharyngeal
- C. Osteomyelitis
- D. Genitourinary

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-605-L01-P

Comparison of In-Patient and Hybrid Treatment of Cystic Fibrosis (CF) Pulmonary Exacerbations at a Pediatric CF Center

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Purpose. Cystic Fibrosis (CF) is a complex, genetic disorder resulting in thick mucus buildup in the lungs, increased risk of respiratory infections, and lung function decline. Despite chronic treatment modalities, some patients will experience acute pulmonary exacerbations resulting in admissions at least once per year.

Exacerbations are managed by systemic antibiotics for 10 to 21 days, with IV antibiotics often utilized for admitted patients. Patients may elect to utilize hybrid therapy, where IV antibiotics are initiated during admission and completed at home. The objective of this study is to compare treatment outcomes between in-patient and hybrid management of CF pulmonary exacerbations.

Methods. This is a retrospective chart review of patients with CF followed by our Pediatric CF Center, who are admitted for an acute pulmonary exacerbation and treated with at least one IV antibiotic, between 11/1/2019 and 10/31/2023. Patients receiving IV antibiotics for a different indication, with CFTR-related metabolic syndrome, or received an organ transplant were excluded. Our primary outcome is time to next exacerbation represented by time between end of index antibiotic course and start of next antibiotic course prescribed for pulmonary exacerbation. Secondary outcomes include change in lung function from time of exacerbation onset to completion of antibiotic course, occurrence and timing of return to 90% or greater of baseline lung function (FEV1 percent predicted). We will also evaluate patient factors as possible predictors in use of full in-patient versus hybrid management and clinical outcomes. Data will be collected from our electronic medical record (Epic) and stored in a REDCap database. Admissions will be grouped as either in-patient or hybrid management. Data will be analyzed using descriptive statistics, Cox Proportional Hazards survival analysis, as well as univariable and multivariable linear and logistic regressions.

Results and conclusions are currently in process and will be presented at the meeting.

Learning Objectives:

Describe the role of IV antibiotic therapy in the treatment of cystic fibrosis (CF) acute pulmonary exacerbations

Discuss the available evidence comparing treatment of cystic fibrosis (CF) acute pulmonary exacerbations with IV antibiotics in the inpatient setting versus the Admission-to-Home (hybrid) setting

Self Assessment Questions:

In addition to increased frequency of airway clearance, which is the most common approach to management of cystic fibrosis (CF) acute pulmonary exacerbations?

- A. Increased frequency of nebulized hypertonic saline
- B. Increased frequency of nebulized dornase alfa
- C. Addition of systemic antibiotic(s)
- D. Addition of a CFTR modulator

Which is TRUE regarding treatment setting in the management of cystic fibrosis (CF) acute pulmonary exacerbations with IV antibiotics?

- A. IV antibiotics should only be administered in the inpatient setting
- B. Use of hybrid therapy has not been studied in children
- C. Hybrid approach is more costly compared to admission alone
- D. Available data shows mixed outcomes when comparing inpatient setting vs hybrid approach

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-534-L01-P

Outcomes of Concentrated Furosemide Infusion on Atrial Fibrillation Rate Post-Kidney Transplant: a Single Center Experience

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The purpose of the study is to assess the incidence of post-operative atrial fibrillation (POAF) amongst kidney transplant recipients (KTR) receiving a dilute (250mg/250mL) vs concentrated (500mg/50mL) furosemide infusion.

Subjects were included if they were adult KTR between 6/1/2022-5/30/2023 and received a continuous furosemide infusion during the initial post-operative admission. Subjects who received a multi-organ transplant, were pregnant, or incarcerated were excluded. A historical cohort from 1/1/2013-12/31/2017 utilizing dilute furosemide infusions served as the control arm. The primary outcome assessed the incidence of POAF during index admission. Secondary outcomes included graft functionality, total furosemide exposure, urine output, and total ins and outs. Graft function was defined as slow (creatinine decreasing <50% in the first week), delayed (need for hemodialysis within the first week), or immediate. Safety outcomes measured the replacement of potassium, magnesium, and calcium.

The incidence of POAF was 9.2% (7/76) vs 12.7% (37/307) in the concentrated and dilute groups respectively (p=0.402). Patients received more furosemide in the concentrated group (2.3 g vs 1.4 g, p<0.001) but had less total daily urine output (4.2 L vs 5.7 L, p<0.001). Patients receiving dilute furosemide infusions were more likely to receive magnesium replacement (p<0.001). Slow graft function (SGF) occurred more in the concentrated group (25% vs 8.8%, p<0.001).

Concentrated and dilute furosemide infusions had similar incidence of POAF in KTR. This may allude to a potentially limited effect volume status has on the incidence of POAF. Patients receiving concentrated infusions were exposed to more furosemide but had less urine output which is likely due to the higher rate of SGF. The ideal dose of furosemide for KTR remains to be defined.

Learning Objectives:

Recognize the target mechanism, efficacy, and safety of furosemide in the use of preventing post-operative atrial fibrillation in kidney transplant recipients.

Recognize risk factors that place kidney transplant recipients at risk for the development of post-operative atrial fibrillation.

Self Assessment Questions:

Which of the following is an underlying mechanism of post-operative atrial fibrillation that is targeted by furosemide?

- A. Fluid overload
- B. Left ventricular hypertrophy
- C. Pro-inflammatory processes
- D. Sympathetic nervous system activation

Which of the following is a risk factor for developing post-operative atrial fibrillation after kidney transplantation?

- A. Baseline anti-arrhythmic use
- B. Low BMI
- C. Pre-transplant history of atrial fibrillation
- D. Single organ transplant

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-679-L01-P

Diabetic Ketoacidosis (DKA) Assessment via Pre- and Post-Order Set Revision in a Community Hospital

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Statement of Purpose: Because the American Diabetes Association (ADA) Guidelines for Diabetic Ketoacidosis (DKA) were written in 2009, there is uncertainty with the best standard of care for patients with DKA. Furthermore, in Europe, DKA guidelines vary from the American guidelines with definitions of DKA and how to treat the underlying acidosis. With outdated and conflicting guidelines for an urgent and complex condition, our institution has seen variations in DKA management between our providers despite a DKA order set and insulin drip management software.

Statement of Methods: Patients admitted on May 2023-July 2023 who received insulin drip to treat DKA, were 18 years or older, and diagnosed with type 1 or type 2 diabetes mellitus will be initially screened for a retrospective pre- order set revision investigation. The changes to the order set are as follows: clarifying nursing admin instructions, requiring laboratory monitoring every 4-hours, and shortening the order set. The primary outcome will be length of DKA stay. Patients are also assessed against the standards of DKA treatment in accordance with the ADA (secondary outcomes) which includes proper insulin drip management, frequency of laboratory monitoring, and appropriate transition to subcutaneous insulin.

Summary of (preliminary) results to support conclusion: Post-order set revision data will be analyzed and compared to pre-order set revision patients.

Conclusions reached: All results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference. Further education and modifications to the order set are warranted to standardize the level of care.

Learning Objectives:

Define DKA resolution to be able to determine an appropriate transition from the insulin drip to a subcutaneous insulin regimen.

Memorize the frequency of which DKA laboratory parameters should be monitored.

Self Assessment Questions:

Select the appropriate definition of DKA resolution according to the 2009 ADA Guidelines:

- A. Blood glucose >200 and 2 of the following: venous pH <7.3, serum bicarbonate ≤ 15 mEq/L, and anion gap ≥ 12 mEq/L
- B. Blood glucose <250 and all the following: venous pH >7.3, serum bicarbonate ≥ 15 mEq/L, and anion gap ≤ 12 mEq/L
- C. Blood glucose <200 and 2 of the following: venous pH >7.3, serum bicarbonate ≤ 15 mEq/L, and anion gap ≥ 12 mEq/L
- D. Blood glucose <200 and all of the following: venous pH >7.3, serum bicarbonate ≥ 15 mEq/L, and anion gap < 12 mEq/L

How often should laboratory parameters be ordered and checked for DKA patients?

- A. Every hour
- B. Every 2-4 hours
- C. Every 6-8 hours
- D. Every 12-24 hours

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-541-L01-P

Post Anesthesia Care Unit (PACU) Length of Stay with Sugammadex versus Neostigmine and Glycopyrrolate in Patients recovering from Intra-abdominal Surgery

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Purpose: Sugammadex has been proven to be effective at producing rapid reversal of moderate or deep neuromuscular blockade, however, there are some disadvantages to its use such as drug interactions and a moderately higher cost than other agents. Neostigmine and glycopyrrolate have also been used to reverse neuromuscular blockade. This study aims to determine whether sugammadex or the traditional combination of neostigmine and glycopyrrolate correlates with a decreased length of stay in the Post-Anesthesia Care Unit (PACU). Methods: The institutional review board approved this retrospective study. This study will include patients at least 18 years of age who are admitted to the PACU for recovery from intra-abdominal surgery after receiving either sugammadex or neostigmine and glycopyrrolate for neuromuscular blockade reversal. Intra-abdominal procedures will include: appendectomy, hysterectomy, cholecystectomy, nephrectomy, gastrostomy tube placement/removal, colectomy, small bowel resection, gallbladder surgery, and hernia surgery. Approximately 200 patients admitted to the Memorial Hospital of South Bend PACU from August 1, 2022 through August 1, 2023 will be selected for analysis. The following data points will be collected: age, sex, race, comorbidities, BMI, date and time of PACU admission and discharge, procedure being performed, operative time, type of anesthesia used, vital signs, medications administered in the operation room and PACU, and any reported adverse effects during PACU stay. The primary endpoint of the study is the time to discharge from PACU in patients who received either sugammadex or neostigmine and glycopyrrolate for neuromuscular blockade reversal. Secondary endpoints of the study will include incidence of medication related adverse effects while in the PACU and time from reversal agent administration to PACU discharge. Adverse effects will specifically evaluate incidence of bradycardia or postoperative nausea and vomiting requiring pharmacologic intervention. Results/Conclusions: Results and conclusions of this study will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall the pharmacokinetic parameters of Sugammadex

Explain the purpose of the use of glycopyrrolate in conjunction with neostigmine

Self Assessment Questions:

What is the onset of action for Sugammadex?

- A. 17 minutes
- B. 30 minutes
- C. 3 minutes
- D. 42 minutes

For what purpose is glycopyrrolate given in conjunction with neostigmine?

- A. Reduce hyperthermia
- B. Reduce bradycardia
- C. Increase respirations
- D. Increase gastrointestinal motility

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-564-L01-P

Impact of Initial Benzodiazepine Dosing on the Escalation of Antiepileptic Medication Therapy for the Termination of Pediatric Status Epilepticus

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Purpose: Status epilepticus is defined as a seizure that lasts beyond 5 minutes or recurrent seizure activity without recovery between seizures that prompts the acute use of anticonvulsant therapy. Clinical guidelines emphasize the need for rapid control of status epilepticus and prevention of recurrent seizures. Several reports show that underdosing of benzodiazepines, the initial treatment for status epilepticus, may be associated with not only the inability to abort the seizure, but also a need to escalate cardiopulmonary support because of repeated doses and ongoing seizure activity.

Providers may shy away from higher dosing for fear of somnolence, which could lead to respiratory depression with the need for intubation. While respiratory depression is the most common and clinically significant adverse event associated with benzodiazepine treatment, studies have shown that the rate of respiratory depression in patients with status epilepticus treated with benzodiazepines is lower compared to those treated with placebo. The purpose of this retrospective chart review is to determine if administering lower than guideline recommended benzodiazepine doses increases the need to escalate to additional antiepileptic medications to terminate seizures for pediatric status epilepticus.

Methods: All patients between 2 months and 18 years old who received intravenous diazepam, intravenous lorazepam, intranasal midazolam, or intramuscular midazolam at Michigan Medicine for the treatment of status epilepticus from January 1, 2016 to June 1, 2023 will be included in this study. Exclusion criteria are patients who were pregnant, incarcerated, or administered any anti-epileptic medication prior to hospital presentation for the purpose of terminating a seizure (this does not include maintenance anti-epileptic therapy). ICD-10 codes will be used to identify patients who had a diagnosis of status epilepticus during hospitalization and received benzodiazepines.

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

Learning Objectives:

Describe current literature and recommended guidelines supporting the use of benzodiazepines as first line therapy in status epilepticus.

Outline the results of benzodiazepine dosing and how it relates to therapy escalation.

Self Assessment Questions:

Fill in the blank: Status Epilepticus is defined as a seizure that lasts beyond ____ minutes or recurrent seizure activity without recovery between seizures that prompts the acute use of anticonvulsant therapy.

- A. 5
- B. 15
- C. 30
- D. 60

Which of the following correctly lists first line therapy options for status epilepticus?

- A. Administer IV lorazepam, IV valproic acid, OR propofol
- B. Administer IV fosphenytoin, IV valproic acid, OR IV levetiracetam
- C. Administer IM midazolam, IV lorazepam, OR IV diazepam
- D. Administer IN midazolam, IV phenobarbital, OR PO levetiracetam

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-689-L01-P

Evaluating Institutional Lipid-Lowering Intensification in Patients Post Atherosclerotic Cardiovascular Disease Revascularization

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Purpose: There is a well-established correlation between low-density lipoprotein-cholesterol (LDL-C) and atherosclerotic cardiovascular disease (ASCVD). Cholesterol management is a proven strategy to decrease rates of ASCVD events, however previous data from the Veterans Health Administration shows that 58% of patients still had an LDL-C > 70 mg/dL one year after coronary revascularization but less than half received intensification of their lipid lowering therapy (LLT). Rates of lipid evaluation and changes in LLT in patients post ASCVD revascularization at University of Illinois Health & Health Sciences System are unknown. We seek to identify the achievement of LDL-C < 70mg/dL at 15 months post ASCVD revascularization. Identifying institutional practices will assist in improving LDL-C goal achievement.

Methods: This is a retrospective cohort study evaluating the LLT intensification in patients after a coronary, cerebral, or peripheral vascular revascularization between July 1, 2021 – July 1, 2022. Essential baseline information to be collected includes lipid panel and LLT, index event, revascularization procedure and date. Follow-up information includes lipid panel(s) post discharge, final LLT at 15 months, and number of outpatient visits with primary care or treating service within 15 months. Secondary outcomes include percentage of patients with follow-up lipid panel, time to follow-up lipid panel, LLT intensifications after ASCVD revascularization, and achievement of LDL-C < 70 mg/dL at 15 months post ASCVD revascularization in patients with vs. without lipid panel within 3 months of revascularization.

Preliminary Results: Six hundred and forty-six patients were identified by procedure lists within the study timeframe and 203 met inclusion criteria. Primary reasons for exclusion included baseline LDL-C < 70 mg/dL, end-stage renal disease, or no follow-up care within 6 months of ASCVD revascularization. Demographic characteristics for these patients include the following, average age 65, 64% male, 47% Black or African American, 25% White, and 33% Hispanic.

Learning Objectives:

Describe guideline directed process for lipid lowering therapy intensification.

Review LDL goals for secondary ASCVD prevention according to patient specific characteristics.

Self Assessment Questions:

A 62-year-old male presents to clinic for medication management. Past medical history includes type 2 diabetes, hypertension, hyperlipidemia, NSTEMI (09/30/2023), and a history of smoking (quit 3 years ago). During the hospitalization for NSTEMI, the patient underwent a left heart catheterization and percutaneous coronary intervention. The patient was also initiated on atorvastatin 80mg once daily at that time. The patient reports no adverse effects at this time. What is the most appropriate next step for lipid lowering therapy management given the most recent lab values below? Lipid panel 09/30/2023: cholesterol 296, triglycerides 378, HDL 38, LDL 182 Lipid panel 12/22/2023: cholesterol 170, triglycerides 177, HDL 47, LDL 88

- A. Continue current therapy, atorvastatin 80mg once daily
- B. Switch to rosuvastatin 40mg once daily
- C. Continue current therapy, atorvastatin 80mg once daily, and add on ezetimibe 10mg once daily
- D. Continue current therapy, atorvastatin 80mg once daily, and add a PCSK-9 inhibitor

According to the 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APHA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines when is a follow-up lipid panel most appropriate after escalation of lipid lowering therapy? What is the goal LDL-C for a high- risk patient?

- A. 1 month, LDL-C < 70 mg/dL
- B. 6 months, LDL-C < 70 mg/dL
- C. 6 months, LDL-C < 55 mg/dL
- D. 12 months, LDL-C < 55 mg/dL

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-506-L01-P

New Onset Atrial Fibrillation Outcomes in Patients with Sepsis or Septic Shock in the Medical/Surgical ICU

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Atrial fibrillation is the most common cardiac arrhythmia and is a relatively common complication for many patients admitted to the ICU. Recent guidance released by the AHA/ACC has put an emphasis on the management of new onset atrial fibrillation (NOAF) while in the hospital with a focus on long term management and follow up. The purpose of this project is to determine if UW-Health ICUs require modifications to their treatment plans for patients with NOAF. This was a single center, retrospective matched cohort study from January 2022 – January 2024. Patients were included if they were diagnosed with sepsis or septic shock while in the ICU with no history of atrial fibrillation. Patients were then matched with other patients admitted to the ICU with sepsis or septic shock based on age, sex, and APACHE IV score. Ten patients who developed NOAF were successfully matched in the preliminary analysis. Of the 10 patients who developed NOAF in the ICU, 8 out of the 10 patients were discharged from the ICU on any type of atrial fibrillation therapy (ie anticoagulation, rate control, and rhythm control). The NOAF group had a longer length of ICU stay compared to the matched cohort (4.7 vs 4.1 days; p=0.74). All cause mortality (2 vs 1 death; p=0.27), incidence of stroke or TIA (1 vs 0 events; p=0.16) and readmission to ICU at 90 days (3 vs 1 readmissions; p=0.14) were all higher in the NOAF group compared to the matched cohort. Prompt recognition and treatment of atrial fibrillation in the ICU may be necessary to improve patient outcomes based the new guidance from the AHA/ACC and preliminary results from this study.

Learning Objectives:

Outline the recommendations from the ACC/AHA regarding how to manage a patient's anticoagulation who develop new onset atrial fibrillation in the hospital

Describe the risk factors that patients in the ICU have for developing new onset atrial fibrillation

Self Assessment Questions:

Based on the AHA/ACC guidance report, when should a patient be anticoagulated if they develop new onset atrial fibrillation while in the hospital?

- A. All hospitalized patients with NOAF should be anticoagulated
- B. Hospitalized patients with NOAF should not be anticoagulated unless they have another indication
- C. Only hospitalized NOAF patients with a previous stroke should be anticoagulated
- D. The Decision to anticoagulate hospitalized NOAF patients should be based on an individual patient's risk for bleeding and stroke

2. Which of the following is a risk factor for developing new onset atrial fibrillation in the ICU?

- A. sepsis/infection
- B. Avoiding vasopressors
- C. Short procedure/operative times
- D. Euvolemic fluid status

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-619-L01-P

Arthralgia rates and treatment among patients receiving bevacizumab-awwb versus bevacizumab

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INTRODUCTION

Bevacizumab is a vascular endothelial growth factor (VEGF) inhibitor used in the treatment of multiple cancer types. It was approved under the brand name Avastin® in 2004 as the first anti-angiogenesis targeted therapy. In 2017, the U.S. Food and Drug Administration (FDA) approved a biosimilar product to Avastin® known as MVASI® (bevacizumab-awwb). The biosimilar product mirrors bevacizumab in approved indications other than lack of ability to use as adjuvant therapy in colon cancer. Although the package inserts of each medication do not include arthralgia, oncology providers within Froedtert and the Medical College of Wisconsin system have noted an increasing number of patients reporting arthralgia with the bevacizumab-awwb product after a formulary change in 2019. This quality improvement project is designed to compare and quantify the incidence of arthralgia with bevacizumab versus bevacizumab-awwb and describe how our institution manages the adverse effect.

METHODS

Retrospective chart review was completed for patients who received either bevacizumab or bevacizumab-awwb at the Froedtert Cancer Center Day Hospital between July 1, 2017 and March 1, 2023. The primary outcome is provider reported rate of arthralgias with bevacizumab versus bevacizumab-awwb. Secondary outcomes include independent rates of arthralgia, rate of grade 3 arthralgias, prescription and over-the-counter supportive care medications prescribed, non-pharmacologic management strategies, and change of therapy, defined as switch to other formulation or discontinuation of bevacizumab.

RESULTS AND CONCLUSIONS

A total of 502 patients are included in this study, 216 in the bevacizumab cohort and 286 in the bevacizumab-awwb cohort. 79% power will detect 12% difference in arthralgia incidence between the two groups. The goal for conclusions within the study is to establish and quantify a difference in arthralgia incidence between the biosimilar and reference products to provide future direction for formulary use. Through secondary outcomes we aim to summarize current management strategies for arthralgias.

Learning Objectives:

Describe the differences between the interchange of biologic agents in comparison to small molecule drugs and assess how this interchange may have impacted patients receiving bevacizumab versus bevacizumab-awwb within data.

Discuss non-pharmacological management strategies for arthralgia adverse effects in oncology patients and reflect on general system guidelines for management of adverse effects in the oncology population.

Self Assessment Questions:

Which FDA resource lists FDA-licensed biological products including biosimilar information?

- A. Red Book
- B. Yellow Book
- C. Purple Book
- D. Orange Book

What are the current NCCN recommendations for management of arthralgia in oncology patients?

- A. Alternating NSAIDs and acetaminophen
- B. Regional analgesia
- C. Physical therapy
- D. None of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-878-L01-P

Closing the Gap on Medication Access Inequities: Pharmacist-Driven Contraception Prescribing

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In the United States, we find ourselves facing a public health crisis: limited access to contraception. Over 19 million patients in America live in a contraception desert, areas lacking enough health centers offering comprehensive contraceptive options based on the county's population. As a result of scarcity and other variables, the United States exhibits high rates of unintended pregnancy. The U.S. Department of Health and Human Services created a national goal within Healthy People 2030 focusing on reducing unintended pregnancy by increasing use of birth control and family planning services. Pharmacists, with their medication expertise and critical community access, can play a pivotal role in providing this essential care. However, not every state legislature grants pharmacists contraceptive prescriptive authority. In April 2023, Indiana passed House Bill 1568, allowing pharmacists to prescribe self-administered contraception to self-identified females, aged 18 and older. Despite permissive legislation in various states, uptake has been limited and many aren't utilizing this opportunity to address reproductive inequity. Eskenazi Health, an academic medical center, and safety-net health system in Indianapolis, seeks to improve access to contraception with a new pharmacist-driven contraception protocol.

Due to limited uptake, a literature gap exists assessing pharmacists' comfortability and knowledge regarding the roll-out and utilization of such a service. The study intends to evaluate pharmacists' comfort level and knowledge before and after formal education on pharmacist-driven contraceptive care, utilizing a retrospective mixed-method approach combining qualitative and quantitative assessment. The intervention involved completion of a formal education program and implementation of a pharmacist-driven protocol at all 9 of our retail pharmacies. Any pharmacist at Eskenazi Health who completed the formal education program between November and December 2023 was included. The results seek to fill identified gaps in literature, positioning Eskenazi Health as a vital contributor to addressing health disparities in metropolitan Indianapolis.

Learning Objectives:

Identify gaps in current literature regarding pharmacist contraceptive prescribing programs.

Discuss the process of implementation and evaluation of a pharmacist-driven contraceptive prescribing protocol, via a state standing order.

Self Assessment Questions:

Which of the following is correct?

- A. There is sufficient literature regarding the impact on "patient reach" with pharmacist-driven contraceptive prescribing programs.
- B. There is insufficient literature regarding pharmacist comfort and knowledge regarding contraceptive prescriptive authority changes.
- C. Access to contraception is equitable, as evidenced by literature.
- D. Literature illustrates it is harder to obtain contraception in the community pharmacy setting.

According to the Indiana standing order, which of the following is correct?

- A. Pharmacists can prescribe self-administered contraception to those aged 18 years and older.
- B. Pharmacists can prescribe contraception for individuals regardless of if pregnancy has been ruled out.
- C. Pharmacists do not need to assess blood pressure upon patient presentation, prior to prescribing contraception.
- D. Pharmacists can prescribe the IUD, as long as the patient is aged 18 years or older.

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-891-L04-P

PICO Utilization in Great Lakes Pharmacy Residency Conference Abstracts

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Purpose: Although pharmacy resident participation in research is strongly encouraged by the American Society of Health-System Pharmacists (ASHP), there are gaps in implementation. Current literature supports national publication rates being low, but the analysis of research design has not been evaluated. The PICO (population, intervention, comparison, outcome) framework is an evidence-based method for developing sound research questions. The primary objective of this study is to determine the percentage of pharmacy resident research abstracts that include all four components of PICO.

Methods: This was a retrospective cohort analysis of resident research project abstracts accepted to the Great Lakes Pharmacy Residency Conference (GLPRC) between 2017-2019. The information included in abstracts was requested by residency conference coordinators such as abstract title, abstract, program type, program year, institution name, and resident name. Each abstract was analyzed for inclusion of PICO components. In order to meet all four criteria, the abstract must have listed a measurable outcome. After PICO analysis, the abstracts were stratified based on program year. Each sub-group was categorized based on the number of PICO components included and the frequency of omission for each component.

Results/Conclusions: A total of 1829 abstracts were included in analysis. All four PICO components were included in 59.6% of abstracts. Of the PGY1 abstracts (n=1388) analyzed, 60.4% included all four PICO components, compared to 56.9% of PGY2 abstracts (n=434). The most common component of PICO that was omitted in abstracts was a comparator. Out of 1829 abstracts, 36% did not include a comparator group, and this trend was similar across all program types. These results demonstrate that over 40% of research projects presented at GLPRC between 2017-2019 did not include all four evidence-based components that contribute to a quality study design, as demonstrated by abstract analysis.

Learning Objectives:

Describe the PICO framework and how it contributes to formulating a sound research question

Identify the rate of residency research projects that utilize the PICO format to create a study design

Self Assessment Questions:

Which example demonstrates a measurable outcome?

- A. Improved efficacy
- B. Difference in hospital length of stay
- C. Appropriate prescribing
- D. None of the above

Which component of PICO is most omitted in pharmacy residency research abstracts?

- A. Population
- B. Intervention
- C. Comparator
- D. Outcome

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-832-L99-P

Standardization of Allergenic Compounding Across a Health System

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Background & Purpose:

UW Health prepares allergenic compounds at two sites that use different ordering and compounding practices. Existing processes have unnecessary risk due to the need for transcription from paper orders and multiple documentation platforms. The allergenic compounds that can be ordered vary in concentrations and units of measure between the two sites. Due to the complex and non-standard nature of sterile allergenic compounding many workflows and databases are internally developed and maintained.

There is motivation in the system for standardization driven by the planned opening of a new clinic site at the end of 2024. The purpose of this project is to minimize risk through standardization of allergenic ordering and compounding practices across UW Health.

Methods:

Current ordering and compounding practices were defined during go-and-see experiences to measure variation and quantify risk between workflows at the two sites. Standardized workflows for compounding were developed with allergy stakeholders and were aided by the development of a documentation form in the electronic health record. Practice changes were then implemented piecewise as appropriate from December of 2023 and will continue through March of 2024. The impact of process standardization will be assessed through remaining variation between sites and the minimization of risk overall.

Outcomes:

The primary outcomes of the project are to assess the reduction of variation and elimination of high-risk steps in the allergenic ordering and compounding practices at UW Health. Results are anticipated for Spring of 2024.

Learning Objectives:

Recognize the current sterile allergenic compounding guidance from USP and AAAAI.

Recall challenges of integrating allergenic compounding documentation with the electronic health record.

Self Assessment Questions:

Which of the following practices follow USP and AAAAI guidance for sterile allergenic compounding?

- A. Product must be prepared in a sterile hood
- B. If products are compounded on a countertop, their refrigerated beyond use date is only 30 days
- C. Products may be compounded in either a sterile hood or on a countertop if it is only used for sterile processes
- D. None of the above

Which of the following is a challenge to consider when evaluating and changing allergenic ordering and compounding workflows?

- A. Accommodating professional and hospital billing
- B. Involvement of several professional groups (physicians, informatics, nursing, etc.)
- C. Product supply chain and availability
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-779-L07-P

Impact of Emergency Medicine Pharmacist Involvement on Compliance of Tranexamic Acid Administration in Trauma Patients in a Large Hospital System

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Hemorrhagic shock from trauma is responsible for approximately 30-40% of trauma-related deaths and can contribute to multiorgan failure. Early hemorrhage control and adequate blood product resuscitation are important for trauma-death prevention. Like traumas, surgeries can undergo the same level of stress, tissue injury, and hypoperfusion. For decades, tranexamic acid (TXA) has been utilized perioperatively to reduce blood loss and postoperative complications. Based on the surgical outcomes and significant findings of the CRASH II trial, several guidelines reference the use of TXA in traumatic injury events. In addition to the ongoing need for studies assessing compliance and utilization of TXA, there is sparse literature evaluating the rate of compliance with the presence of an emergency medicine (EM) pharmacist. While there is evidence supporting the impact of EM pharmacists on patient outcomes and cost-avoidance, there is a need to assess their impact on the care of critically ill, trauma patients. The purpose of this study was to assess if the rate of compliance of TXA administration in trauma patients within a large healthcare system "based on order panel instructions" was improved with an EM pharmacist present. This retrospective, multicenter, cohort study was conducted from January 1st, 2021, to January 1st, 2023, and included adults who presented with a traumatic injury to OSF Healthcare Saint Anthony Medical Center, OSF Healthcare Saint Francis Medical Center, or OSF St. Joseph Medical Center. Patients who received TXA intra-operatively, at a non-OSF hospital, or those who received non-intravenous TXA were excluded. The primary outcome was compliance rate of TXA administration when an EM pharmacist was present compared to when an EM pharmacist was not. A total of 221 patients were screened and roughly 90 patients were included. Analysis and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Explain the mechanism of tranexamic acid and its place in management during a trauma.

Recognize the primary literature and guidelines that support the use of tranexamic acid in trauma.

Self Assessment Questions:

What is the mechanism of tranexamic acid?

- A. Inhibits the activity of cyclooxygenase (COX)
- B. Inhibits plasminogen activation and fibrinolysis
- C. Enhances the activity of plasma protein antithrombin
- D. Reversibly binds to the thrombin

What was the intravenous tranexamic acid dosing regimen utilized in the CRASH II trial?

- A. 1g over 10 min
- B. 1g over 8 hrs
- C. 1g over 10 min, followed by 1g over 8 hrs
- D. 2g over 8 hrs, followed by 1g over 8 hrs

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-872-L01-P

Parenteral Nutrition for Critically Ill Patients: From Silos to Support Teams

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Purpose:

The American Society of Parenteral and Enteral Nutrition (ASPEN), the European Society for Clinical Nutrition and Metabolism (ESPEN), and the American College of Gastroenterology (ACG) have recently supported the implementation of nutrition support teams (NSTs) within hospitals. Physicians, dietitians, nurses, and pharmacists on NSTs engage in nutrition risk screening, creating patient-specific nutrition plans, providing education, and developing policies that reflect current guideline recommendations. They also collaborate to prevent, monitor, and/or resolve parenteral nutrition (PN) complications including electrolyte abnormalities, poor glycemic control, refeeding syndrome, and bloodstream infections. The purpose of this study was to evaluate the safety and efficacy of PN prescribed for critically ill patients at an institution with a multidisciplinary NST compared to an institution without one.

Methods:

This retrospective cohort study was approved by the Institutional Review Board. The primary objective was to evaluate the safety of PN electrolytes prescribed by determining the proportion of patients whom experienced an electrolyte abnormality (EA) within the first 72 hours of PN. EA was defined as two or more consecutive lab values for an electrolyte falling out of normal range. The study also had multiple secondary objectives: evaluate the efficacy of PN electrolytes prescribed by assessing supplementation patients required outside of PN, determine if PN macronutrients were within 10% of ASPEN guideline recommendations for critically ill patients, and describe potential PN-related adverse patient outcomes including hypo-/hyperglycemia, length of stay, and 30-day mortality. Adult patients were included if they were initiated on PN within the medical or surgical ICU. Patients were excluded if their ICU length of stay or PN duration was less than 72 hours or they required PN at home prior to ICU admission.

Results/Conclusion:

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

Learning Objectives:

Identify metabolic and mechanical complication of parenteral nutrition.

Describe the strengths and limitations of previously published literature on nutrition support teams.

Self Assessment Questions:

Which of the following parenteral nutrition complications is classified appropriately?

- A. Hyperglycemia – mechanical complication
- B. Refeeding syndrome – metabolic complication
- C. Bloodstream infection – mechanical complication
- D. Electrolyte abnormality – metabolic complication

2. Which of the following is true regarding current literature on nutrition support teams?

- A. The majority of studies published are randomized controlled trials
- B. The majority of studies assess the same primary outcomes
- C. The majority of studies had nutrition support teams without pharmacists
- D. The majority of studies assess ICU patients

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-565-L01-P

Appropriateness of blood culture ordering in non-hospital admitted patients presenting to the emergency department and the impact of a pharmacist-led education intervention

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Purpose: Overutilization of blood cultures in low-risk patients can lead to suboptimal patient care and unnecessary cost for the patient and health care system. A recent retrospective study demonstrated that blood culture contamination events were associated with a 79% increased cost of care resulting from longer hospital stays and unnecessary antimicrobial therapy. The purpose of this research is to assess appropriateness of blood cultures, identify issues leading to overutilization to develop targeted education, and measure the impact of pharmacist led intervention in non-hospital admitted patients presenting to the emergency department.

Methods: This research is a quality improvement study that includes a retrospective evaluation component with a pre and post intervention assessment. Eligible subjects will include adult patients from April 2023 to September 2023 who were discharged home from the emergency department after a blood culture was obtained. Blood culture data will include ordering provider type, ordering source, indication/suspected infection, and blood culture result. Patient data that will be collected includes baseline characteristics, chief complaint, vital signs and lab values included in systemic inflammatory response criteria, discharge diagnosis, and subsequent admission for positive blood cultures. Patients will be excluded if they were admitted to a hospital directly from the original emergency department visit, expired or immunocompromised. The retrospective review assessed data trends and opportunities for improvement to develop targeted education. The interventions centered around SIRS criteria, ordering type, ordering sources and biomarkers. This intervention was implemented in the emergency department setting over a four-week period. To assess the impact, three months of post-intervention data will be collected one month after disseminating educational material into practice.

Results/Conclusion: the retrospective and post-intervention data will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Outline the types of factors that contribute to the usage of blood cultures in low-risk patient populations.

Recognize the consequences behind inappropriate blood cultures.

Self Assessment Questions:

Which of the following can contribute to ordering of blood cultures in low-risk populations?

- A. Type of SIRS criteria met/used
- B. Manual entry of blood cultures
- C. Under recognition of normal biomarkers, such as a normal lactate and MAP
- D. All of the above

What are the potential consequences of inappropriate of blood cultures?

- A. Blood culture contamination
- B. Increased patient length of stay
- C. Unnecessary antimicrobial therapy
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-875-L99-P

Workflow for Authorizing Pharmacists to Order Home Medications on Admission

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Pharmacists are uniquely trained in therapeutics to provide optimal medication management during transitions of care. Studies have shown that involving pharmacists in ordering medications on admission increased the accuracy of medications ordered and increased efficiency with the time to rectify errors. Currently the surgeons reorder home medications post-procedure, which is not always done efficiently and may lead to delays in restarting chronic medications as well as potential errors.

The objective of this quality improvement study is to develop a workflow with a post-operative medication guideline to allow pharmacists the ability to resume medications based on an updated home medication list for post-operative patients. It includes adults admitted by a general and urology surgeon to Froedtert Menomonee Falls Hospital. Patients with a hospitalist consult, trauma surgery patients, or admitted to the intensive care unit post-procedure will be excluded. A pharmacist competency will be completed to review expectations and impacts to workflow. Pre-implementation data will be gathered using an electronic survey to collect the number and type of errors observed along with a baseline satisfaction survey for pharmacists and surgeons. Data will be collected from the electronic health record (EHR) to track the time from when prior to admission medications are updated to medication reconciliation completion. Post-implementation data will be collected from February 2024 to April 2024 through documentation within the EHR. Satisfaction surveys will be sent out monthly to surgeons and pharmacists during the implementation period.

The primary outcome is the change in the average time for pharmacists to reorder home medications when verifying admission orders. Secondary outcomes are change in the number of errors for medications reordered on admission and change in satisfaction with the new workflow for both surgeons and pharmacists.

The study is currently ongoing, and the results will be shared in the final manuscript.

Learning Objectives:

Review current literature findings with pharmacist's impact on transitions of care and reordering home medications.

Discuss the benefits of implementing a workflow for pharmacists to reorder home medications in surgical patients using a post-operative medication guideline.

Self Assessment Questions:

According to current literature, pharmacist involvement in reordering home medications has which of the following benefits?

- A. Increase accuracy of home medications reordered on admission
- B. Increase efficiency of home medications reordered on admission
- C. Decrease errors of home medications reordered on admission
- D. All of the above

Pharmacists are uniquely trained to assist in what area?

- A. Diplomatic negotiations with bacteria
- B. Medication management across various settings
- C. Mind control for medication compliance
- D. Interpreting hieroglyphics on prescriptions

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-868-L04-P

Evaluating the Financial Impact of RFID Technology in Drug Box Filling at Michigan Medicine's Pharmacy Department

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Background: Effective inventory management within healthcare settings is integral to both optimizing operational efficiency and ensuring patient safety. Traditional pharmacy inventory methods using manual processes can be inefficient. Radio Frequency Identification (RFID) technology offers a solution by using electromagnetic fields to detect and track medication tags, improving accuracy and streamlining workflows. In particular, the use of RFID in managing pharmacy code trays and drug boxes involves tagging each medication for easy identification of those nearing expiration or needing restocking. Although RFID technology has been shown to reduce medication errors and inventory management time, its initial costs impede widespread adoption. This study aims to quantify the financial benefits of the KitCheck RFID system compared to conventional methods, addressing the need for a standardized Return on Investment (ROI) assessment to facilitate broader implementation.

Objectives: To perform a detailed financial evaluation of the transition from manual processes to the KitCheck RFID system for drug box filling at Michigan Medicine.

The study aims to determine ROI by comparing direct costs, such as implementation and maintenance, against staff time savings and increased operational efficiencies.

Methods: This study employs a mixed-method approach, combining observational analysis with ROI assessment. In the observational analysis, participants are divided into two groups: one using the KitCheck RFID system and another using manual methods. Each will fill drug boxes, and the time taken, errors noted, and labor costs will be recorded. For the ROI analysis, data from Michigan Medicine's financial and pharmacy departments will be collected to compare the costs of RFID implementation against those of manual drug box filling. This includes analyzing ongoing expenses such as tags, licensing, and maintenance. The study will also examine long-term financial impacts such as medication expirations and recalls. Results/Conclusions: Final results and conclusions to be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the operational benefits of RFID Technology in pharmacy inventory management

Identify the challenges and barriers to RFID implementation in pharmacy operations

Self Assessment Questions:

The primary advantage of implementing RFID technology in pharmacy inventory management is

- A. Reduction in physical storage needs
 - B. Improved accuracy and efficiency in medication management
 - C. Reduction of pharmacy technician roles
 - D. Decrease in medication variety
- A critical barrier to the widespread implementation of RFID technology in pharmacy operations is

- A. The complexity of RFID tag design
- B. The initial cost of system setup and integration
- C. The availability of RFID-compatible medications
- D. Resistance from pharmacy staff due to perceived job threat

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-782-L04-P

Retrospective analysis of direct oral anticoagulant hold recommendations for gastrointestinal procedures by an outpatient anticoagulation clinic

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Purpose:

Anticoagulants pose a serious threat to the health of patients in the perioperative setting and challenge a facility's throughput and finances. Despite extensive efforts to regulate their use in this setting, patients still suffer harm. The purpose of this study was to compare the hold recommendations given by the Veteran Health Indiana outpatient anticoagulation clinic to the actual duration that patients held their anticoagulants peri-procedurally and resultant outcomes. This research will be used to identify gaps in the current process and serve as a guideline for future process improvement.

Methods:

This was a retrospective chart review of patients who were taking a direct oral anticoagulant (DOAC) and underwent an elective gastrointestinal (GI) procedure at Veteran Health Indiana between April 30, 2021, and April 30, 2023. Patients were included if they were 18 years of age or greater and took an appropriately dosed DOAC. Patients were excluded from the study if they underwent an urgent procedure, were concomitantly using antiplatelet agents other than aspirin, or had their procedure cancelled or delayed for a reason unrelated to their anticoagulant. The primary outcome was to assess the percentage of patients who followed the pre-procedure hold recommendations given by the outpatient anticoagulation clinic. Secondary outcomes included: percentage of patients who followed the post-procedure hold recommendations given by the outpatient anticoagulation clinic, incidence of 30-day major bleeding, incidence of 30-day thromboembolic event, incidence of 30-day mortality, percentage of procedures cancelled due to DOAC mismanagement, percentage of procedures rescheduled due to DOAC mismanagement, and days between date of communication of hold recommendations and date of procedure. Select outcomes were compared between patients who were adherent to the recommendations given by the anticoagulation clinic and those who were non-adherent.

Results and Conclusions:

Results and conclusions will be presented at the conference.

Learning Objectives:

Identify undesired consequences that may occur when anticoagulants are mismanaged in the periprocedural setting.

Discuss potential improvements in the process for delivering hold recommendations to patients to address non-adherence.

Self Assessment Questions:

Which of the following is an undesired consequence that may occur if a patient does not hold their anticoagulant as recommended prior to elective surgery?

- A. Procedure gets cancelled
- B. Patient experiences a significant bleeding event during surgery
- C. Patient experiences a clot prior to surgery
- D. All of the above

What is a potential way to improve patient adherence to hold recommendations provided by an anticoagulation clinic?

- A. Contact the patient with instructions at least 6 months in advance
- B. Multiple members of the clinical team should call the patient with differing instructions
- C. Have a nurse repeat the anticoagulation clinic's hold recommendations in a pre-procedure screening phone call
- D. Document hold recommendations in the patient's chart and assume the surgeon will let the patient know

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-883-L01-P

Impact of rapid blood culture identification on antibiotic de-escalation at a Veteran Affairs Medical Center

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Purpose:

Timely antibiotic de-escalation in bacterial blood stream infections has been shown to improve patient outcomes, optimize antibiotic stewardship, and generate economic savings. Rapid diagnostic technologies, like BioFire® FilmArray® Blood Culture Identification Panels (BioFire BCID2), provide clinically relevant information on common bacteremia-causing organisms quicker than traditional methods, enhancing targeted antibiotic management. The introduction of this new technology at Veteran Health Indiana (VHI) warrants the need for further evaluation of the facility's antibiotic practices regarding positive bacterial blood cultures.

Methods:

This was a pre-post quasi-experimental study done through a retrospective chart review of patients with positive blood cultures at VHI between March 1, 2022, and October 1, 2023. Patients were included in this study if they had a positive bacterial blood culture and received at least one antibiotic indicated for bacteremia during their inpatient stay. Patients were excluded if they expired prior to blood culture results, transferred out of the VHI facility, left against medical advice from inpatient status, or had untreated contaminants in blood culture results. The primary outcome was difference in time to optimal antibiotics from culture draw pre- vs. post-BioFire BCID2 implementation. The secondary outcomes were difference in time to organism identification, difference in time on broad spectrum antibiotics, and difference in time to appropriate antibiotics.

Results:

The median difference in time to optimal antibiotics in the pre-intervention group was 58.5 hours compared to 43.4 hours in the post-intervention group (P = 0.11). Time to organism identification was the only statistically significant outcome at 37.8 hours pre-BioFire BCID2 and 16.9 hours post-BioFire BCID2 (P < 0.001).

Conclusion:

Although implementation of BioFire BCID2 decreased median time to optimal antibiotics, the results were not statistically significant. Additional barriers need to be addressed to optimize utilization of rapid BCID technologies and enhance the antimicrobial stewardship program.

Learning Objectives:

Identify potential advantages of adding rapid diagnostic testing technologies to antimicrobial stewardship programs based on previous studies.

Recognize opportunities for antimicrobial optimization using rapid diagnostic testing technology results.

Self Assessment Questions:

What is a potential advantage of adding rapid diagnostic testing technologies to antimicrobial stewardship programs?

- A. Lower incidence of allergic reactions to antibiotics.
- B. Shorter post-culture length of hospital stays.
- C. Higher hospital and patient costs.
- D. Longer duration of empiric antibiotics in patients.

Which one of these is recommended to be used in an E. coli that is also CTX-M positive?

- A. Ampicillin/sulbactam
- B. Vancomycin
- C. Meropenem
- D. Cefepime

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-836-L01-P

Say it Ain't Steno: Impact of a Microbiology Nudge Comment

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Stenotrophomonas maltophilia is a known colonizer of the respiratory tract, in which treatment is not required. Microbiological comment "nudges" have been successful passive antimicrobial stewardship interventions in pneumonia and bacteriuria. The purpose of this study is to describe the effect of a targeted *S. maltophilia* respiratory culture nudge on antibiotic use in patients with colonization. This is an IRB approved before and after quasi-experimental study across five acute care hospitals in Michigan. Adult patients with a respiratory culture for *S. maltophilia* and who do not meet defined criteria for active infection between January 2022 and December 2023 will be included. Patients who meet defined criteria for community, hospital, or ventilator associated pneumonia will be excluded. Definitions for active infections were determined in collaboration with two infectious diseases physicians. The following comment was added to all *S. maltophilia* respiratory culture results beginning February 27th, 2023: "S. maltophilia is a frequent colonizer of the respiratory tract. Clinical correlation for infection is required. Colonizers do not require antibiotic treatment." The primary outcome is an absence of therapy for *S. maltophilia*. Secondary outcomes include the proportion of antibacterial discontinuation within 72 hours. Safety outcomes included antibiotic related adverse events. A non-equivalent dependent variable of appropriate deep vein thrombosis prophylaxis will assess the standard of care provided. This study will include 168 patients, calculated using an anticipated effect size of 20% and an estimated inappropriate antibacterial use of 42% due to colonization from previously collected data. Statistical analysis will be completed using student's t-test or Mann Whitney U-test for continuous data. Categorical data will be analyzed using Chi-square or Fisher's exact test. Variables with p < 0.2 in bivariate analysis plus clinical rationale will be considered for a multivariable logistic regression to determine variables independently associated with treatment of *S. maltophilia* colonization. To be presented.

Learning Objectives:

Describe concerns associated with the treatment of *Stenotrophomonas maltophilia*.

Recognize the appropriate management of a patient with positive *Stenotrophomonas maltophilia* respiratory cultures.

Self Assessment Questions:

According to the 2023 IDSA Guidance on the treatment of Antimicrobial Resistant Gram-Negative Infections, which of the following adverse effects are associated with the use of intravenous or oral trimethoprim-sulfamethoxazole (TMP-SMX)?

- A. Hypokalemia
- B. Dehydration
- C. Hypernatremia
- D. Elevated creatinine

Which of the following best describes the utility of a microbiology nudge intervention?

- A. It's an interactive process and requires a lot of time
 - B. It's a lean process and focuses on collaboration
 - C. It's a passive process and doesn't require any education
 - D. It's a traditional process and focuses on training
- Q1 Answer: D Q2 Answer: B
 ACPE Universal Activity Number 0121-9999-515-L01-P

USP <797> Compliance within a Health-System

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Background & Purpose:

The revised guidelines of USP <797> provide the opportunity to enhance compliance across three sites within the University of Wisconsin (UW) Health system. At UW Health, compounded sterile preparations (CSPs) with extended beyond-use-dating (BUD) techniques are utilized in a hub-and-spoke model. The reclassification of CSPs may necessitate updated procedures to ensure USP <797> standards are upheld. The updated guidelines place emphasis on documented standard operating procedures (SOPs), supporting the review of policies and procedures to verify comprehensive coverage of all aspects.

Methods:

First, two teams consisting of individuals who oversee areas of USP <797> compounding will be created. One team will consist of key stakeholders and the other, directors. Both teams will be tasked with meeting on a recurrent basis. Following team creation, a gap analysis tool will be identified to assess compliance across three UW Health sites. Site audits and visual inspections will be conducted at a frequency designated in stakeholder meetings. Observations will be discussed and appropriate actions for correction will be identified. Once access to the list of all CSPs utilizing extended beyond-use dating is granted, actions will be identified to determine opportunities for future direction. Similarly, once access to all sterile compounding SOPs is obtained, the stakeholder group will revise as needed.

Outcomes:

Outcomes are anticipated in Spring 2024 following completion of site audits. The primary outcome of this project is to improve compliance to USP <797> across three sites within the UW Health system.

Learning Objectives:

Identify differences between Immediate-Use and Category 1, 2, and 3 compounded sterile preparations

Recognize the scope of Immediate-Use compounding

Self Assessment Questions:

A site compounds 30-item batches of vancomycin 2g bags in an ISO-5 primary engineering control, located within an ISO-7 secondary engineering control. They do not use extended beyond-use dating. What category does this preparation fall within?

- A. Category 1
- B. Category 2
- C. Category 3
- D. Immediate-Use

Which of the following scenarios is an example of immediate-use compounding?

- A. Pharmacy technician preparing a stat vasopressin drip within an ISO-5 primary engineering control
- B. Registered nurse administering a pre-filled lidocaine syringe inside the operating room
- C. Critical care pharmacist preparing a norepinephrine drip at bedside, using not more than three sterile starting ingredients
- D. Registered nurse administering an amiodarone drip prepared by the unit pharmacist

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-761-L07-P

HECK-Yes, this is the Remix!!: Ceftriaxone versus Cefepime or Carbapenems for Definitive Treatment of Low-Risk AmpC-Harboring Enterobacterales Bloodstream Infections

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Purpose

The emergence of inducible resistance poses a significant challenge in the treatment of Enterobacterales that produce AmpC, which renders ceftriaxone ineffective. Clinical practice guidelines recommended the use of cefepime or carbapenems as the preferred therapy for AmpC-harboring organisms. However, recent literature suggests that ceftriaxone may be a viable treatment option for low-risk AmpC-harboring organisms. This study aims to compare the effectiveness of ceftriaxone to AmpC-stable therapies (i.e., cefepime or carbapenems) for the treatment of bloodstream infections caused by low-risk AmpC-harboring Enterobacterales.

Methods

This IRB-approved study is a non-inferiority retrospective cohort analysis of patients with a documented bloodstream infection due to *Serratia marcescens*, *Morganella morganii*, or *Providencia* spp. Patients ≥ 18 years of age admitted to Henry Ford Health System between January 1, 2017, and February 29, 2024, will be included. Cohorts consist of patients who received either definitive ceftriaxone or AmpC-stable therapies. The primary outcome is all-cause mortality at 30 days. Secondary outcomes include clinical success/failure, hospital readmission < 30 days, secondary infections, development of ceftriaxone resistance, and length of stay. Categorical variables will be compared via Chi-square or Fisher's exact test. Continuous variables will be compared with the Mann-Whitney U test. Bivariate analysis will be used to compare the percentages of patients with each outcome according to exposure. This study will be powered using the following assumptions: alpha of 0.025, $\bar{r}^2$ of 0.2, and non-inferiority margin of 10%. The non-inferiority margin will be defined as the lower limit of the one-sided 97.5% confidence interval (CI) for the difference in the primary endpoints between the ceftriaxone and AmpC stable groups. For all analyses, P values <0.05 will be considered statistically significant.

Results

To be presented at the 2024 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Review the outcomes of patients treated with ceftriaxone vs AmpC stable therapies for bloodstream infections caused by low-risk AmpC-harboring Enterobacterales. Select a regimen for *S. marcescens*, *M. morganii*, or *Providencia* spp based on organism identification from a rapid blood culture result.

Self Assessment Questions:

1. Which organism is considered to be a low-risk AmpC producer?

- A. *Enterobacter cloacae*
- B. *Morganella morganii*
- C. *Escherichia coli*
- D. *Klebsiella oxytoca*

2. JM is presented to the hospital with abdominal pain (s/p liver transplant 2022) and no known allergies. JM was started on vancomycin and cefepime. A blood culture was collected and three hours later, finalized as *Serratia marcescens*. Which of the following would be the best option for the initial treatment for JM?

- A. Nitrofurantoin
- B. Vancomycin
- C. Colistin
- D. Ceftriaxone

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-867-L01-P

Quality of Life in Endometriosis and Uterine Fibroids Patients Prior to Starting a Medication Through a Regional Community Pharmacy Chain

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Purpose: Endometriosis (EM) and Uterine Fibroids (UF) are chronic and progressive diseases. Both disease states can be characterized by pain and infertility which can negatively impact patients' health-related quality of life (HRQOL) with EM affecting roughly 10% of reproductive age females worldwide and UF affecting 20-25%. Despite the prevalence of both disease states there are few studies about this patient population's quality of life before starting a new medication. Time from onset of symptoms to diagnoses usually spans years meaning patients have an extensive medical journey before they receive adequate treatment. Although there is some information about the journey EM and UF patients must go through to get patient care, the medication journey is not described. Due to these gaps, our primary objective is to report on the HRQOL in EM and UF patients starting a new medication. The secondary objective is to identify EM and UF patients' medication history up to 2 years prior to starting a new medication.

Methods: This is a multi-center prospective survey study to assess patients' quality of life before starting a new medication in a regional pharmacy chain. The study will be conducted from January- March 2024. The survey administered will be the CDC HRQOL-4, a validated tool that assesses perceived physical and mental well-being, is disease agnostic, and is a standard of care within the specialty pharmacies. A text message will be sent out to patients who meet the eligibility criteria with a link to the survey. Once the survey is filled out a specialty pharmacist will conduct follow-up as deemed appropriate.

Results: The study is currently in progress. Potential impacts of the study include quality improvement projects within the pharmacies based on responses to the HRQOL-4 and a better understanding of these patients' QoL before starting new treatment therapies.

Learning Objectives:

Explain signs and symptoms related to both endometriosis and uterine fibroids

Recognize what the CDC HRQOL-4 questions tell us and what the application is to endometriosis and uterine fibroid patients

Self Assessment Questions:

Which of the following are symptoms of both endometriosis and uterine fibroids?

- A. Headache
- B. Abdominal Pain
- C. Rash
- D. Blurred Vision

What do the CDC HRQOL-4 questions look to tell us?

- A. Social Activities
- B. Relationships with other people
- C. Both the physical and mental state of patients
- D. Personal development and fulfillment

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-725-L01-P

Clinical safety and efficacy of anti-staphylococcal penicillins versus cefazolin in methicillin-susceptible *Staphylococcus aureus* bacteremia in pediatric patients

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Purpose: Bacteremia is a major cause of morbidity and mortality among hospitalized pediatric patients with *Staphylococcus aureus* being the leading cause. *Staphylococcus aureus* bacteremia (SAB) is often secondary to a primary focal infection such as osteomyelitis, septic arthritis or skin and soft tissue infection, and has the potential to cause severe complications including septic shock, endovascular infection, and disseminated infection. Despite the frequency and severity of SAB, optimal treatment approaches, especially in pediatric patients, remain unknown. Methods: A retrospective cohort study was conducted to compare the safety and efficacy of anti-staphylococcal penicillins (ASPCNs) (nafcillin and oxacillin) versus cefazolin in pediatric patients with MSSA bacteremia. We assessed patients less than or equal to 18 years old who had a positive MSSA blood culture from July 2011 to July 2023 hospitalized at an Indiana University Health hospital. Exclusion criteria included patients with a central nervous system infection or mortality within 48 hours of antibiotic initiation. The primary composite endpoint is treatment failure defined as mortality within 1 year due to SAB, clinical failure defined as a positive blood culture for MSSA after two consecutive negative blood cultures obtained on separate days, followed by later positivity of blood cultures within 14 days, or relapse of MSSA bacteremia within 1 year of original SAB. Conclusion: Our proposed research may lead to an increase in pediatric patients who receive cefazolin for MSSA bacteremia as first-line treatment. If no difference in clinical efficacy is observed, preferential use of cefazolin would potentially lead to cost savings and reduced incidence of adverse effects. If a difference in efficacy is observed, further exploration into the risks and benefits of these treatment options would be warranted. Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Conference in 2024.

Learning Objectives:

Describe the cefazolin inoculum effect

Discuss the advantages and disadvantages of cefazolin versus anti-staphylococcal penicillins

Self Assessment Questions:

Which of the following is a theoretical advantage of anti-staphylococcal penicillins compared to cefazolin?

- A. Cost
- B. Administration
- C. Decreased nephrotoxicity
- D. Efficacy regardless of bacterial inoculum

Which of the following is generally an infection associated with a high inoculum that may lead to SAB?

- A. Urinary tract infection
- B. Community-acquired pneumonia
- C. Infective endocarditis
- D. Intra-abdominal infection

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-657-L01-P

Assessment of Patient Adherence to Injectable Biologics at a Veteran Affairs Medical Center

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Biologic medications have revolutionized the treatment of many dermatologic and rheumatologic disease states including rheumatoid arthritis, plaque psoriasis, psoriatic arthritis, amongst others. Non-adherence to injectable biologic medications for dermatologic and rheumatologic indications has been linked with poor disease state outcomes and increased healthcare costs. There is concern non-adherence may lead to treatment failure, which may require advancement of treatment to more intensive and expensive therapy options. Some experts support adherence rates of at least 80-90% to limit adverse events and treatment failure. No studies have yet to be conducted at Veteran Health Indiana (VHI) evaluating the adherence rates of biologic medications within dermatology and rheumatology clinics. The purpose of this study to assess prescribing patterns and patient adherence rates to injectable biologics at VHI.

This study is a retrospective electronic chart review of all patients who had documented prescribing of certain biologic medications within the dermatology and rheumatology specialty clinic at Veteran Health Indiana VA Medical Center between September 1, 2021 to September 1, 2023. Patients will be included if they have a documented prescription from a VHI dermatology or rheumatology provider, at least one documented fill through the VA pharmacy, and actively taking the injectable biologics for at least three months during the study time frame. The following injectable biologics will be included for evaluation: etanercept, adalimumab, certolizumab pegol, golimumab, ixekizumab, secukinumab, brodalumab, ustekinumab, risankizumab, guselkumab, tildrakizumab, sarilumab, tocilizumab, and abatacept. The primary outcome is to assess the portion of patients with calculated medication possession ratios (MPR) of 90% or greater to their prescribed biologic medication for dermatologic/rheumatologic conditions. Secondary outcomes will assess time from initial prescribing of the biologic to follow-up with the prescriber/clinic and the patient's adherence rates to scheduled follow-up appointments.

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

Learning Objectives:

Identify risks of injectable biologic non-adherence and review importance of injectable biologic adherence rates for the treatment of dermatologic and rheumatologic conditions

Discuss patterns of adherence identified amongst a Veteran patient population prescribed injectable biologic medications for dermatologic and rheumatologic conditions

Self Assessment Questions:

What are some of the risks of non-adherence to injectable biologic agents for dermatologic and rheumatologic disease states?

- A. Development of immunogenicity (anti-drug antibodies)
- B. Worsening of disease state
- C. Treatment failure
- D. All of the above

What adherence rates are recommended for biologic agents to reduce rates of treatment failure?

- A. At least 30-40%
- B. At least 40-50%
- C. At least 50-60%
- D. At least 80-90%

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-830-L01-P

Outcomes from the use of cefazolin for surgical prophylaxis in penicillin allergic patients

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Purpose:

Cefazolin remains the drug of choice for surgical prophylaxis due to its safety profile and bactericidal activity against the predominant organisms causing surgical site infections (SSI). Previous studies challenging penicillin allergies with cefazolin for surgical prophylaxis have reported minimal rates of allergic reactions, as IgE-mediated reactions are rare. In January 2023, pharmacy, infectious disease, surgery, and anesthesiology implemented a screening tool to assist providers in determining which patients with a penicillin allergy would be a candidate for cefazolin perioperatively. This study looks to evaluate the incidence of allergic reactions in patients receiving cefazolin with a penicillin allergy, including anaphylaxis.

Methods:

This was a single-center, retrospective chart review of patients with a documented penicillin allergy that received periprocedural antibiotics between February 1, 2023 - January 31, 2024. Patients were included if they had a documented penicillin allergy preoperatively, were at least 18 years of age, and underwent a surgical procedure and received preoperative antibiotics during the study period. Patients were excluded if they had a documented penicillin allergy resulting in severe delayed skin reactions (Stevens-Johnson syndrome [SJS], toxic epidermal necrolysis [TEN], drug reaction with eosinophilia and systemic symptoms [DRESS]). The primary objective was to determine the incidence of allergic reactions in patients who had a documented penicillin allergy and received cefazolin for preoperative antibiotic prophylaxis. Secondary outcomes include the appropriateness of antibiotic regimen in congruence with American System of Health Systems Pharmacists (ASHP) recommendations, incidence of SSI, incidence of adverse drug reactions in those with a history of anaphylaxis vs non-anaphylaxis allergy, incidence of allergic reactions requiring pharmacologic vs non-pharmacologic interventions, and incidence of acute kidney injury. Data was collected from the VA's electronic health record, and analyzed using Microsoft Excel.

Results and Conclusions:

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

Learning Objectives:

Identify advantages of cefazolin in patients with penicillin allergy

Recognize which penicillin allergic patients are candidates for cefazolin

Self Assessment Questions:

What is an advantage of cefazolin therapy in patients with penicillin allergy?

- A. Minimizes unnecessary MRSA coverage
- B. Offers coverage of common pathogens and against skin flora commonly implicated in SSIs
- C. Both A & B
- D. None of the above

Which of the following penicillin-allergic patients is not a candidate for cefazolin perioperatively?

- A. Patient with decreased renal function
- B. Patient with history of rash
- C. Patient with history of anaphylaxis
- D. Patient with history of Stevens-Johnson syndrome

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-871-L01-P

Raising the Barb: Evaluating the Impact of the Updated Alcohol Withdrawal Management Order Panel on Escalation of Care

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Purpose: Within the inpatient setting, alcohol withdrawal syndrome (AWS) is a significant concern which accounts for nearly one-third of emergency department visits. Evolving literature regarding the use of phenobarbital has prompted a reevaluation of the conventional treatment approach, which currently relies heavily on benzodiazepines. This study aims to investigate the pre and post effects of implementing an updated alcohol withdrawal management order panel in alignment with the 2020 American Society of Addiction Medicine guidelines.

Methods: This retrospective, single-center cohort study will analyze patients admitted to Trinity Health Ann Arbor from February 2020 to August 2022 and October 2022 to December 2023, with a primary diagnosis of AWS and received treatment with lorazepam or phenobarbital. Exclusions include direct ICU admissions, treatment in Michigan Medicine ED, admissions <24 hours, ED mechanical ventilation, epilepsy history, non-AWS MICU transfers, lorazepam or phenobarbital allergies, and pregnancy. The primary outcome will assess the proportion of patients requiring escalation of care defined as transferring from the general floor to the MICU. Secondary outcomes will evaluate MICU and total hospital length of stay, incidence of mechanical ventilation, and cumulative doses of phenobarbital vs. lorazepam. To determine the necessary sample size, data from a previous Trinity Health study was utilized, which estimated the need for a total of 817 patients to achieve 80% power. Statistical analysis will involve chi squared test for the primary objective and various statistical tests, including t-tests, non-parametric tests, and chi-square tests for the secondary objectives. Multivariate regression analysis will account for potential confounding variables.

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

Learning Objectives:

Discuss updates from the 2020 American Society of Addiction Medicine guidelines on the management of alcohol withdrawal syndrome

Identify risks and benefits associated with different medication regimens

Self Assessment Questions:

According to the 2020 American Society of Addiction Medicine guidelines, what CIWA score triggers medication intervention?

- A. 5
- B. 8
- C. 10
- D. 12

What are potential drawbacks of benzodiazepine use for alcohol withdrawal syndrome?

- A. Lack of consistent pharmacokinetics
- B. Variability in patient response
- C. Benzodiazepine resistance
- D. All of the above

Q1 Answer: C Q2 Answer: D
ACPE Universal Activity Number 0121-9999-620-L01-P

Characterization of Microbial Isolates and Antibiotic Prescribing In Vascular and Orthopedic Patients with Osteomyelitis of the Foot

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PURPOSE

In patients with vascular insufficiency (VI) or diabetes mellitus (DM) with suspected osteomyelitis, empiric broad-spectrum antibiotic prescribing is common. Data suggests empiric antibiotic therapy should be driven by local prevalence of pathogens and patient-specific characteristics. Targeted antibiotic therapy for residual osteomyelitis of the foot should be pursued if surgical source control is not achieved. Targeted therapy relies on appropriate bone culture and pathology data from residual proximal bone obtained during surgery.

Our institutional guideline recommends empiric antibiotic therapy active against *P. aeruginosa* and methicillin-resistant *S. aureus* for diabetic foot infections based on the presence of systemic signs of infection and patient-specific risk factors. With data suggesting antibiotics should be tailored to local microbiology, it is pertinent to evaluate the organisms isolated in the Froedtert Health System. The goal of this study is to evaluate patients diagnosed with osteomyelitis of the foot to characterize organisms isolated during surgical source control procedures, empiric and targeted antibiotic use, and current surgical processes for identifying causative pathogens.

METHODS

This retrospective chart review is evaluating 135 patients with a diagnosis of osteomyelitis of the foot associated with VI and/or DM between November 1, 2020 and November 1, 2023. Inclusion criteria include 18 years of age or older and definitive surgical source control procedure. Exclusion criteria include hematogenous osteomyelitis, initial procedure of below or above knee amputation, and foot or ankle orthopedic hardware. The primary objective is to describe organisms isolated during definitive surgical source control procedure in patients with VI and/or DM and osteomyelitis of the foot. The secondary objectives include characterizing empiric antibiotic prescribing, characterizing culture and pathology samples, and describing clinical outcomes associated with antibiotic use for osteomyelitis of the foot.

RESULTS/CONCLUSIONS

Results and conclusions are in progress; will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the role of local microbiology in guiding empiric antibiotic prescribing.

Explain the importance of obtaining appropriate surgical cultures and pathology in treating foot and toe osteomyelitis.

Self Assessment Questions:

Why are local microbiology results and patient specific characteristics important in guiding empiric antibiotic prescribing?

- A. The rates of both pathogen incidence and resistance markers can vary greatly based on geographical location and may affect empiric antibiotic recommendations.
- B. An antibiogram developed based on local microbiology data could alter and potentially narrow choice of empiric antibiotics based on local pathogens.
- C. Patient specific characteristics can help estimate risk of infection with resistant pathogens and therefore alter choice of empiric antibiotics.
- D. All of the above.

Why is it important to obtain appropriate surgical cultures and pathology in treating foot and toe osteomyelitis?

- A. Surgical cultures and pathology help guide the transition from empiric to targeted antibiotic therapy and determine the duration of antibiotic therapy.
- B. Surface wound swabs are non-inferior to surgical bone or deep tissue cultures and pathology for guiding targeted antibiotic therapy.
- C. Organisms isolated from surgical cultures cannot be evaluated if antibiotics are given prior to collection of cultures.
- D. Surgical cultures should not be used to guide the transition to definitive antibiotic therapy as empiric therapy should be continued for the duration of therapy.

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-502-L01-P

Assessing National Institutes of Health Stroke Scale (NIHSS) Improvement in Patients Presenting with Acute Ischemic Stroke after Receiving Alteplase or Tenecteplase

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Recent studies have shown tenecteplase to be non-inferior to alteplase for the treatment of acute ischemic stroke. Although not FDA approved for treatment of stroke, tenecteplase has quickly gained popularity in hospitals across the country due to ease of administration and preparation. Previous studies have demonstrated similar improvement in 90 day neurological function with both agents, however differences in acute neurological improvement have not been compared. The purpose of this study is to assess differences in acute neurological function in patients who received tenecteplase or alteplase as determined by changes in NIHSS. This study will be submitted to the Institutional Review Board for approval. All information on patients who meet inclusion criteria will be collected by retrospective chart review through electronic health records. Patients meet inclusion criteria if they are 18 years of age or greater and received tenecteplase or alteplase for treatment of suspected acute ischemic stroke. Patients with diagnosed large vessel occlusions will be excluded. The following data will be collected: age, gender, weight, height, blood pressure, past medical history, current medications, labs, imaging and documented NIHSS scores. Data will be further analyzed to compare differences in NIHSS before and after administration of thrombolytic for up to 24 hours after dose administration. Secondary outcomes will include length of stay, time to thrombolytic administration, and bleeding. All collected information will be kept in a secure location within the hospital and will be de-identified to maintain confidentiality. All data collected will utilize a 95% confidence interval and significance will be determined by an alpha of 0.05.

Learning Objectives:

Discuss current recommendations for management of an acute ischemic stroke

Describe potential adverse effects of thrombolytic therapies

Self Assessment Questions:

Which of the following has a current FDA approval for treatment of acute ischemic stroke?

- A. Tenecteplase
- B. Alteplase
- C. Streptokinase
- D. Alteplase and Tenecteplase

What is the maximum recommended dose of tenecteplase for acute ischemic stroke?

- A. 25 mg
- B. 45 mg
- C. 50 mg
- D. 90 mg

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-640-L01-P

Comparison of dexamethasone-sparing and olanzapine-sparing nausea prevention versus standard of care for highly emetogenic chemotherapy

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Purpose: Chemotherapy-induced nausea and vomiting (CINV) is one of the most common adverse effects reported with chemotherapy. CINV requires the use of various antiemetics dependent on the emetogenicity of chemotherapy. High emetogenic chemotherapy (HEC) requires NK-1 receptor antagonists, 5-HT₃ receptor antagonists, olanzapine, and dexamethasone. In 2021, the National Comprehensive Cancer Network's antiemesis guidelines introduced steroid-sparing regimens with olanzapine in HEC. Both olanzapine and dexamethasone possess unfavorable toxicity profiles which may affect their use in practice. The study's purpose is to evaluate the incidence of CINV in HEC after receiving either steroid-sparing, olanzapine-sparing, or combination (standard of care) antiemetic regimens. Methods: This is a single-center retrospective, observational, cohort study conducted from April 2018 to April 2023. Patients will be included in the study if they are ≥18 years old, received a cycle of doxorubicin/cyclophosphamide, carboplatin/etoposide, cisplatin/gemcitabine, and if they received a high-risk antiemetic regimen including dexamethasone, olanzapine or both on day 1 of chemotherapy. Patients were excluded if they started their first cycle of chemotherapy outside of the previously defined study dates; if they did not receive complete administration of a cycle of the previously mentioned chemotherapy regimens; if they received an antiemetic regimen for CINV other than designated for HEC regimens; if they received concurrent radiation therapy; or receiving concurrent immunotherapy. The primary outcome is comparing the incidence of CINV in patients receiving steroid-sparing, olanzapine-sparing, or combination antiemetic regimens following HEC. Secondary outcomes included identifying patient specific risk factors that increase the risk of CINV with standard high-risk antiemetic regimens when receiving HEC; evaluating efficacy between different doses of olanzapine in the prevention of CINV in steroid-sparing regimens; and comparing incidence of adverse reactions between the antiemetic regimens. Results: Data collection and analysis is still ongoing. Conclusion: Currently ongoing, will present at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review current guidelines regarding management of chemotherapy-induced nausea and vomiting.

Identify the appropriate antiemetic regimen for the treatment of chemotherapy-induced nausea and vomiting.

Self Assessment Questions:

In patients receiving high emetogenic chemotherapy, the NCCN guidelines recommend utilizing multiple classes of medications for management of chemotherapy-induced nausea and vomiting. Which of the following classes are not used for acute or delayed nausea prevention for high emetogenic chemotherapy?

- A. 5HT₃ RA
- B. NK₁ RA
- C. First Generation Antipsychotic
- D. Corticosteroids

JK is a 60 yo patient, recently diagnosed with triple negative breast cancer, who presents to the clinic today to receive their first cycle of dose-dense doxorubicin and cyclophosphamide. Per the NCCN guidelines, JK is receiving a high emetogenic chemotherapy regimen. Which scheduled take home antiemetic regimen would be appropriate for this patient?

- A. Ondansetron and prochlorperazine
- B. Dexamethasone and olanzapine
- C. Metoclopramide
- D. Ondansetron

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-544-L01-P

Duration of Antimicrobial Treatment for Donor-Derived Staphylococcus Aureus Infections Post-Lung Transplantation

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Lung transplant recipients are at an increased risk of developing infectious complications, accounting for over 25% of all post-lung transplant deaths. These infections are typically bacterial in nature and present as pneumonia, bloodstream infection, wound infection, or empyema. An empyema, or complicated parapneumonic effusion, is an infection of the pleural space that occurs in 3-5% of lung transplant recipients. While empyema is a rare occurrence post-lung transplantation, the mortality rate is approximately 40%. Therefore, patients should receive adequate perioperative antimicrobial prophylaxis to prevent serious infectious complications that can lead to empyema.

Bacterial infections immediately post-lung transplantation can be derived from the donor, recipient, or nosocomial sources. When treating donor-derived bacterial infections, the American Society of Transplantation Infectious Disease Guidelines strongly recommend that the recipient should receive 7 to 14 days of antibiotic treatment targeted to the organism isolated from the donor, although this recommendation is not specific to lung transplant. Several studies have identified *Staphylococcus aureus* as the most frequently isolated microorganism in donor respiratory cultures, often leading to infectious complications such as pneumonia and empyema.

At Loyola University Medical Center, the current lung transplant protocol involves treating *Staphylococcus aureus* infections from donor-derived respiratory cultures for 4 weeks. This duration of therapy was increased in August 2019 from the previous 2-week duration due to a concern for increased rates of empyema attributed to donor-derived *Staphylococcus aureus* infections from donor respiratory cultures. However, prolonged courses of antibiotics have been shown to increase adverse events and antimicrobial resistance and should therefore be avoided if possible. Thus, this study aims to evaluate whether a 4-week duration of therapy for donor-derived *Staphylococcus aureus* infections from donor respiratory cultures decreases the incidence of empyema compared to a 2-week duration. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the complications of donor-derived infections post-lung transplantation

Select an appropriate duration of antimicrobial therapy for donor-derived bacterial infections post-lung transplantation

Self Assessment Questions:

Which of the following microorganisms is most frequently isolated in donor-derived lung cultures post-lung transplantation?

- A. *Staphylococcus aureus*
- B. *Streptococcus pneumoniae*
- C. *Pseudomonas aeruginosa*
- D. Cytomegalovirus

According to the American Society of Transplantation Infectious Disease Guidelines, which of the following is an appropriate treatment duration for donor-derived antimicrobial infections?

- A. 72 hours
- B. 14 days
- C. 21 days
- D. 28 days

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-517-L01-P

Assessing Hepatitis A Virus and Hepatitis B Virus Screening, Immunity, and Vaccination in People Living With HIV in the Illinois Department of Corrections (IDOC)

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Purpose: Individuals in custody are highly susceptible to vaccine-preventable diseases, including hepatitis A virus (HAV) and hepatitis B virus (HBV). A survey study of correctional facilities revealed that correctional systems across the country vary in their offering of hepatitis vaccines. Existing data on hepatitis vaccination and immunity rates among individuals in custody are mixed. In the Illinois Department of Corrections (IDOC) HIV Telemedicine Clinic, patients are screened for HAV/HBV, providing an opportunity to recommend vaccines in those without immunity. The purpose of this study is to evaluate the rate of HAV and/or HBV screening, immunity, and vaccination pre- and post-serologic screening and vaccine recommendation. **Methods:** This retrospective cohort pre-post study included patients ≥18 years old who followed in the University of Illinois Hospital (UIH) IDOC HIV Telemedicine Clinic between January 1, 2022, and December 31, 2022, with 9-month follow-up to account for screening and vaccination recommendations. For inclusion, patients must be an individual in custody with an ICD-10 diagnosis of HIV. Patients were excluded from primary endpoint analysis if they have chronic HBV infection. The primary endpoint was to compare the rates of vaccination and immunity to HAV and/or HBV among individuals in custody living with HIV within IDOC in 2022 to those patients incarcerated in IDOC in 2019, where standardized recommendations for routine serologic screening and vaccination were not routinely performed. Secondary endpoints included the number of individuals receiving HAV/HBV screening, acceptance of vaccination if recommended, and documented barriers to vaccination. We hypothesize that there is an increase in vaccination rates and immunity to HAV/HBV in 2022 compared to 2019. Data will be collected via retrospective chart review and statistical analysis will include descriptive statistics, Chi-squared testing for categorical data, and Mann-Whitney testing for continuous data. Data collection is ongoing, and results will be reported at the conference.

Learning Objectives:

Describe the current state of hepatitis screening, vaccination, and immunity amongst individuals in custody, including the Illinois Department of Corrections

Recognize the potential benefits of offering routine serologic screening and hepatitis vaccinations to individuals in custody

Self Assessment Questions:

What does data on hepatitis vaccination rates amongst individuals in custody reveal?

- A. Individuals in custody are adequately vaccinated against hepatitis A
- B. Individuals in custody are adequately vaccinated against hepatitis B
- C. Correctional facilities vary in their offering of the hepatitis vaccines
- D. Correctional facilities have adequate resources and funding to support vaccination efforts

Which of the following is TRUE regarding screening of hepatitis A and B for individuals in custody?

- A. Increased vaccine refusal rates
- B. Increased immunity rates
- C. Increased transmission rates
- D. All of the above

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-816-L06-P

Real-World Incidence of Depression and Impact on Adherence Among Patients Receiving Oral Oncolytics

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Purpose

Depression is a common comorbidity in patients that have been diagnosed with cancer and profoundly harms prognosis, quality of life, and duration of hospitalization. Various works have evaluated the incidence of depression in patients that have been diagnosed with cancer and identified the relationship between depression and non-adherence to treatment. However, to the best of the author's knowledge, there are no data specifically identifying depression rates in patients taking oral chemotherapy. Therefore, the aim of this work is to quantify the incidence of depression in patients taking oral chemotherapy and evaluate the relationship with degrees of non-adherence.

Methods

Patient information from January 1st 2021 to August 30th 2023 will be obtained from the Indiana University Health electronic health records via retrospective chart review. Prescription information for oral oncolytics and antidepressants will be obtained from the IU Health Advanced Therapy Pharmacy, specific manufacturers, External Rx History in Cerner, and provider-documented medication histories. Adult patients started an oral oncolytic on or after January 1st 2021 with indefinite intent or metastatic disease will be included if they received a depression screening in clinic. Patients with complicated psychiatric diagnoses (i.e. schizophrenia or bipolar disorder) and those on weekly treatment regimens will be excluded. Depression will be identified via the patient health questionnaire (PHQ) 2 and 9 (PHQ2, PHQ9), ICD-10 codes for depression, and use of antidepressants for psychiatric purposes. Adherence will be measured by the difference in the intended start date of the cycle and the date the medication was dispensed. Patients that are less than 1 week late to pick up their prescription are considered adherent; all others are non-adherent. Unpaired group analysis will be performed using Wilcoxon rank-sum analysis and continuous variables will be analyzed using Spearman's correlation analysis. Results will be presented at GLPRC 2024.

Learning Objectives:

Identify risk factors for depression in patients with cancer

List complications of depression in patients with cancer

Self Assessment Questions:

Which of the following oral oncolytics is associated with an increased incidence of depression?

- A. Acalabrutinib (Calquence)
- B. Dasatinib (Sprycel)
- C. Osimertinib (Tagrisso)
- D. Venetoclax (Venclexta)

_____ is a physiological consequence of depression in patients with cancer

- A. Damage to social relationships
- B. Hypotension and syncope
- C. Impaired immune system and increased inflammation
- D. Hypertension and intracranial hemorrhage

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-512-L01-P

Incidence of New Onset Diabetes After Transplant (NODAT) in Recipients of HCV NAT-positive Organs

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Background: Incidence of hepatitis C (HCV) in the general population has been increasing over the last decade due to the opioid epidemic and increased IV drug use. HCV treatment was revolutionized with the introduction of highly effective DAAs that are significantly more tolerable than the previous treatment options. As a result, there has been a shift to utilizing organs recovered from HCV-NAT positive donors to expand the donor pool and reduce waitlist time. There is a well-documented risk of developing new onset diabetes after transplant (NODAT) in patients with chronic HCV prior to transplant. There is no current literature to assess the risk of developing NODAT in HCV naïve recipients of HCV NAT-positive organ transplants.

Methods: IRB-approved, retrospective chart review of adult kidney and/or liver transplant recipients of HCV NAT-positive organs compared to HCV NAT-negative organs between 4/12/2019 - 9/30/2022. Patients with a pre-transplant diagnosis of diabetes or had diabetes as their indication for transplant were excluded. The primary outcome is the incidence of NODAT within one year of transplant. Secondary outcomes include patient and graft survival and incidence of rejection at one-year post-transplant.

Results: During the study period, 19 and 13 patients received HCV-NAT positive kidneys and livers, and 370 and 153 patients received HCV-NAT negative kidneys and livers, respectively. Anticipated results include a potential increased incidence of NODAT in those who receive an HCV NAT-positive organ, an increased risk of developing NODAT in patients who receive a liver compared to a kidney, and no difference in allograft or patient survival at one year.

Conclusion: This study aims to compare the incidence NODAT between recipients of an HCV NAT-positive organ and recipients of an HCV negative organ to assess if there is an increased risk associated with receiving an HCV NAT-positive organ in the first year of transplant.

Learning Objectives:

Recall the relationship between HCV infection and diabetes mellitus

Identify modifiable vs non-modifiable risk factors for development of new onset of diabetes after transplant

Self Assessment Questions:

Chronic HCV infection prior to transplant increases the risk of developing diabetes after transplant

- A. TRUE
- B. FALSE
- C. It depends
- D. Unknown relationship

Which of the following is not a modifiable risk factor for developing new onset diabetes after transplant?

- A. Weight
- B. Lifestyle/activity level

C. HCV infection prior to transplant

D. Diet

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-590-L01-P

Evaluation of the Impact of Pharmacist-Driven Management of Positive Blood Culture Results on Optimal Antimicrobial Therapy in a Community Hospital Setting

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Purpose: Early initiation of appropriate antibiotics can reduce morbidity and improve patient outcomes. Studies have shown that pharmacist-directed management of culture results can reduce delay in initiation and increase proper antibiotic selection. The purpose of this study was to evaluate the impact of a pharmacist-driven initiative to decrease time to optimal antimicrobial therapy.

Methods: This study was a single-center, retrospective chart review of inpatients with a positive blood culture result at a community hospital. Patients 18 years or older with a positive blood culture communicated by the microbiology lab were included. The blood culture results were reported to the inpatient pharmacist via telephone, and documentation of the call was recorded in the electronic medical record for assessment. If indicated, a clinical pharmacist notified providers of culture results and provided recommendations for therapy optimization. All recommendations and provider responses were documented in patient charts, along with the updated antimicrobial regimen, if applicable. The primary outcome of this study was mean time to optimal antimicrobial therapy. The secondary outcomes were percent of patients changed to optimal therapy, percent of provider recommendation acceptance, and primary reason for pharmacist intervention.

Results: The mean time to optimal therapy was reduced from 16.42 to 1.02 hours pre- versus post-intervention ($P < 0.05$). The percent of patients changed to optimal therapy increased from 51.4% pre-intervention to 55.2% post-intervention ($P = 0.095$). A total of 96.65% of pharmacist antibiotic recommendations were accepted by providers. The primary and secondary pharmacist interventions were assessment of antimicrobial therapy without change and de-escalation of antimicrobial therapy, respectively.

Conclusion: Pharmacist-driven management of blood culture results led to a statistically significant reduction in mean time to optimal therapy. The percent of patients changed to optimal therapy increased with pharmacist intervention, but was not statistically significant. Providers frequently accepted pharmacist recommendations for antimicrobial therapy changes.

Learning Objectives:

Identify a pharmacist's role as part of the antimicrobial stewardship team.

Recognize the importance of establishing and practicing antimicrobial stewardship programs in hospitals.

Self Assessment Questions:

Which of the following is considered a pharmacist's role on an antimicrobial stewardship team according to ASHP?

- A. Promote optimal use of antimicrobial agents
- B. Facilitate the transmission of infections
- C. Prescribe antibiotics only when needed
- D. Provide education about antimicrobial stewardship only to patients

Which of the following is considered a benefit of antimicrobial stewardship programs according to the Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA)?

- A. Increased adverse events
- B. Increased rates of antibiotic resistance
- C. Improved patient outcomes
- D. Less need for healthcare training in infectious disease

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-589-L01-P

Naloxegol vs. Methylnaltrexone for Opioid-Induced Constipation in Hospitalized Patients with an Inadequate Response to Traditional Laxatives

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Purpose: Opioid-induced constipation (OIC) affects approximately 40% to 80% of patients receiving chronic opioids. If left untreated, OIC can lead to additional problems, such as hemorrhoids, anal fissures, and impaction. The American Gastroenterological Association recommends escalation of therapy to a peripherally acting mu-opioid receptor antagonist (PAMORA) after an adequate trial of at least two types of traditional laxatives. The purpose of this study is to determine if naloxegol is non-inferior to methylnaltrexone at producing a bowel movement (BM) at the end of day one of PAMORA administration in hospitalized patients receiving opioids who had an inadequate laxative response.

Methods: This is a single-center, retrospective cohort study of patients with OIC admitted to UofL Health between March 1, 2021, and July 31, 2023. Patients who received naloxegol or methylnaltrexone after 48 hours of at least two traditional laxatives (one being a stimulant, and received at least 30 morphine milligram equivalents 24 hours prior to initial PAMORA dose) will be included. Patients will be excluded if they received both PAMORAs within the first 24 hours, received a PAMORA as a home medication, were designated nothing by mouth and did not have enteral access, had a jejunostomy or ostomy tube, were pregnant, or incarcerated. The primary outcome is production of a BM at the end of day one of PAMORA administration. Secondary outcomes include time to first BM after administration of PAMORA, required switching to, or addition of, another PAMORA to produce a BM, receipt of antitmotility agent after PAMORA administration, and total PAMORA cost per patient. This study was approved by the University of Louisville Institutional Review Board.

Results: Data collection is ongoing. Results will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Conclusion: Conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review guideline recommendations and existing literature for treatment of opioid-induced constipation

Discuss appropriate use of PAMORAs after inadequate traditional laxative response

Self Assessment Questions:

Which of the following are preferred first-line laxatives for opioid-induced constipation according to the American Gastroenterological Association?

- A. Bisacodyl
- B. Methylalnaltrexone
- C. Docusate
- D. Naloxegol

MR is a 57-year-old female admitted to the trauma critical care service. MR has been on a fentanyl drip for two days and the team is concerned about opioid-induced constipation. Docusate-senna 50 mg-8.6 mg 1 tablet twice daily and polyethylene glycol 17 g daily were started yesterday. She has not had a bowel movement, and the team would like your recommendation.

- A. Add naloxegol
- B. Add methylalnaltrexone
- C. Add a bisacodyl suppository
- D. Continue current regimen for 48 hours before escalating therapy

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-573-L01-P

Effects of Pharmacist Continuity of Care on Medication Event Reporting in a Large Community Hospital

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Statement of Purpose:

The purpose of this study is to compare the impact of intermittent and continuous pharmacist staffing models on event reporting, pharmacist interventions, and pharmacist satisfaction at a large community hospital.

Statement of methods used:

This was a single center, retrospective study at a large community hospital. This study looked at comparing intermittent and continuous pharmacist staffing models by evaluating rates of pharmacist interventions and medication related event reporting. In addition, an anonymous pharmacist survey was conducted to assess job satisfaction, and opinions on differences in staffing models relating to patient safety and quality of care. This survey was available for completion for 14 days, with 54 inpatient pharmacists eligible to participate. Intermittent staffing was defined as <3 days worked in the same clinical position in a 5-day work week (Monday-Friday). Continuous staffing was defined as ≥4 days worked in the same clinical position in a 5-day work week (Monday-Friday).

The inclusion period for data collection was January 1st to June 30th, 2023. The primary outcome of this study was the number of good catch reports per 1,000 patient days. Additional outcomes were the number of pharmacist interventions, adverse drug reactions, and medication errors reported per 1,000 patient days. Pharmacist interventions were further broken down into the following categories: antimicrobial stewardship, patient counseling, medication reconciliation, drug information, pharmacy recommendations, IV to oral conversions, and renal dose adjustments. Data was collected from telemetry, critical care, medical surgical units, and the neonatal intensive care unit (NICU). Interventions made by other hospital personnel and data from outpatient infusion centers, peripartum and procedural areas were excluded.

Summary of preliminary results to support conclusion:

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

Learning Objectives:

Describe the impact of a consistent pharmacist as it relates to adverse drug events (ADE), rates of accepted interventions, and intervention types within a hospital unit. Discuss the measurable outcomes impacted by having a dedicated/consistent pharmacist within a hospital unit.

Self Assessment Questions:

Which would not be a potential benefit to having a dedicated/consistent pharmacist staffing on a unit weekly?

- A. Increased interventions relating to nutrition monitoring
- B. Increased compensation of pharmacists
- C. Decreased rates of indicated medications not prescribed to patients
- D. Increased quantity of medication dose modifications

Which of the following is a measurable outcome that could be impacted by having a dedicated pharmacist, excluding weekend/holidays?

- A. Mean drug charges
- B. Mean ICU length of stay
- C. Total length of stay
- D. Preventable adverse drug event (ADE) incidents

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-765-L04-P

Identifying Improvement Opportunities for the Utilization of Carbapenems in a Community Health System

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The medication use evaluation is a two-arm quality improvement project to assess utilization of broad-spectrum antibiotics within the health system. The first arm evaluated patient characteristics and use of meropenem within the health system. The second arm evaluated the effectiveness of the existing ertapenem restriction criteria and identified areas of improvement. This is a retrospective chart review with two arms evaluating use of two carbapenem antibiotics on formulary within the institution. This study evaluated data collected from the electronic health record for patients aged 18 years and older who were administered at least one dose of meropenem or ertapenem from August 1st, 2022 to August 1st, 2023 during a hospital encounter. In the meropenem arm, the primary endpoint is a composite endpoint of percent of patients who received meropenem with at least one of the following: beta-lactam allergy, positive culture for bacteria of interest during their admission, or history of bacteria of interest within past 12 months. Secondary endpoints include a breakdown of the primary endpoint, patients with ICU status at the time of meropenem order, initial empiric antibiotic orders that included meropenem, antibiotic therapy that was escalated to meropenem, and distribution of order indications. The ertapenem arm evaluated the ongoing efficacy of current ertapenem restriction criteria by assessing the accuracy of ertapenem orders. The primary endpoint identified the percent of ertapenem orders that match the criteria chosen based on current institution restriction criteria and chart documentation. Secondary endpoints include percent of ertapenem orders with complete pharmacist documentation and breakdown of indication selected at time of ertapenem order. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference

Learning Objectives:

Identify risk factors for developing antimicrobial resistance

Review current literature for treatment of antimicrobial resistant organisms

Self Assessment Questions:

Which of the following is a risk factor for developing antimicrobial resistance?

- A. Longer duration of antibiotic therapy
- B. Current and prior antibiotic drug exposure
- C. Frequent admissions in healthcare settings
- D. All of the above

What is the preferred antibiotic treatment for ESBL producing organisms outside of the urinary tract per IDSA?

- A. Tetracyclines
- B. Carbapenems
- C. Cephalosporins
- D. Penicillins

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-745-L01-P

Continuous Infusion Vancomycin in Pediatrics

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PURPOSE: Intravenous vancomycin continuous infusion (IVCI) is an increasingly utilized vancomycin dosing strategy in adult populations due to potential advantages in time to target attainment, ease of drug sampling/calculations, reduced total daily dose and reduced nephrotoxicity. However, there is little literature available on the use, dosing, and monitoring of continuous infusion vancomycin in pediatric patients. At Riley Hospital for Children at Indiana University Health, current practice guidelines recommend initiating IVCI in certain situations, including patients requiring >25 mg/kg/dose intermittent infusion vancomycin, history of vancomycin infusion reaction, and if desired when transitioning to outpatient antibiotic therapy for ease of administration. The objective of this study is to describe the use of IVCI in a free-standing pediatric hospital, including safety, dosing and whether patients are achieving therapeutic AUC₂₄. **METHODS:** This is a single-center, IRB approved, retrospective chart review of patients at Riley Hospital for Children who received continuous infusion vancomycin during an inpatient admission from January 2018 through September 2023. Data collected included age, sex, percentile for weight, vancomycin dose (including continuous infusions and intermittent infusions which immediately preceded continuous), vancomycin concentrations during IVCI course, number of dose changes, indication, pathogen targeted, outpatient parenteral antimicrobial therapy (OPAT) duration and concentrations, baseline serum creatinine, highest SCr during course, and allergy information. Endpoints of the study included average dose of IVCI to meet therapeutic targets, percent difference between final intermittent dosing versus IVCI dose in mg/day, and incidence of acute kidney injury while receiving IVCI. **RESULTS AND CONCLUSIONS:** Data collection is still ongoing. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize potential indications for vancomycin continuous intravenous infusions in pediatric patients.

Identify therapeutic monitoring strategies for vancomycin continuous infusions.

Self Assessment Questions:

According to the 2020 revised consensus guidelines, "Therapeutic monitoring of vancomycin for serious methicillin-resistant *Staphylococcus aureus* infections" what is a recommended therapeutic target for vancomycin continuous intravenous infusions?

- A. Trough concentration 10-15 mcg/mL
- B. Steady-state concentration 10-15 mcg/mL
- C. Steady-state concentration 20-25 mcg/mL
- D. Trough concentration 20-25 mcg/mL

You are a clinical pharmacist presenting an in-service to your medical team about vancomycin continuous infusions versus vancomycin intermittent infusions. You explain that compared to intermittent infusion, continuous infusion vancomycin is associated with _____.

- A. Reduced risk of mortality
- B. Increased risk of nephrotoxicity
- C. Reduced time to achieve target concentrations
- D. Ease of concomitant administration of parenteral medications

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-612-L01-P

Cyclophosphamide Use in Rheumatologic Conditions

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Cyclophosphamide is commonly utilized for immunosuppression in rheumatologic conditions, such as lupus and vasculitis. However, no standardized recommendations exist for the use of supportive therapies, namely mesna, that mitigate the potential for serious adverse events of cyclophosphamide in rheumatologic conditions, which may influence the length of cyclophosphamide infusions and patients' quality of life. This study evaluated overall and infusion location-specific cyclophosphamide prescribing trends over the last five years within the rheumatology department at a pediatric hospital. Standardized dosing protocols will be created based on the results of this study to prioritize safety, patient experience, and staff efficiency.

A retrospective chart review was conducted for patients who received intravenous cyclophosphamide doses for rheumatologic conditions. Data collected included patient demographics; fertility consultations; and use of mesna, pre- and post-infusion fluids, opportunistic infection prophylaxis, and additional ancillary medications. Trends in prescribing, frequency of serious adverse events, and time to cyclophosphamide start were compared between doses administered inpatient and an infusion clinic.

Sixty-five patients were identified between January 2018 and July 2023, and 38 met inclusion criteria. Amongst the 210 infusions administered, 77.6% occurred in an inpatient setting and 93% were delivered with at least one dose of mesna. Median time to cyclophosphamide start was 3.39 hours less for infusions in an infusion clinic ($p < 0.0001$). Nineteen serious adverse events were recorded, all relating to infections or cytopenias. Prescribing trends varied widely for other supportive therapies. Time to cyclophosphamide start was significantly faster in the infusion clinic compared to inpatient admission. Additionally, patients in the infusion center had similar rates of adverse events as those admitted. Creating standardized dosing protocols for intravenous cyclophosphamide administration in rheumatologic conditions will reduce interprescriber variability. Our data suggests that the use of infusion clinics would improve patient experience and staff efficiency by reducing the duration of infusions.

Learning Objectives:

Review common toxicities and supportive measures utilized in cyclophosphamide treatment of rheumatic diseases

Discuss factors that impact length of cyclophosphamide infusions and patients' experiences

Self Assessment Questions:

Which of the following adverse events associated with cyclophosphamide treatment is paired with the correct preventative measure?

- A. Nausea/vomiting & hydration fluids
- B. Infertility & sulfamethoxazole/trimethoprim
- C. Opportunistic infection prophylaxis & egg/sperm preservation
- D. Hemorrhagic cystitis & mesna

What factor is associated with significantly increased duration of cyclophosphamide infusions at this pediatric institution?

- A. Type of hydration fluid utilized
- B. Location of cyclophosphamide infusion
- C. Administration of furosemide post-infusion
- D. Higher doses of cyclophosphamide

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-560-L01-P

Pharmacy Productivity Metrics in an Adult and Pediatric Emergency Department

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Current productivity metrics for emergency medicine pharmacists (EMPs) are often limited to number of orders verified and notes entered in the electronic medical record, which does not accurately encompass the work being performed. Some EMP clinical activities that are difficult to quantify include bedside response for high acuity patients, drug information and toxicology consults, and patient education. Preliminary work assessing EMP clinical activities demonstrated a correlation between clinical activities and an emergency department (ED) pharmacy intensity scoring tool (EMPIST) but did not include an assessment at pediatric-only emergency departments. In addition, it is unclear if the EMPIST score can be applied broadly to EDs outside of the study. The objective of this study is to develop and implement an institutional-specific EMP metric tracker that adequately captures clinical activities for both an adult and pediatric emergency department.

This single-center, prospective, observation analysis will collect EMP clinical activities over a two-week period to determine true clinical activities completed by shift time and respective ED (adult or pediatric). Tracker categories include bedside monitoring, antibiotic optimization, stewardship of high-cost medications, therapeutic interventions, discharge prescription review, medication history, and discharge education. The primary outcome will be the correlation between the total EMPIST score and the sum of

EMP activities, with each individual item and activity assigned a point value of 1. The secondary outcome will be average time spent participating in bedside resuscitation. Descriptive statistics will be used for all variables. Spearman's rank-order correlation coefficient will be used to evaluate the agreement between EMP activities and the scoring tool. The outcomes of this study will be used to establish a workload dashboard to monitor EMP clinical activities over time, which can then be monitored to optimize EMP staffing schedules, identify patients with a greater EMP need, and determine full-time equivalent staffing needs.

Learning Objectives:

Review current literature on pharmacist intervention tools

Discuss the development of an institution-specific ED pharmacy metric scoring tool

Self Assessment Questions:

Which of the following ED-specific pharmacy metrics are not being captured in standard metric tracking?

- A. The number of questions asked by nurses
- B. Bedside response
- C. Prospective antimicrobial stewardship
- D. All of the above

T/F: The MRC-ICU score captures the time spent on a task or medication

- A. TRUE
- B. FALSE
- C. -
- D. -

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-787-L04-P

Outpatient Parenteral Antimicrobial Therapy: 30-day Readmission Rates and Risk Factors

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Background: Outpatient parenteral antimicrobial therapy (OPAT) is the intravenous (IV), subcutaneous, or intramuscular administration of antiviral, antibiotic, or antifungal agents outside of the hospital setting. Hospital readmissions due to complications or adverse drug events are key risks associated with OPAT. Prior studies have reported OPAT-related 30-day readmission rates ranging from 6 to 26%. Previous research suggests that specific types of infection, a history of antimicrobial resistance, or discharge to a skilled nursing facility may be independent predictors of OPAT-related 30-day hospital readmission. However, these results are not uniform across studies. At Henry Ford Jackson Hospital (HFJH), the healthcare team works to optimize OPAT regimens for each patient. Pharmacists also provide OPAT education directly to patients and case managers complete a social determinants of health assessment to identify patient needs, including those related to transportation and access to healthcare follow-up. Despite these beneficial practices, HFJH has continued to observe a higher incidence of OPAT-related readmissions compared to other hospitals within Henry Ford Health. Purpose: This study aims to measure the rate of all-cause unplanned 30-day OPAT hospital readmissions or emergency department (ED) visits and to identify potential risk factors for OPAT readmissions. Methods: This is a single-center retrospective cohort study of adults discharged from HFJH with at least one IV antimicrobial between 10/1/2022 and 9/30/2023. The primary outcome is all-cause unplanned 30-day hospital readmissions or ED visits among patients discharged with OPAT. Secondary outcomes include medical, social, and demographic risk factors for OPAT-related 30-day hospital readmission or ED visit. Results/Conclusions: Data analysis is currently being performed. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize potential advantages of OPAT.

List potential risk factors for OPAT-related hospital readmission.

Self Assessment Questions:

Which of the following is considered an advantage of OPAT?

- A. More cost-effective than oral antimicrobial therapy.
- B. Lower risk of complications compared to oral antimicrobial therapy.
- C. Shorter hospital stays.
- D. Shorter durations of antimicrobial therapy.

Which of the following is a potential risk factor for readmission among patients discharged with OPAT?

- A. OPAT durations of less than 7 days.
- B. Past medical history of antimicrobial resistant infection.
- C. Early outpatient follow-up with infectious disease specialists.
- D. Having a primary care provider.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-524-L01-P

Characterization of Risk for Dexmedetomidine Withdrawal in the Intensive Care Unit

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Background:

Dexmedetomidine is a highly utilized sedative in the intensive care unit (ICU) that works as a centrally acting alpha2 agonist, which doesn't require airway support. Current literature suggests that not only does dexmedetomidine withdrawal occur, it may be prevented rather than just treating symptoms. Although studies have demonstrated safety and efficacy of dexmedetomidine infusions for up to five days, withdrawal can occur when infusions are stopped abruptly. Typical withdrawal symptoms include confusion, agitation, tachycardia, and hypertension. The primary objective of this study is to understand characteristics surrounding patients who experience withdrawal from dexmedetomidine infusions and identify any potential risk factors that may put a patient at a higher risk of having withdrawal symptoms. Secondary outcomes include analyzing clonidine use for prevention and treatment of dexmedetomidine withdrawal, impact on hospital and ICU stay, and sedation cost of treatment.

Methods:

This retrospective chart review will look at 200 adult patients from March 1, 2020, through July 31, 2023 that received at least 12 continuous hours of dexmedetomidine infusion at Trinity Health Grand Rapids. Dexmedetomidine withdrawal is defined as two or more of the following: BP greater than 160/90 mmHg, HR greater than 100 beats/min, positive Confusion Assessment Method ICU (CAM-ICU) score, or Richmond Agitation and Sedation Scale (RASS) score of +1 or higher. Patients who are on clonidine prior to admission, expire or are discharged from the ICU within 24 hours of dexmedetomidine discontinuation, have cirrhosis, or are initiated on dexmedetomidine for the treatment of alcohol withdrawal will be excluded from the study. A regression analysis will be performed to identify which variables correlate to withdrawal to predict a patient's risk of withdrawal in the future.

Learning Objectives:

Explain the pathophysiology behind the role of alpha-2 agonists in sedation.

Identify the gaps in current literature surrounding dexmedetomidine and clonidine for sedation.

Self Assessment Questions:

How do dexmedetomidine and clonidine exert sedative effects?

- A. Through alpha-2 antagonism
- B. Through alpha-1 and alpha-2 agonism
- C. Through alpha-2 agonism
- D. Through mixed beta and alpha agonism

Which of the following gaps in literature exist surrounding dexmedetomidine and clonidine?

- A. Incidence of dexmedetomidine withdrawal
- B. Benefits of using clonidine for dexmedetomidine withdrawal
- C. Characteristics of dexmedetomidine withdrawal
- D. Consensus around clonidine dosing for weaning off dexmedetomidine infusion

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-634-L01-P

Look-alike Sound-alike Gap Analysis

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Since 2008, the Institute for Safe Medication Practices (ISMP) has maintained a list of drug name pairs, employing recommended uppercase and bolded tall-man letters in mixed case to emphasize distinctions in look-alike and sound-alike drug names. Studies conducted between 2000 and 2021 demonstrate that tall-man lettering, alone or combined with other text enhancements, may improve drug name perception and reduce errors stemming from name similarity. ISMP, the US Food and Drug Administration (FDA), the World Health Organization, and the International Medication Safety Network endorse tall-man lettering for the prevention of medication errors due to similarity in medication names.

Froedtert & the Medical College of Wisconsin (F&MCW) currently has a document summarizing the medications that should employ tall-man lettering at the institution, however there are gaps when compared to industry standards published by ISMP and the FDA. This project seeks to address these gaps in recommendations and will also assess the effectiveness and implementation of tall-man letters for LASA drug names. The intervention will include adding medications that are not currently on F&MCW's LASA list but are recommended by the FDA or ISMP. It will also include changing any tall-man lettering that is different than what is recommended by the FDA or ISMP. Finally, the intervention will involve removing all tall-man lettering for medications that are not recommended by the FDA or ISMP. After adopting and implementing the industry standards, this quality improvement project aims to determine whether the use of mixed uppercase and lowercase letters to emphasize dissimilarities in drug names reduces errors caused by name similarity.

Results of this project are pending.

Learning Objectives:

Identify which organizations publish industry standards for look-alike sound-alike tall man lettering

Review some of the strategies recommended by ISMP & FDA for emphasizing distinctions among look-alike sound-alike drug names.

Self Assessment Questions:

Which organizations publish industry standards for look-alike sound-alike tall-man lettering?

- A. ISMP & FDA
- B. ISMP & WHO
- C. WHO & DEA
- D. FDA & DEA

Which of the following is a strategy recommended by ISMP and FDA to emphasize distinctions in look-alike sound-alike drug names?

- A. Increased size of lettering
- B. Underlined lettering
- C. Tall-man lettering
- D. Colorful lettering

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-791-L05-P

Shockingly Vague: Comparing Adjunctive Measures in Septic Shock

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The objective of this study is to assess the effectiveness and safety of the administration of vasopressin compared to hydrocortisone as adjunctive agents to norepinephrine for hemodynamic management in septic shock. There is a lack of consensus regarding the timing and order of initiation of vasopressin and hydrocortisone in septic shock. Historically, in patients requiring escalating norepinephrine doses, vasopressin has been initiated first followed by hydrocortisone. However, recent retrospective studies have suggested there may be benefit to initiating hydrocortisone before vasopressin. This study intends to provide further clarity regarding the selection and timing of a second-line agent in septic shock.

This is an observational study using retrospective data from patients with septic shock admitted to the medical intensive care unit (ICU) at five Trinity Health hospitals between February 2020 and July 2023. The cohort was divided into two groups: patients treated with vasopressin (0.03-0.04 units/min) and patients treated with hydrocortisone (200-300 mg/day). Major inclusion criteria include a diagnosis of septic shock as defined by the ICD-10 diagnosis code for septic shock, appropriate fluid resuscitation, initiation on norepinephrine prior to initiation of study drug, and baseline serum lactate ≥ 2 mmol/L. The primary outcome is resolution of shock, defined as attainment of a mean arterial pressure of 65 mm Hg for more than 24 hours without the use of vasopressors, with in-hospital mortality as a competing risk event. Secondary outcomes include ICU length of stay, hospital length of stay, 30-day mortality, time to vasopressor discontinuation, need for renal replacement therapy, and safety outcomes. Outcomes were analyzed with Cox proportional hazard models and multivariable regression models. Baseline characteristics between the hydrocortisone and vasopressin groups were collected and compared.

Learning Objectives:

Review current literature regarding adjunctive measures to norepinephrine in septic shock

Discuss the effect of adjunctive agents (hydrocortisone vs. vasopressin) to norepinephrine in septic shock on outcomes across five Trinity Health Michigan hospitals

Self Assessment Questions:

1. According to the 2021 Surviving Sepsis Campaign Guidelines, at what dose of norepinephrine (NE) should initiation of vasopressin (V) and hydrocortisone be considered?

- A. V: 0.1-0.25 mcg/kg/min; HC: ≥ 0.2 mcg/kg/min
- B. V: ≥ 0.2 mcg/kg/min; HC: 0.1-0.25 mcg/kg/min
- C. V: 0.25-0.5 mcg/kg/min; HC: ≥ 0.25 mcg/kg/min
- D. V: ≥ 0.25 mcg/kg/min; HC: 0.25-0.5 mcg/kg/min

2. Historically, vasopressin has been initiated prior to hydrocortisone. Based on current literature, which of the following is NOT associated with early initiation of hydrocortisone?

- A. Shorter times to vasopressor discontinuation
- B. Greater number of days free from vasopressors
- C. Shorter ICU and hospital length of stay
- D. Greater reductions in SOFA score at 72 hours

Q1 Answer: C Q2 Answer: D
ACPE Universal Activity Number 0121-9999-730-L01-P

Investigating the Underutilization of GLP-1 Receptor Agonists and SGLT-2 Inhibitors in Patients with Type 2 Diabetes

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Purpose: In the US, individuals with diabetes are two times more likely to develop cardiovascular disease, up to 50% may develop congestive heart failure (CHF), and more than 30% have chronic kidney disease (CKD). Certain medications for diabetes (glucagon-like peptide 1 receptor agonists [GLP-1 RAs] and sodium-glucose cotransporter-2 [SGLT-2] inhibitors) have also been shown to have added cardiovascular and renal benefits. The American Diabetes Association recommends customizing treatment based on individual patient characteristics and comorbidities. The purpose of this study is to identify any potential underutilization of GLP1-RAs or SGLT-2 inhibitors among veterans with type 2 diabetes (T2DM) in order to improve patient-centered care and ensure optimal cardiovascular and renal protection.

Methods: This study is a retrospective electronic chart review of patients with a diagnosis of T2DM and a co-morbidity of ASCVD, CHF, and/or CKD at Veteran Health Indiana who are not prescribed a GLP-1 receptor agonist or a SGLT-2 inhibitor from January 1, 2021 through December 31, 2022. Patients were included if they were at least 18 years of age, had a diagnosis of T2DM with a co-morbidity of ASCVD, CHF, and/or CKD, and were not prescribed a GLP-1 RA or SGLT-2 inhibitor. Patients were excluded if they resided in a long-term care facility or if they had no primary care provider assigned. The primary outcome was to determine the number of veterans with T2DM and ASCVD, CHF, and/or CKD who are not prescribed a GLP-1 RA or SGLT-2 inhibitor. Secondary outcomes include an assessment of the various reasons for underutilization of these agents.

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

Learning Objectives:

State the percentage of veterans who could have potentially benefited from a GLP-1 receptor agonist or a SGLT-2 inhibitor.

Explain the factors leading to the low use of GLP-1 receptor agonists or a SGLT-2 inhibitors.

Self Assessment Questions:

MS is a 65 YOM with T2DM diagnosed 3 months ago. He was started on lifestyle modifications and metformin which has been titrated up to 1000 mg BID. His PMH is significant for HTN, HLD, obesity, MI s/p drug-eluting stent, and chronic pancreatitis. Today, his eGFR is 64 mL/min/1.73 m² and A1C is 7.8%. BP is 138/72 mmHg with HR 82 bpm. Based on the information provided, which of the following is the best to recommend as additional therapy for MS's DM?

- A. Add empagliflozin
- B. Add semaglutide
- C. Add glargine
- D. Add alogliptin

What were the main barriers to the use of GLP-1 receptor agonists and SGLT-2 inhibitors among the patient population in this study?

- A. Formulary status of medications
- B. Drug supply shortages
- C. Lack of familiarity of these medications among healthcare providers
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-585-L01-P

Impact of Pharmacist Transitions of Care Services for Patients with Chronic Obstructive Pulmonary Disease in a Rural Community Hospital

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Purpose: The prevention of medication related errors is an important component of patient safety for all health systems. The objective of this study is to determine if the integration of pharmacist services into the multidisciplinary transitions of care (TOC) team will reduce discrepancies in discharge medication reconciliation lists, improve medical staff satisfaction with the discharge medication reconciliation process, and improve medication related Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores.

Methods: Pharmacists were consulted for TOC services on patients being discharged from the hospital with a diagnosis of chronic obstructive pulmonary disease (COPD). Pre and post intervention data was collected with 40 patients in the control group and 40 patients in the intervention group. In the intervention group, the pharmacist provided: (1) a medication review, (2) discharge medication counseling and education, and (3) a follow-up telephone call after discharge. The medication review included interventions to ensure that patients were receiving guideline-directed medication therapy for COPD treatment and interventions to address unintentional discrepancies between the best possible pre-admission home medication list and discharge medication reconciliation list. Discharge counseling and education included standard medication counseling, as well as inhaler technique demonstrations, as needed tobacco cessation counseling, strategies to improve adherence, and ensuring access to medications. Follow-up phone calls served to reemphasize the information discussed at discharge and identify any new medication related issues. Medical staff satisfaction with the pharmacist TOC services was measured through surveys conducted pre and post intervention. The primary outcome is the change in the average number of discharge medication reconciliation discrepancies between the control and intervention groups. Secondary outcomes include the impact of the pharmacist services on medication related HCAHPS scores and medical staff satisfaction with the discharge medication reconciliation process.

Results and conclusion to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define guideline-directed medication therapy for patients with chronic obstructive pulmonary disease (COPD).

Recognize the role that transitions of care pharmacist services can have in patients with COPD.

Self Assessment Questions:

Based on 2023 GOLD guidelines, which of the following treatment regimens is most appropriate for a patient with a COPD exacerbation leading to hospitalization?

- A. ICS alone

- B. ICS/LABA
- C. LAMA alone
- D. LABA/LAMA

Which of the following are interventions that transitions of care pharmacists can make in an attempt to improve outcomes in patients with COPD?

- A. Reviewing of home medication list to improve discharge medication reconciliation accuracy
- B. Providing discharge medication counseling and education
- C. Completing post-discharge follow up calls
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-508-L01-P

Safety and Efficacy of Full Intensive Phase Apixaban and Rivaroxaban Following Extended Duration Parenteral Anticoagulation for Acute VTE Treatment

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Purpose: Direct Oral Anticoagulants (DOACs) are recommended as first-line agents for the treatment of venous thromboembolism (VTE). The recommended dosing strategies include a 7-day intensive phase (10 mg twice daily) for apixaban and a 21-day intensive phase (15 mg twice daily) for rivaroxaban, followed by a less intense maintenance regimen of 5 mg twice daily and 20 mg once daily, respectively. The AMPLIFY and EINSTEIN trials excluded patients with greater than 48 hours of parenteral anticoagulation; however, in the inpatient setting, it is common to maintain patients on parenteral anticoagulation for a greater duration as the longer half-lives of DOACs can be unfavorable when immediate cessation is needed for procedures and tests. When patients need more than 48 hours of parenteral anticoagulation, dosing practices vary widely in switching patients from a parenteral anticoagulant to a DOAC. This study aims to evaluate the safety and efficacy of utilizing the entire intensive phase of DOAC therapy in the setting of prolonged parenteral anticoagulation duration compared to partial or no intensive DOAC therapy.

Methods: A retrospective chart review will be performed to evaluate adult patients that received greater than 48 hours of parenteral anticoagulation followed by apixaban or rivaroxaban for acute VTE between July 1, 2021, and December 31, 2022. Patients that received full intensive phase of either agent will be compared with none or partial intensive phase. The primary endpoint is the composite incidence of major bleeding, defined by International Society on Thrombosis and Hemostasis, within 90 days. For baseline characteristics and primary endpoints, t-tests or Mann-Whitney tests will be used for continuous data and chi-square, or Fisher's exact tests will be used for categorical data.

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

Learning Objectives:

Describe the prevalence and risk factors associated with venous thromboembolism.

Review the retrospective data reported from Indiana University Health for the efficacy and safety of full intensive phase of DOAC following extended duration of parenteral anticoagulation for the treatment of VTE.

Self Assessment Questions:

AMPLIFY and EINSTEIN studies excluded which of the following patients?

- A. Patients who received >48 hours of low molecular weight heparin
- B. Patients with atrial fibrillation
- C. Patients who received >24 hours of continuous intravenous heparin
- D. Patients with hemoglobin less than 10 mg per deciliter

Which of the following dosing strategies is recommended by available guidelines for the transition to DOAC following extended duration of parenteral anticoagulation for VTE treatment?

- A. Skip intensive phase dosing completely and start maintenance dose.
- B. Guidelines do not address this topic directly. Limited studies have assessed the safe transition to DOAC in this scenario.
- C. It is recommended that patients receive full intensive dosing phase followed by maintenance dose, regardless of duration of parenteral anticoagulation.
- D. It is recommended to count the parenteral anticoagulation duration as part of the total intensive phase of DOAC if patients receive >48 hours of parenteral anticoagulation.

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-647-L01-P

Unveiling the Impact of Pharmacist Double Checks in Pediatric Oncology Amidst the Digital Health Revolution

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Historically when chemotherapy orders were transcribed from paper into an electronic system, a second pharmacist validated the transcription. High risk medications required dual/second verification. Though technology has improved how orders flow through the verification process, challenges persist. Pharmacist verification ensures appropriateness of the regimen for diagnosis, validation of treatment parameters, and mitigation of toxicity. Pediatric chemotherapy regimens can present with greater complications compared to adults. This population may be less tolerant of chemotherapy due to developing organs being more susceptible to adverse effects. Additionally, treatment sessions may include medications that must be administered via different routes on the same day. Therefore, it becomes increasingly important to identify how pharmacist dual verification enhances the value in reviewing chemotherapy orders for pediatric patients.

Retrospective, single-center, descriptive study to evaluate the rate of therapy modifications due to errors during chemotherapy order verification in pediatric patients at C.S. Mott Children's Hospital at University of Michigan Health from July 1, 2022 - June 30, 2023.

Inpatient and outpatient anti-cancer treatment plans for patients < 18 years old that required dual verification by different pharmacists are included. Patients enrolled in clinical trials at the time of treatment are excluded.

Primary outcome is the incidence of error identification during first verification and second verification. Secondary outcomes involve error classification, verification completion time, and time between verifications. Descriptive statistics will detail patient demographics, diagnoses, chemotherapy regimen details, number and type of corrections, and validation that the review was completed by two different pharmacists.

Study limitations include its retrospective nature, potential oversight in supportive care changes, and inability to review unidentified errors. Implementation of electronic medical records and electronic order verification has advanced our practice, however changes in current practice will require evidence of safe.

Learning Objectives:

Explain the importance of chemotherapy order error identification

Review objectives, design, and significance of the proposed study

Self Assessment Questions:

Which of the following reason for why pediatric oncology orders may be more complicated than adult orders?

- A. Adults tend to be less tolerant of chemotherapy.
- B. Pediatric treatment days may occur more frequently than adult treatment days.
- C. Pediatric medications are administered via a single route.
- D. Adults tend to experience more severe side effects due to chemotherapy.

What is a limitation of technology in chemotherapy verification?

- A. Automated dose calculations
- B. Identification of drug-drug interactions
- C. Assessment of organ function
- D. Warnings on dose limits

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-807-L05-P

Response of Serum Creatinine to Albumin Protocol Adjustment: A Pre and Post Analysis

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Purpose: Acute kidney injury (AKI) in hospitalized patients with decompensated cirrhosis is associated with increased morbidity and mortality. Volume resuscitation with albumin may improve renal perfusion and prevent hepatorenal syndrome (HRS). American Association for the Study of Liver Disease (AASLD) guidelines recommend intravenous albumin for volume resuscitation in patients with hypovolemia-induced AKI, dosed at 1 gram/kilogram of body weight/day for 48 hours with no delineation on body weight used. The purpose of this study was to compare serum creatinine and AKI stage responses in patients with cirrhosis and AKI receiving flat dose to those receiving ideal body weight (IBW)-based albumin following an albumin dosing change at our institution.

Methods: This was a single-center, retrospective, cohort study at an academic tertiary care center. Patients were divided into a pre-exposure group of flat dose albumin and a post-exposure group of IBW-based albumin. The primary outcome was the difference in proportion of patients with response in AKI stage by day 7 or discharge, whichever was sooner, between groups. Patients included were at least 18 years of age with a diagnosis of cirrhosis and AKI who received albumin via an institutional order panel for ≤ 48 hours. Exclusion criteria included: septic shock, crystalloid fluids exceeding 1 liter, albumin use outside of the protocol, nephrotoxic medications, vasopressors, midodrine and octreotide, or large-volume paracentesis within the initial 48 hour albumin resuscitation. Data collected include demographics, serum albumin, serum creatinine, AKI stage, and albumin dosage at defined intervals during resuscitation. Linear regression models will be used to estimate proportions and differences in proportions.

Results, Conclusions: Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the diagnostic criteria and initial medication management for acute kidney injury in patients with cirrhosis.

Explain the risks of over resuscitation with albumin in AKI with cirrhosis.

Self Assessment Questions:

The AASLD guidelines recommended intravenous albumin infusions for volume resuscitation in patients with hypovolemia-induced AKI for what duration?

- A. 24 hours
- B. 48 hours
- C. 72 hours
- D. Until resolution of the AKI

Which of the following is a potential complication when using a targeted serum albumin as a marker for resuscitation?

- A. Pulmonary edema
- B. Esophageal varices
- C. Paradoxical hypoalbuminemia syndrome (PHS)
- D. Progression to ESRD

Q1 Answer: B Q2 Answer: A

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

Impact of Antiviral Stewardship on Cytomegalovirus Outcomes in Transplant Recipients

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Purpose: The purpose of this study is to describe high-risk post-prophylaxis CMV at our center and evaluate the effectiveness of pharmacist antiviral stewardship on early identification and treatment.

Methods: High-risk surveillance at our center requires CMV PCRs every 14 days for a duration of 90 days. Preemptive treatment with valganciclovir is started for any replication >LLOQ. The goal of the surveillance program is to provide treatment before symptomatic disease to foster CMV specific cell-mediated immunity. Adult patients were included if they received a primary liver or kidney transplant at our center between 7/1/2020-11/30/2022. Patients were followed through 12 months post-transplant and all data was collected via retrospective chart review.

Results: 92 patients were identified in the study period (62 kidney, 30 liver). Mean age at transplant was 53.43±12.65 years, 70.7% were male and 60.9% received lymphocyte induction. Incidence of post-prophylaxis CMV was 52.2%. All patients received PET with mean time from first detection to PET initiation of 4±2.5 days.

Mean duration of PET at first replication was 33±27.5 days. Throughout the surveillance period 19.6% patients reported symptoms suspicious for CMV syndrome, which were mostly mild. CMV-related hospital admission during surveillance was 4.3%. No patients developed CMV end-organ disease or ganciclovir resistance during the study. 22 patients (23.9%) had CMI testing after the 90-day surveillance period, 45.4% had positive assays. Of these, all patients had a replication event during surveillance. Of the 54.6% with negative CMI testing, 58.3% did not have a replication episode during the surveillance period.

Conclusions: These results demonstrate that a CMV stewardship program can be used to recognize and promptly manage post-prophylaxis viremia in CMV high-risk patients. Based on our experience, protocolized post-prophylaxis surveillance may reduce CMV hospitalizations, as well as prevent end-organ disease and ganciclovir resistance. Facilitated CMI development in the setting of controlled replication is possible.

Learning Objectives:

Identify the solid-organ transplant patient serostatus at highest risk for cytomegalovirus replication and progression to end-organ disease

Recognize the potential benefits of an effective cytomegalovirus antiviral stewardship program

Self Assessment Questions:

Which of the following serostatuses represents patient's who are high-risk for cytomegalovirus end-organ disease?

- A. Donor + / Recipient +
- B. Donor - / Recipient -
- C. Donor + / Recipient -
- D. Donor - / Recipient +

Which of the following are benefits identified with an effective, protocolized post-prophylaxis cytomegalovirus surveillance program?

- A. Reduced hospitalizations for cytomegalovirus disease
- B. Reduced incidence of ganciclovir resistance within the solid-organ transplant population
- C. Facilitated development of cytomegalovirus cell-mediated immunity
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-639-L01-P

An automated approach to diagnosis verification: effects on utilization of glucagon-like peptide-1 agonists (GLP-1a)

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Purpose

The GLP-1a drugs are a substantial cost driver with increasing utilization for weight loss among non-diabetic patients. Payers have strategies to prevent drug use for non-covered diagnoses. A new strategy requires the dispensing pharmacist to provide evidence of a covered medical diagnosis at the point-of-sale. This automated process intends to reduce the use of drugs for non-covered diagnoses while promoting timely dispensing for covered diagnoses. This study assessed the effect of requiring a diagnosis code for diabetes at the point-of-sale on the utilization of GLP-1a drugs.

Methods:

This was a retrospective cohort study where 12 months of pharmacy claims data were compared between a group exposed to the diagnosis code requirement and a group not exposed. The primary endpoint was the change in the proportion of overall members utilizing GLP-1a drugs in the control and intervention groups. The secondary endpoint was the percent change in per-member-per-month (PMPM) total cost. An exploratory endpoint assessed delays in therapy in the intervention group.

Results:

The proportion of members utilizing GLP-1a drugs significantly changed from 4.1% to 6.8% of members in the control group ($P < 0.0001$). The proportion changed from 1.4% to 1.5% in the intervention group, which was not statistically significant ($P = 0.0159$). Total PMPM cost increased by 79% in the control group and 15% in the intervention group. Among claims rejected for not having a diagnosis code, the mean delay in dispensing for members with diabetes was 2.4 days.

Conclusions:

This study suggests that requiring diagnosis codes at the point-of-sale is an effective utilization management strategy. This strategy decreased the rise in GLP-1a utilization and costs compared to a group that did not require diagnosis codes. Overall, this strategy is a resource effective method of controlling drug spend that does not delay dispensing for covered uses.

Learning Objectives:

Identify GLP-1a medications indicated for weight loss vs type 2 diabetes.

Discuss the benefits and limitations of various utilization management strategies.

Self Assessment Questions:

What utilization management strategy requires a managed care pharmacist to review the patient's case?

- A. Diagnosis codes inputted at the point-of-sale
- B. Making a drug "not covered" on a formulary
- C. Prior authorization
- D. A quantity limit

Which of the following medications is indicated for weight loss in non-diabetic patients?

- A. Ozempic
- B. Wegovy
- C. Mounjaro
- D. Rybelsus

Q1 Answer: C Q2 Answer: B
ACPE Universal Activity Number 0121-9999-767-L04-P

Comparison of Minocycline versus Sulfamethoxazole/Trimethoprim Monotherapy for Treatment of Stenotrophomonas Maltophilia Pneumonia

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Purpose: Stenotrophomonas maltophilia is a gram-negative multidrug-resistant bacillus that is a nosocomial pathogen with high mortality rates. Antibiotic selection to treat S. maltophilia remains challenging due to inherent antibiotic resistance, lack of controlled clinical trials comparing antibiotics with in-vitro susceptibility, and unfavorable adverse effects of antibiotics commonly prescribed. Historically, trimethoprim-sulfamethoxazole (TMP-SMX) monotherapy has been the standard of care, but treatment with alternatives, such as minocycline, is desirable due to toxicity concerns with TMP-SMX. These include acute kidney injury (AKI), hyperkalemia, and thrombocytopenia. Therefore, the purpose of this study was to compare the rate of clinical cure and adverse effects between minocycline versus TMP-SMX monotherapy for S. maltophilia pneumonia.

Methods: A single-center, retrospective cohort study of patients with S. maltophilia pneumonia admitted between March 1, 2018 and September 30, 2023 was conducted comparing minocycline versus TMP-SMX monotherapy. Patients aged 18-89 with their first episode of S. maltophilia pneumonia treated with TMP-SMX or minocycline monotherapy within the study period were eligible for study inclusion. Patients were excluded if they were incarcerated, received combination therapy for greater than 48 hours, had a concomitant untreated infection, had a polymicrobial respiratory culture, had resistance to or lack of susceptibility to definitive antibiotics, had recurrent S. maltophilia, were admitted already on treatment, or had a history of cystic fibrosis. The primary outcome was the rate of clinical cure, defined as meeting two of the three prespecified criteria for a period of 48 hours while on definitive therapy. These criteria included normalization of white blood cell count, absence of fever or hypothermia, and improvement in oxygen requirements. Secondary outcomes evaluated included time to clinical cure, infection-related length of stay, infection-related mortality, pneumonia recurrence, and overall incidence of adverse effects which was a composite of AKI, hyperkalemia, and thrombocytopenia.

Results/Conclusions: Analysis is ongoing and results will be presented.

Learning Objectives:

Describe current literature regarding Stenotrophomonas maltophilia treatment.

Recognize challenges in treating Stenotrophomonas maltophilia pneumonia while avoiding medication toxicity.

Self Assessment Questions:

What is Stenotrophomonas maltophilia?

- A. Virus
- B. Fungus
- C. Gram positive cocci
- D. Gram negative bacilli

Which is a side effect commonly reported with TMP-SMX use?

- A. Epistaxis
- B. Hyponatremia
- C. Thrombocytopenia
- D. Hypokalemia

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-578-L01-P

Safety and Efficacy of Peripheral Anti-thymocyte Globulin Administration in Kidney Transplant Recipients

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Rabbit anti-thymocyte Globulin (rATG) is historically recommended to be administered via high flow vein, typically a central venous catheter, for prevention and treatment of rejection. Recently, peripheral administration of rATG was proposed due to available literature noting its comparable safety and efficacy to central administration, but with reduced costs and central line associated complications. In August of 2021, Henry Ford Hospital (HFH) implemented a protocol to administer rATG via peripheral intravenous (IV) access. The purpose of this study is to compare the safety and efficacy of centrally and peripherally administered rATG induction therapy.

This retrospective cohort quasi study will identify transplant recipients who have received rATG induction therapy, via either central or peripheral IV access, at HFH from August 1st, 2018, to August 31st, 2023. The patient cohort is comprised of adult recipients of renal transplant alone who received rATG induction therapy. This study excludes those who are pregnant, HIV positive, received A2B incompatible kidneys, or received a dual transplant. Primary outcomes include biopsy proven rejection requiring treatment within 6 months post-transplant, infusion site reaction, line infection within 48 hours of line placement, and upper extremity deep vein thrombosis (DVT) within 1 month of last rATG dose. Secondary outcomes include receipt of planned induction doses of rATG; thrombocytopenia, leukopenia, and lymphopenia within 24 hours of last rATG dose; opportunistic infection, length of stay, and death within 6 months of transplant. This study will include 70 patients who received rATG via peripheral access and 70 patients who received rATG via central access. Statistical analysis will be conducted using mean and standard deviation and Chi-squared or Fisher's exact tests for normal parametric and categorical data, and median and interquartile range and Mann-Whitney U for normal non-parametric and continuous data.

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

Learning Objectives:

Describe the advantages and disadvantages of central versus peripheral administration of rATG in adult renal transplant recipients.

Discuss safety outcomes in adult renal transplant recipients who have received rATG as induction therapy.

Self Assessment Questions:

Why was rATG formerly recommended to be administered via central line only?

- A. Concerns surrounding fluid volume administration
- B. rATG is an irritant and may cause thrombophlebitis when administered peripherally
- C. Central line administration required less pokes for the patient
- D. There is a lower chance of losing line access with central line administration

The initial dose of rATG for induction should be administered:

- A. Immediately before or at the time of transplantation
- B. The day prior to transplantation
- C. The day after transplantation
- D. 3 days prior to transplantation

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-681-L01-P

Analysis of Automated Dispensing Cabinet Override Rates

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Background/Purpose: The override function on automated dispensing cabinets (ADCs) is intended to be used in situations where the benefit of administering a medication not reviewed by a pharmacist outweighs the risk of poor patient outcomes from a delay in medication administration. This project will identify opportunities to reduce the rate of override dispenses, assess the appropriateness of medications currently being dispensed on override, and will also ensure compliance with accreditation standards and accepted best practices. **Methods:** Medication dispense data from ADCs, excluding anesthesia workstations and non-profiled cabinets, were collected and analyzed to identify; the total hospital override rate, unit specific override rates, and the most common medications dispensed on override. A decision algorithm to determine if a medication should be available to override was created and integrated into institution policy. Upon approval of the policy update, the institution's current list of medications available on override will be assessed for appropriateness according to the new policy. Thereafter, the physical ADCs will restrict the override function on non-applicable medications. An educational tool to emphasize the procedure of overrides will be created and presented to the hospital staff who retrieve medications from the ADC. An analysis of override rates post-education will be conducted to assess post-implementation override rates and medications commonly dispensed on override. Lastly, a process for override dispense rate tracking and regular review will be designed and implemented. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the approach to reduce the override dispense rate from ADCs

Identify situations where a medication is appropriate for override dispensing

Self Assessment Questions:

How can the override dispense rate be reduced to only include appropriate medications?

- A. Restrict ALL medications from override dispensing from ADC.
- B. Remove ADCs from areas and only make medications deliveries by hand.
- C. Perform monthly analysis of ADC dispenses.
- D. Identify current dispensing trends, make updates to an approved override dispense list, standardize dispense settings on ADCs.

Which of the following is an appropriate reason to override and dispense a medication?

- A. The product is a known second line agent for a known patient allergy.
- B. The risk of patient harm from delayed administration is greater than the benefit provided from pharmacist review.
- C. Prepping pre-op antibiotics for a patient's upcoming surgery.
- D. To avoid delayed administration time when contacting a pharmacist to verify a high-risk medication.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-843-L99-P

Effects of Typical Antipsychotic Administration in Methamphetamine Exposed Patients in the Emergency Department

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Purpose: According to the National Institute on Drug Abuse nearly 1.6 million people possessed methamphetamine use disorder in 2021. Clinical manifestations of methamphetamine use are sympathomimetic in nature and include agitation. Management of the acute agitation component is generally supportive, with benzodiazepine therapy preferred. Typical antipsychotics are strong dopaminergic antagonists and may provide a synergistic effect in controlling agitation. The purpose of this study is to determine if there is clinical benefit of typical antipsychotic administration in methamphetamine-exposed patients with acute agitation.

Methods: A single-center, retrospective, cohort study was conducted from June 1, 2021 to December 1, 2023. All adult patients presenting to University of Kentucky Emergency Departments that were acutely agitated secondary to amphetamines, and required pharmacotherapy for chemical sedation, were included. Patients were excluded if they had readily reversible etiologies, initial SBP < 90, initial QTc > 500, were pregnant, were less than 18 years of age, had a drug allergy to included pharmacotherapy, and initial presentation was not primarily due to methamphetamine use. The primary endpoint was the requirement of supplemental pharmacotherapy in the emergency department greater than 30 minutes from the initial dose. Secondary endpoints included number of supplementary doses of pharmacotherapy agents administered within first 12 and 24 hours, total doses of supplemental pharmacotherapies received, the need for restraints, and the level of hospital admission. Safety endpoints included incidence of hypotension, need for mechanical ventilation, and the development of neuroleptic malignant syndrome.

Results: 219 unique patients were identified, representing 249 individual patient encounters. Of the encounters, 89 were treated with benzodiazepine monotherapy, 52 with antipsychotic monotherapy, and 108 with both antipsychotics and benzodiazepines. Additional endpoint analysis is currently ongoing.

Conclusion: Methamphetamine intoxication can lead to acute agitation requiring pharmacologic therapy to manage symptoms, as well as other complications. Final results are pending.

Learning Objectives:

Identify key pathophysiologic features of methamphetamine toxicity, and how it relates to selection of pharmacotherapy.

Discuss the role of benzodiazepines and typical antipsychotics for management of acute agitation related to methamphetamine toxicity.

Self Assessment Questions:

Which statement best explains the rationale for the use of typical antipsychotics in methamphetamine toxicity?

A. Typical antipsychotics directly antagonize methamphetamine receptors, preventing further neurotoxic effects.

B. Antipsychotics enhance the release of dopamine, counteracting the dopaminergic surge induced by methamphetamine.

C. Typical antipsychotics potentiate GABAergic inhibition, mitigating the excessive sympathetic activity and CNS stimulation associated with methamphetamine toxicity

D. Antipsychotics inhibit the reuptake of norepinephrine, balancing the dysregulation caused by methamphetamine on adrenergic pathways.

In patients presenting to the emergency department with acute agitation related to methamphetamine toxicity, why are benzodiazepines and typical antipsychotics considered ideal choices?

A. Their ability to directly counteract methamphetamine-induced neurotoxic effects.

B. Quick onset of action, facilitating rapid alleviation of acute agitation.

C. Selective modulation of adrenergic receptors, reducing sympathetic hyperactivity.

D. Delayed onset of action, allowing for a gradual and controlled response to agitation symptoms

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-519-L01-P

Cefepime vs Piperacillin-Tazobactam in the Management of Pseudomonas Pneumonia

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Pseudomonas pneumonia is a severe infection with significant clinical importance due to its high morbidity and mortality rates, posing a major healthcare concern worldwide. One of the distinguishing characteristics of *Pseudomonas aeruginosa* is its ability to develop resistance to a wide range of antimicrobial agents. The presence of multidrug resistance in *Pseudomonas* strains further complicates treatment options and increases the risk of treatment failure. Despite the clinical significance *Pseudomonas pneumonia* has, there is no clear consensus on the most effective antibiotic regimens for treating *Pseudomonas pneumonia*. The Infectious Diseases Society of America (IDSA) recommends various options for the treatment of *Pseudomonas pneumonia* therapy, such as piperacillin-tazobactam, cefepime, ceftazidime, aztreonam, meropenem, or imipenem. Whether any preference should be given to a single agent, beyond the likelihood of displaying in vitro activity, remains uncertain. Direct comparisons of safety and efficacy between various in vitro active antibiotics are limited, inconclusive, and largely derived from patients with bacteremia. Cefepime and piperacillin-tazobactam are among the most commonly used anti-pseudomonal agents, yet no studies have directly evaluated treatment failure rates between these two agents. This study aims to assess clinical outcomes among patients with culture-positive *Pseudomonas pneumonia* treated with either cefepime or piperacillin-tazobactam. This is a retrospective single-center observational cohort study that will include all adult patients with a culture positive *Pseudomonas aeruginosa pneumonia* admitted to Michigan Medicine. The primary outcome will be a comparison of the desirability of outcomes ranking (DOOR), a patient-centric paradigm allowing the consideration of multiple outcomes. Included in the DOOR will be clinical cure, toxicity, resistance, recurrence, and mortality. This study is in progress, results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the prevalence of *Pseudomonas pneumonia*

Review current guideline recommendations

Self Assessment Questions:

Which of the following statements about *Pseudomonas pneumonia* is correct?

A. The mortality rate for *Pseudomonas pneumonia* varies from 20% to 50%

B. Timely initiation of appropriate antimicrobials has been shown to decrease mortality

C. Mechanisms of resistance include the expression of various factors such as efflux pumps, target site mutations, and production of beta-lactamases.

D. All of the above statements are correct

According to the Infectious Diseases Society of America (IDSA) guidelines, which of the following statements is true regarding the treatment of *Pseudomonas pneumonia*

A. IDSA recommends one specific anti-pseudomonal antibiotic over others

B. IDSA does NOT recommend one specific anti-pseudomonal antibiotic over others

C. Empiric antibiotics are not included within the guideline recommendations

D. None of the above

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-663-L01-P

Impact of Pharmacist Education on Veterans Hospitalized with Hypertension

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Hypertension is one of the leading causes of morbidity and mortality in the United States. Hypertension is also a modifiable risk factor for several cardiovascular diseases and comorbid conditions. Previous research, including the CAPTION trial, has shown that pharmacist education on blood pressure in the primary care setting may improve patients' blood pressure control. The objective of this study is to evaluate the impact of pharmacist-directed education provided to Veterans hospitalized with hypertension when compared to a historical control.

Single facility, retrospective cohort study completed via chart reviews of electronic health records from the Robley Rex Veterans Affairs Medical Center (RRVAMC). Patients will be included in the education group if they are 18 years of age or older, hospitalized at RRVAMC from October 1, 2023 through April 30, 2024 with uncontrolled hypertension, and received pharmacist education on antihypertensive medications. Patients will be compared to a historical control group hospitalized between the dates of September 30, 2020 to September 30, 2023 with the same criteria above and without pharmacist education provided. Patients will be matched 1:1 with the following baseline characteristics: number of adjustments made to antihypertensive medications while inpatient, service location of patient in hospital, number of active antihypertensive medications on admission, and systolic blood pressure greater than 180 mm Hg on admission. Education provided by pharmacists to Veterans currently hospitalized with hypertension will include the following: medication information including adverse effects, importance of medication adherence, blood pressure goals, recommended monitoring and follow-up. The primary outcome of the study is a 30-day composite of unplanned health care visits related to blood pressure, including hospital readmission, emergency department visit, or outpatient care provider visit. Secondary outcomes will include, but are not limited to, referral to Patient Aligned Care Team (PACT) pharmacist and assessment of adherence to antihypertensive medications.

Learning Objectives:

Identify potential risks of uncontrolled hypertension.

Indicate a patient's blood pressure goal for outpatient hypertension management.

Self Assessment Questions:

Uncontrolled hypertension can lead to which of the following comorbid conditions.

- A. Stroke
- B. Infection
- C. Kidney disease
- D. Both A and C

PL is a 54-year-old Veteran hospitalized for acute hypoxic respiratory failure. Blood pressure on admission is 179/115 mm Hg. Past medical history includes type 2 diabetes, chronic kidney disease, and hypertension. PL will be counseled at the time of discharge on blood pressure medications and goals. According to the 2017 ACC/AHA hypertension guidelines, what is the patient's outpatient blood pressure goal?

- A. <120/<80 mm Hg
- B. <130/<80 mm Hg
- C. <140/<90 mm Hg
- D. <150/<90 mmHg

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-552-L01-P

Spacer Prescribing with Pressurized Metered-Dose Inhalers

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Background and Objectives: Spacers have been proven to improve inhaled medication delivery and are included on the World Health Organization (WHO) list of essential technology for asthma. However, there are many obstacles to spacer use, including accurate prescribing and counseling, cost, socioeconomic factors, device cleaning, and inconvenience. Community pharmacists have demonstrated the ability to not only dispense and perform, but also prescribe, conduct point of care testing, administer immunizations, and provide medication therapy management. Therefore, community pharmacists are uniquely positioned to address the aforementioned obstacles to spacer use.

The purpose of this study is to determine compliance with GINA asthma treatment guidelines for spacer prescribing with pressurized metered-dose inhalers (pMDIs). The objectives of this study are to determine the number of patients who are prescribed a pMDI with and without a spacer, and to identify patient specific factors of individuals who receive and do not receive a spacer with their pMDI prescription at a community pharmacy.

Methods: A retrospective chart review will be conducted using EnterpriseRx® claims data from prescriptions processed by SpartanNash pharmacies in the state of Michigan. Data collected will include prescribing history of pMDIs and spacers, demographic information, and patient payment. Available demographic information from EnterpriseRx® will include age, sex, zip code, preferred language, pharmacy location, prescriber, prescriber location and insurance provider. Data will be analyzed using descriptive statistics. Appropriate statistical analysis will be completed between groups who either received or did not receive a spacer at the community pharmacy.

Results: Research in progress.

Conclusion: Research in progress.

Learning Objectives:

Recognize the number of patients who are prescribed a pMDI with and without a spacer.

Identify patient specific factors of individuals who receive and do not receive a spacer with their pMDI prescription.

Self Assessment Questions:

Which of the following statements are correct?

- A. Approximately 35% of patients receiving a pMDI were also prescribed and received a spacer at a community pharmacy.
 - B. Approximately 10% of patients receiving a pMDI were also prescribed and received a spacer at a community pharmacy.
 - C. Approximately 5% of patients receiving a pMDI were also prescribed and received a spacer at a community pharmacy.
 - D. Approximately 1% of patients receiving a pMDI were also prescribed and received a spacer at a community pharmacy.
- Based on patients who filled a spacer at a community pharmacy, which of the following factors may impact spacer prescribing?

- A. Patient sex
- B. Patient age
- C. Patient eye color
- D. Patient profession

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-699-L01-P

Impact of Admission Medication History Services at a Community Teaching Hospital

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Purpose:

National Patient Safety Goal 03.06.01 states health systems should maintain and communicate accurate patient medication information. While the process of medication reconciliation is intended to identify and resolve discrepancies, obtaining an accurate medication history is a crucial first step. Studies demonstrate when pharmacy staff obtain a patient's medication history, medication-related discrepancies decrease compared to medication histories obtained by non-pharmacy staff. Our institution has an established program where pharmacy technicians, known as medication historians, perform medication histories for patients in the emergency department. However, there are instances when medication historians are unavailable and other clinical staff must complete the medication histories. The purpose of this quality assessment is to identify gaps in the medication history and reconciliation process to optimize care transitions.

Methods:

A retrospective chart review will be conducted for inpatients discharged between July 1, 2023, to September 30, 2023. The primary outcome of this assessment is the percent of patients who had their admission medication history performed by a medication historian. Secondary outcomes include the error rate for medication histories completed by clinical staff other than a medication historian, types of medication errors, percent of medication histories requiring clarification by a pharmacist, and time points for each step of the medication history process. Finally, discharge medication reconciliations for patients with an identified error on their admission medication history will be reviewed to determine if the error was resolved.

Results/Conclusion:

Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the impact pharmacy has on the medication history process

Describe the medication historian standard work and auditing process

Self Assessment Questions:

How can pharmacy involvement positively impact the medication history process?

- A. Decrease the rate of medication history errors
- B. Decrease hospital readmissions
- C. Decrease emergency department visits
- D. All of the above

Which of the following is included in the medication historian standard work and auditing process?

- A. Medication history accuracy rate
- B. Number of completed medication histories
- C. Number of completed medication reconciliations
- D. Answers A and B

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-793-L05-P

Assessment of ECG Monitoring and QTc Interval Prolongation in Patients Receiving Ribociclib

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The purpose of this study is to evaluate adherence to the manufacturer's recommended electrocardiogram (ECG) monitoring for ribociclib. Additionally, to further comprehend the need for ribociclib's ECG monitoring, this study intends to quantify real-world rates of corrected QT (QTc) interval prolongation associated with use of this agent. Data will be collected through a retrospective and prospective chart review of patients initiated on ribociclib at Community Health Network MD Anderson Cancer Centers. The chart review will be composed of a query of ribociclib prescriptions from March 13, 2017 through August 31, 2023. Data will be collected through chart review for the time period of January 30, 2017 through December 1, 2023. An estimated 65 patients who were 18 years or older and received ribociclib prescriptions prescribed and managed by providers within the network will be included in this study. Patients who were pregnant, incarcerated, or over the age of 89 years old were excluded. The primary objective is to assess the proportion of patients who received ECG monitoring after starting ribociclib at each time interval that it is recommended by the manufacturer. Secondary objectives include the proportion of patients with Common Terminology Criteria for Adverse Events (CTCAE) v5.0 grade 2 or higher QTc interval prolongation after initiation of ribociclib and the percent of patients that had an interruption or dose adjustment of ribociclib due to QTc interval prolongation.

Learning Objectives:

Describe the role of cyclin-dependent kinase 4 and 6 (CDK4/6) inhibitors in metastatic breast cancer according to the recommendations provided by the 2023 National Comprehensive Cancer Network (NCCN) guidelines.

Recognize the unique cardiotoxicity with ribociclib's use and the place in therapy for ECG monitoring during its use.

Self Assessment Questions:

In patients starting ribociclib therapy, what is the recommended frequency for ECG monitoring to evaluate QTc interval changes?

- A. 1 week after the initiation of therapy
- B. Prior to starting therapy and 2 weeks after the initiation of therapy
- C. Every month after the initiation of therapy
- D. Prior to starting therapy, 2 weeks after the initiation of therapy, at the beginning of cycle 2 of therapy, and as clinically indicated

When do the 2023 National Comprehensive Cancer Network (NCCN) Breast Cancer guidelines recommend the use of a cyclin-dependent kinase 4 and 6 (CDK4/6) inhibitor?

- A. First-line in combination with adjuvant chemotherapy for stage II hormone receptor-negative (ER/PR-), HER2-positive (HER2+) breast cancer
- B. First-line in combination with endocrine therapy for metastatic hormone receptor-positive (ER/PR+), HER2-negative (HER2-) breast cancer
- C. As adjuvant therapy for risk reduction in stage I hormone receptor-positive, HER2-negative (HER2-) breast cancer
- D. First-line for recurrent unresectable hormone receptor-negative (ER/PR-), HER2-positive (HER2+) breast cancer

Q1 Answer: D Q2 Answer: B

Evaluation of Phenobarbital Use for Treatment of Alcohol Withdrawal Syndrome in Intensive Care Patients

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Purpose: Alcohol withdrawal syndrome (AWS) standard of care treatment is to prevent seizures control agitation by using an agent that works in a similar mechanism as alcohol. Alcohol exerts its depressive effects by binding to GABA and NMDA receptors. Benzodiazepines have long been used due to their ability to bind to GABA receptors. Recently, phenobarbital has become a popular treatment option due to its ability to bind to both GABA and AMPA-type glutamate receptors, its long half-life, its pharmacokinetic/pharmacodynamic properties and shortage in the supply of the benzodiazepine, lorazepam. The purpose of this study is to investigate how phenobarbital is being utilized in UW Health SwedishAmerican Hospital's critical care unit (CCU) for AWS.

Methods: This retrospective, observational chart review's inclusion criteria are patients who are 18 years or older, admitted to the CCU at UW Health SwedishAmerican Hospital, had the AWS order set ordered during their admission in the CCU, and received at least one dose of phenobarbital and/or benzodiazepine in the CCU. Exclusion criteria are pregnant patients, incarcerated patients, or patients on phenobarbital prior to admission. Electronic health records will be used to identify patients that met inclusion criteria from August 1st, 2022 to July 31st, 2023. Patients who meet inclusion criteria will be divided into three groups, patients who were initiated on phenobarbital with a loading dose, patients who were initiated on phenobarbital without a loading dose, and patients who were initiated on benzodiazepines. The primary outcome is median CCU length of stay. The secondary outcomes are median hospital length of stay, incidence of intubation post initiation of AWS treatment, cumulative phenobarbital dose administered during admission, and any adverse drug reactions that occurred.

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

Learning Objectives:

Describe how phenobarbital's mechanism of action treats alcohol withdrawal syndrome.

Explain the appropriate dosing of phenobarbital for alcohol withdrawal syndrome treatment.

Self Assessment Questions:

Which of the following receptors does phenobarbital bind to?

- A. Mu receptors
- B. Alpha-2 receptors
- C. NMDA receptors
- D. GABA and AMPA-type glutamate receptors

What is the absolute maximum cumulative dose of phenobarbital a patient can receive for alcohol withdrawal syndrome without checking phenobarbital levels during a hospital admission?

- A. 5 mg/kg
- B. 10 mg/kg
- C. 20 mg/kg
- D. 30 mg/kg

Q1 Answer: D Q2 Answer: D

Development and Implementation of a Transitions of Care Management Service Within an Inpatient Pediatric Neurology Setting

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Purpose:

Transitions of care (TOC) remain a widely discussed topic due to recognition that enhanced management during this phase can lead to improved patient outcomes.

While there is recognition of the importance of TOC in adults, pediatric TOC quality standards are lacking which causes concerns as these patients are more susceptible to harm from medication errors. Additionally, there is an absence of data on implementing billable TOC services in this population and what impact a pharmacist could have. The purpose of this study is to show what impact pharmacists can make in expanding current discharge services by implementing a transitional care management service in a pediatric neurology setting.

Methods:

This study will be a single center analysis that will explore the elements necessary for expansion of current pharmacist discharge counseling services to billable transitional care management services with pediatric neurology patients. Through an assessment of current TOC pharmacist workflow, we will identify necessary changes to expand into a billable service. Staffing considerations, time for required interventions by pharmacy staff, reimbursement opportunities based on current billing codes, and relevant barriers to implementation will be included in this study. Based on the existing role of a TOC pharmacist, this study will focus on conversion of non-billable discharge counseling calls to fully billable TOC services, solely completed by a pharmacist. Data acquired will assist in proposing an FTE requirement for these expanded services and aims to lead an expansion of TOC services to all floors of this pediatric facility.

Results:

Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Residents Conference in April 2024.

Conclusions:

Conclusions will be forthcoming based on results.

Learning Objectives:

Identify requirements for implementation of a billable TOC service within a facility.

Discuss reimbursement opportunities, staffing considerations, and FTE need for an expanded TOC service.

Self Assessment Questions:

Which of the following payors consistently reimburse for TCM services?

- A. Indiana Medicaid
- B. Medicare
- C. Aetna
- D. Anthem

Which sections of a TCM service can a pharmacist lead without a collaborative practice agreement?

- A. All sections of a TCM service
- B. Scheduling and 48-hour follow-up calls
- C. 48-hour follow-up calls and 7/14-day visits
- D. No sections of a TCM service

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-781-L04-P

Implementation of a Multimodal Pain Order Set in Burn Patients

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Statement of purpose: Following a burn injury, patients can experience background, breakthrough, and procedural pain. The 2020 American Burn Association (ABA) guidelines recommend a multimodal approach to pain management comprised of both opioids and non-opioids. The purpose of this study is to compare outcomes before and after implementation of a multimodal pain order set in the burn admission order set within the electronic medical record (EMR).

Methods: This single center, retrospective, cohort study is being conducted at an ABA-verified burn center. A multimodal pain management order set was implemented in June 2021. The pre-group includes adult burn patients admitted between January to June 2021, and the post-group includes adult patients admitted between January to June 2022. Exclusion criteria includes patients with history of opioid use disorder, outpatient use of medications for opioid use disorder, patients who are opioid tolerant [greater than 60 morphine milligram equivalents (MME) for greater than one week], admission for frostbite, and patients who are incarcerated. Pertinent demographic data includes age, burn total body surface area (TBSA) affected, mechanical ventilation, number of surgeries, and whether patients filled an opioid prescription within the 90 days prior to admission. The primary outcome is daily MME received on days one, three, and seven from admission. Secondary outcomes include daily MME ordered on days one, three, and seven from admission and evidence of pain, defined as a Critical-Care Pain Observation Tool (CPOT) score greater than two or verbal pain scale greater than three on days one, three, and seven from admission. Safety outcomes include naloxone administration, incidence of Pasero Opioid-induced Sedation Scale (POSS) score of three or four during first seven days of admission, and maximum corrected QT interval if patient received methadone.

Results: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference in April 2023.

Learning Objectives:

Identify non-opioid analgesics utilized for acute pain in burn patients

Review the clinical impact of a multimodal pain order set on daily opioid consumption and pain control

Self Assessment Questions:

Which medication class is recommended first line for non-intubated patients in our pain order set?

- A. Scheduled oxycodone
- B. Scheduled acetaminophen with oxycodone as needed
- C. Fentanyl infusion
- D. Scheduled IV morphine

What is one unique component in our pain score assessment endpoint compared to other primary literature?

- A. Pain endpoint is assessing mean pain scores which is the most accurate assessment method
- B. Pain endpoint allows for assessment of non-intubated patients only
- C. Pain endpoint is a normalized pain score assessment utilizing both CPOT and NRS for both intubated and non-intubated patients
- D. This study has the same pain score endpoint compared to all previous literature discussed

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-822-L08-P

Evaluation of order set implementation and impact on appropriate treatment for community acquired pneumonia (CAP)

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Purpose: It is well known that the overuse and misuse of antibiotics can lead to adverse events, antibiotic resistance, and increased healthcare costs. In 2022, Ascension Borgess Hospital (ABH) implemented a community acquired pneumonia (CAP) order set to guide physicians on antimicrobial prescribing, acknowledging the importance of antimicrobial stewardship and the commitment to improve the appropriate use of antibiotics. The orderset included guideline concordant agents and durations of therapy for CAP. The purpose of this study is to evaluate appropriate antimicrobial prescribing after implementing a pneumonia order set.

Methods: This is a retrospective chart review study that will evaluate 236 patients, 18 years of age or older treated for CAP at Ascension Borgess hospital between 10/1/2021 and 8/1/2023. A report was generated from the electronic medical record using ICD-10 codes for CAP. The primary endpoint of this study is to evaluate appropriate antimicrobial prescribing after implementing a CAP orderset. Appropriate therapy was defined as correct empiric antimicrobial agents, dosing, and duration in accordance with the national guidelines. Secondary endpoints include length of hospital admission, readmission rates, mortality rates and Clostridium difficile infection rates. An exploratory endpoint was pre-determined to evaluate pharmacists' intervention on duration of therapy, and utilization of an order-set to prescribe antibiotics. Outcomes measured on a nominal scale will be assessed using Chi-square or Fisher's exact test as appropriate and outcomes on a continuous scale will be assessed using a t-test or Mann-Whitney U test based on distribution of data.

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

Learning Objectives:

Describe the current guideline recommendations for treatment of community acquired pneumonia (CAP)

Explain the benefit of shorter durations of antibiotic therapy for CAP

Self Assessment Questions:

Which of the following is an appropriate empiric regimen for the inpatient treatment of community-acquired pneumonia in a 82 year old male with multiple comorbidities and normal renal function?

- A. Amoxicillin-sulbactam 875mg twice daily for 7 days
- B. Ciprofloxacin 750mg twice daily plus Doxycycline 100mg twice daily for 7 days
- C. Azithromycin 500 mg daily for 3 days plus ceftriaxone 1g daily for 5 days
- D. Cefepime 1g every 6 hours plus vancomycin for 5 days

Which of the following is the benefit of shorter duration of therapy in CAP?

- A. Likely as efficacious as longer treatment duration
- B. Reduce unnecessary antibiotic exposure
- C. Reduce antibiotic resistance
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-672-L01-P

Real-world weight loss with semaglutide versus dulaglutide in type 2 diabetes

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Purpose: The use of glucagon-like peptide-1 receptor (GLP-1) agonists has become increasingly common given the literature supporting their benefit for glycemic control, cardiovascular risk reduction, and weight management. In patients with Type 2 Diabetes Mellitus (T2DM), modest or larger (>10%) weight loss improves glycemic control and other cardiovascular risk factors. The expected degree of weight loss varies between the GLP-1 agonists and available doses. Recently, higher doses of semaglutide and dulaglutide have become available. However, the real-world difference in weight loss between semaglutide and dulaglutide at these higher doses is not known. The purpose of this study is to compare the real-world effect of weekly injectable semaglutide and dulaglutide on weight loss in an urban, predominately African American patient population with T2DM.

Methods: This is a single center, retrospective cohort study of patients at an academic internal medicine clinic. Patients with T2DM initiated on semaglutide or dulaglutide between January 2021 and September 2022 will be included. Patients will be excluded if they are < 18 or > 75 years of age, pregnant or lactating, or were prescribed any GLP-1 agonist in the 12 months prior to study inclusion date. The primary outcome is the percentage change in actual body weight from baseline at 52 weeks. Secondary outcomes include mean weight loss in kilograms, weight loss of >5% and >10% at 52 weeks, percentage change in hemoglobin A1C at 52 weeks, and hemoglobin A1C of <7% and <8% at 52 weeks. Additionally, a subgroup analysis will be performed in the African American population. Lastly, a regression analysis will be performed to identify patient specific factors that may impact the primary outcome.

Results/Conclusion: Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Classify the GLP-1 agonists into categories of very high, high, or intermediate efficacy for weight loss based upon the American Diabetes Association Guidelines.

Discuss differences between clinical trial participants and real-world patients that may result in discrepancies in the weight loss outcomes reported with GLP-1 agonists in clinical trials versus the outcomes observed in practice.

Self Assessment Questions:

According to the 2024 American Diabetes Association Guidelines, which of the following GLP-1 agonists has a very high efficacy for weight loss?

- A. Semaglutide
- B. Liraglutide
- C. Exenatide
- D. Dulaglutide

Which of the following factors may explain differences in weight loss observed in real-world patients on a GLP-1 agonist compared to participants in a clinical trial?

- A. Lack of intensive lifestyle interventions, including modifications to diet and exercise, in real-world patients
- B. Slower up-titration of GLP-1 agonist dose in real-world patients
- C. Lack of adherence to therapy in real-world patients
- D. All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-709-L01-P

Safety and efficacy of intravenous posaconazole in pediatric hematopoietic stem cell transplant (HSCT) patients

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Purpose:

Patients undergoing hematopoietic stem cell transplant (HSCT) are at increased risk for invasive fungal infections. The Children's Oncology Group supportive care guidelines recommend posaconazole as an option for treatment or prophylaxis due to its broad spectrum of activity. Posaconazole became available intravenously (IV) and was approved for use in adults. Literature describing IV posaconazole use in pediatric HSCT patients is limited due to small sample sizes and reports of a wide dosing range required to reach target posaconazole serum concentrations. The purpose of this study is to describe the safety and efficacy of IV posaconazole in pediatric HSCT patients.

Methods:

This is a retrospective chart review at a free-standing pediatric hospital. The primary outcomes of this study are to determine the dose required to reach target posaconazole levels, and the incidence of probable or proven invasive fungal infections in patients receiving IV posaconazole for prophylaxis. Secondary outcomes include the frequency of adverse events with IV posaconazole, and posaconazole levels following dose adjustments during a single course. Pediatric HSCT patients less than 18 years who had at least one administration of IV posaconazole and at least one measured posaconazole level were included. Exclusion criteria included initiation of posaconazole after day +200, subtherapeutic serum concentrations drawn prior to at least 5 days of therapy, and levels drawn >3 hours prior to the next dose of posaconazole. Data collected includes details related to their HSCT, posaconazole dose and frequency, posaconazole levels, baseline organ function (QTc, bilirubin, aspartate aminotransferase/alanine aminotransferase, serum creatinine, and cystatin C glomerular filtration rate), and documented adverse events related to posaconazole use. Descriptive statistics will be used to characterize the study patient population and outcomes.

Results/Conclusions:

Data analysis is currently in progress; results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review current evidence for the use of intravenous posaconazole in pediatric hematopoietic stem cell transplant patients

Identify weight-based dosing practices of intravenous posaconazole that are safe and effective in pediatric patients

Self Assessment Questions:

1. When choosing an antifungal prophylactic agent in a pediatric hematopoietic stem cell transplant patient, what does the Children's Oncology Group recommend as an ideal agent?

- A. Mold-active azole or echinocandin
- B. Non-mold-active azole or amphotericin B
- C. Non-mold-active azole or echinocandin
- D. No antifungal prophylaxis

2. Therapeutic drug monitoring for posaconazole is conducted using trough plasma levels. What is the goal trough for a patient on posaconazole for prophylaxis?

- A. ≥ 0.5 mg/L
- B. ≥ 0.7 mg/L
- C. ≥ 1 mg/L
- D. ≥ 2 mg/L

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-628-L01-P

Comparison of Patients Achieving Treatment Success with a Glucagon-Like Peptide-1 Receptor Agonist for Weight Management Between Primary Care Provider and Pharmacist Co-managed Patients

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Statement of Purpose:

Rates of overweight and obesity are at an all-time high and continue to climb with nearly 72% of adults over the age of 20 being overweight and 41.9% being obese in 2023. Current guidelines for weight management recommend treatment in patients with a body mass index (BMI) of ≥ 30 kg/m² or ≥ 27 kg/m² with a weight-related condition such as hypertension. Current glucagon-like peptide-1 agonist (GLP-1) treatment options include liraglutide, semaglutide, and the recently approved GLP-1/GIP agonist tirzepatide. Literature regarding embedded ambulatory care pharmacists' involvement with GLP-1 use for weight management is limited with most literature focusing on community pharmacist involvement. Due to the high cost of GLP-1s and prevalence of overweightness and obesity, the study purpose is to compare the proportion of patients achieving treatment success for weight management on a GLP-1 between primary care provider alone and pharmacist co-managed patients.

Statement of Methods Used:

This is a retrospective cohort review of eligible patients on an FDA-approved GLP-1 for weight management and managed by their PCP alone or with pharmacist co-management. Patients were enrolled if they were ≥ 18 years old, had either a BMI of ≥ 27 with a weight-related comorbid condition or a BMI ≥ 30 , and were on a GLP-1 for a minimum of 12 weeks. Patients were excluded from the study if they had a diagnosis of type 2 diabetes. The primary objective is the difference in percentage of patients achieving treatment success between the PCP alone and pharmacist co-managed groups. Key secondary endpoints include time to maximum tolerated dose, percentage difference in total weight lost, and percentage of patients continued on therapy after treatment failure.

Results/Conclusion:

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

Learning Objectives:

Identify treatment criteria for glucagon-like peptide-1 receptor agonists (GLP-1s) in weight management

Define the criteria for treatment success and failure when using GLP-1s for weight management

Self Assessment Questions:

Which of the following patients is an appropriate candidate for GLP-1 treatment for weight management?

- A. BMI of 29 with history of gastric sleeve
- B. BMI of 32 who has failed treatment with both liraglutide and semaglutide
- C. BMI of 27 without any comorbidities
- D. BMI of 35

Which of the following patients has achieved treatment success on GLP-1 therapy?

- A. Lost 4% of body weight at 7 weeks on semaglutide

B. Lost 6% of body weight at 12 weeks on liraglutide
C. Lost 3% of body weight at 12 weeks on liraglutide
D. Gained 2% of body weight at 14 weeks on semaglutide
Q1 Answer: D Q2 Answer: B
ACPE Universal Activity Number 0121-9999-608-L01-P

Incidence of Low-Level Viremia (LLV) with use of Long-Acting Injectable (LAI) Cabotegravir/Rilpivirine (CAB/RPV)

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Purpose

CAB/RPV, a novel injectable antiretroviral therapy (ART) is a recommended regimen by the Department of Health and Human Services for persons living HIV based on data available from Phase 3 trials that confirmed its use was non-inferior to standard of care oral ART (OART). For patients demonstrating adherence and virologic suppression with OART, switching to CAB/RPV LAI allows for regimen simplification and decreased pill burden.

Currently, little to no data exists regarding incidence of LLV with CAB/RPV LAI use. Studies suggest LLV is not only associated with an increased risk of virologic failure but may also increase the risk of cancer, cirrhosis, and cardiovascular disease. Persistent LLV has largely been attributed to medication non-compliance in the past. However, unlike daily OART, CAB/RPV is administered every 1-2 months, increasing the likelihood of medication adherence. The purpose of this study is to evaluate the incidence of LLV in patients receiving LAI CAB/RPV

Methods

This is a retrospective, single center, exploratory study utilizing information obtained from the electronic medical record at an academic medical center. The study population includes 200 adult patients who received at least 2 doses of CAB/RPV LAI between January 1, 2021, and July 31, 2023, had HIV RNA results measured within 6 months prior to CAB/RPV initiation and one or more HIV RNA results measured at least 30 days post CAB/RPV initiation. Pregnant women, children, incarcerated patients, and patients with greater than 4 weeks of therapy interruption were excluded. The primary objective is to determine the incidence of LLV, defined as an HIV-1 RNA level between 20 - 199 copies/mL. Secondary endpoints explore the association between LLV and body mass index, and the occurrence of LLV relative to the number of doses received.

Results

Data analysis is ongoing. Complete results and statistical analyses will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define low level viremia in the context of this study

Discuss potential factors associated with low level viremia occurrence

Self Assessment Questions:

According to the study presented, LLV was defined as an HIV-1 RNA level

- A. Less than 20 copies/mL
- B. Between 20 – 199 copies/mL
- C. Between 200 – 499 copies/mL
- D. Greater than 500 copies/mL

Which of the following factors is/are proposed to increase the likelihood of low level viremia

- A. Medication non-adherence
- B. One-pill medication regimen
- C. Presence of resistant mutations
- D. Both A and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-752-L02-P

Pharmacist's Touch: Elevating Antimicrobial Stewardship via Transitions of Care Interventions

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Purpose: The continuous challenge of antimicrobial misuse highlights the need for enhanced interventions. Studies have shown that 70% of antibiotic prescriptions at discharge need improvement. While existing antimicrobial stewardship primarily addresses inpatient and outpatient settings, transitions of care (TOC) often lack oversight, contributing to up to 60% of medication errors. In response, A TOC pharmacy program was established at our 548-bed community teaching hospital in 2016. TOC pharmacists focused on discharge interventions in patients with the highest risk for mortality within 30 days. A previous analysis of 1,100 patients showed that the TOC pharmacists made 298 (14.4%) antimicrobial interventions affecting 255 (23.2%) patients. The most frequent recommendations involved treatment duration, drug interactions, and dosing. The TOC pharmacist position was eliminated in 2022. The primary objective of this study is to evaluate the impact of the elimination of the TOC pharmacy position on antimicrobial prescribing at discharge.

Methods: This retrospective, single center, pre-post cohort study investigated the impact of the elimination of the TOC pharmacy program on appropriate and optimal antimicrobial prescribing. Adult inpatients with the highest risk of 30-day mortality receiving an antimicrobial at discharge were included. Two distinct time periods were compared: September-November 2021 (TOC cohort) and September-November 2022 (post-TOC cohort). Appropriate antimicrobial use at discharge was determined by adherence to effective treatment recommendations, encompassing antimicrobial selection, dose, and duration. Optimal prescribing was defined as adherence to institutional recommendations. Comparisons between groups were analyzed via chi-square and Fisher's exact tests for categorical variables, and t-tests or non-parametric tests for continuous variables. A P value $\leq$ 0.05 was considered statistically significant.

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

Learning Objectives:

Identify potential opportunities for improvement in the prescribing practices for discharge antibiotics.

Describe the impact of the TOC program on optimizing the appropriateness of antimicrobial use at discharge.

Self Assessment Questions:

How does the TOC program contribute to the appropriateness of antimicrobial use at discharge?

- A. By extending the length of hospital stays
- B. By streamlining patient check-out processes

C. By identifying medication errors
D. By reducing the overall use of antimicrobials during the hospital stay
In transitions of care and antimicrobial stewardship, what is a major benefit of involving a pharmacist?
A. Evaluating treatment duration, dosing and drug interactions
B. Improving hospital admission rates
C. Enhancing surgical outcomes
D. All of the above
Q1 Answer: C Q2 Answer: A
ACPE Universal Activity Number 0121-9999-845-L01-P

The Impact of Prescriber Adherence to System-Wide Guidelines on the Treatment of Community-Acquired Intra-Abdominal Infections with Oral Antibiotics Upon Hospital Discharge

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Background: Community-acquired intra-abdominal infections (CAIAs) pose a significant healthcare challenge, requiring prompt and effective management due to their association with increased complication rates, including higher morbidity and mortality, extended hospital stays, and increased healthcare costs. At Henry Ford Health (HFH), the existing empiric antibiotic therapy guidelines for the outpatient treatment of CAIAs propose four oral therapy options, with amoxicillin/clavulanate monotherapy recommended if local susceptibility rates for common pathogens are $\geq 85\%$. The current sensitivity rates of *E. coli* to β -lactams with a β -lactamase inhibitor and fluoroquinolones range from 60-64% and 79-87% in Southeast Michigan, respectively. However, a common choice for oral antibiotic treatment of CAIAs within the HFH system is amoxicillin/clavulanate, or fluoroquinolone monotherapy in the presence of a penicillin allergy. The main objectives of this study are to evaluate the extent of prescribing adherence to established system guidelines and assess clinical outcomes of HFH patients prescribed oral antibiotic therapies for CAIAs. Methods: This is an IRB-approved, multicenter, single-system, observational, retrospective cohort study examining the medical charts of 128 patients discharged with oral antibiotics between 8/1/2022 and 8/1/2023. This study includes patients aged 18 years and older diagnosed with CAIAI (i.e., acute diverticulitis, pancreatitis, cholecystitis, cholangitis, abscess, and appendicitis) and treated at a HFH acute care hospital. Exclusion criteria include individuals under 18 years of age, pregnant women, residents of correctional facilities, patients with an inpatient admission within 30 days prior to their CAIAI diagnosis, or those whose care was transferred to a non-HFH hospital. The primary outcome of this study is the number of emergency department visits and/or inpatient readmissions for CAIAI following the completion of oral antibiotic therapy. Secondary outcomes include the escalation of CAIAI to sepsis or septic shock, the length of hospital stay post-initial discharge, and in-hospital mortality. Data collection and analysis are currently underway.

Learning Objectives:

Recognize organisms that should be empirically covered by antibiotics during the treatment of community-acquired intra-abdominal infection (CAIAI).
Identify appropriate outpatient oral antibiotic therapies for the treatment of CAIAs based on the most recent national practice guidelines.

Self Assessment Questions:

According to the most recent version of the SIS/IDSA guidelines, empiric antibiotic treatment for uncomplicated CAIAI should include coverage for which of the following enteric organisms:

- A. *Escherichia coli*
- B. *Pseudomonas aeruginosa*
- C. *Staphylococcus aureus*
- D. *Enterococcus faecalis*

When treating a patient with no known drug allergies for CAIAI where the *E. coli* susceptibility rate is 70%, which of the following antibiotic choices is most appropriate to begin empirically for outpatient treatment?

- A. Amoxicillin-clavulanate
- B. Moxifloxacin
- C. Cefuroxime + metronidazole
- D. Ciprofloxacin + clindamycin

Q1 Answer: A Q2 Answer: C
ACPE Universal Activity Number 0121-9999-562-L01-P

Evaluation of Adherence to a Health-System's Guideline for Treatment of Community-Acquired Pneumonia

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Purpose:

Literature describes low adherence to institutional treatment guidelines for community-acquired pneumonia (CAP). The purpose of this study is to evaluate the adherence to an institutional guideline for CAP at a community health-system and to identify opportunities to promote antimicrobial stewardship.

Methods:

This retrospective study included patients admitted to one of Norton Healthcare's four adult hospital in Louisville, KY between January 1, 2021 and December 31, 2021. Included patients were ≥ 18 years old, had a discharge diagnosis of pneumonia, and received ≥ 3 days of antibiotics indicated for pneumonia. The primary outcome was the composite percentage of adherence to the local pneumonia guidelines based on antibiotic selection in the emergency department (ED), antibiotic selection on admission, intravenous (IV) to oral (PO) conversion and total length of therapy. Secondary outcomes included adherence to the individual measurements and comparing baseline characteristics of adult inpatients with CAP and HCAP and based on adherence rates.

Results:

The study included 200 patients. The primary outcome occurred in 10 patients (5%). Adherence was highest for antibiotic selection in the ED (54.3%). Appropriate selection occurred on admission in 51% of patients. 45.7% of patients were converted from IV to PO. The appropriate length of therapy was used in 15.5% of patients. 154 CAP patients and 46 HCAP patients. Baseline characteristics were similar between CAP and HCAP. Adherence to guidelines was lower in CAP (3.2%) compared to HCAP (10.9%). HCAP was more likely to receive appropriate length of therapy and less likely to have the appropriate antibiotic selected compared to CAP. The median length of therapy for CAP and HCAP was 8 and 9 days, respectively.

Conclusions:

This study describes low adherence to local pneumonia treatment guidelines within a community health system with differing levels of adherence for HCAP and CAP patients.

Learning Objectives:

Discuss appropriate duration therapy for community-acquired pneumonia based on ATS/IDSA community-acquired pneumonia guidelines

Describe potential opportunities to improve adherence to institutional guidelines for community-acquired pneumonia

Self Assessment Questions:

A patient is currently being treated for CAP. It is day 4, and he has normal vital signs with no oxygen support. He currently has a full diet and is at his baseline mentation. He is on ampicillin-sulbactam and azithromycin. What duration of therapy is most appropriate based on the 2019 ATS/IDSA CAP guidelines?

- A. 10 days
- B. 5 days
- C. 7 days
- D. Should have already stopped

Which approach would be best to improve adherence to institutional guidelines for CAP?

- A. Allowing flexible interpretation of guidelines based on personal preferences
- B. Make guidelines less strict in their recommendations
- C. Implement clinical decision support to remind providers of guideline recommendations
- D. Reduce frequency of guideline updates

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-708-L01-P

Evaluation of Patient Satisfaction with Anti-CD20 B-cell Depletion Therapy in Multiple Sclerosis

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Purpose: Disease-modifying therapy (DMT) is the mainstay of treatment for multiple sclerosis (MS). Three high-efficacy DMT options include the anti-CD20 B-cell depletion agents ocrelizumab, ofatumumab, and ublituximab-xiy. The primary differences among these agents are the frequency and route of administration. There is currently no guideline recommendation on which agent should be selected. It is unknown whether there is a difference in patient satisfaction among these anti-CD20 B-cell depletion agents.

Methods: This was a prospective, single-center study conducted at University of Louisville (UofL) Health's MS clinic from August 1, 2023 to October 20, 2023. Adults aged 18 years or older were eligible for inclusion if they had a MS diagnosis, completed the respective loading dose for ocrelizumab, ofatumumab, or ublituximab-xiy, were currently on the same anti-CD20 B-cell depletion therapy for at least 90 days. Patients were excluded if they had a diagnosis of primary progressive MS. Eligible patients could complete the Treatment Satisfaction Questionnaire for Medication version 1.4 (TSQM v1.4) and answer questions regarding MS symptom progression and control after obtaining consent. The primary outcome was the difference in TSQM v1.4 global satisfaction score among patients receiving ofatumumab, ocrelizumab, or ublituximab-xiy. Secondary outcomes included side effects, symptom relief, convenience, and adherence. A subgroup analysis was conducted to examine differences in satisfaction stratified by length of time on current DMT. This study was approved by the UofL Institutional Review Board.

Results: There is no significant difference in global satisfaction between ocrelizumab and ofatumumab ($p=0.181$). Additionally, there was no significant difference in perceived effectiveness, or side effects ($p=0.469$; $p=0.466$). Ofatumumab was perceived to be significantly more convenient (96.8 vs. 87.8, $p=0.037$) and may improve symptom control more than ocrelizumab (71.4 vs. 39.3, $p=0.268$).

Conclusion: Ofatumumab may be more convenient and improve symptom control more than ocrelizumab without significantly affecting global satisfaction.

Learning Objectives:

Describe the differences in administration route and frequency among ocrelizumab, ofatumumab, and ublituximab-xiy

Explain how the Treatment Satisfaction Questionnaire for Medication version 1.4 assesses patient satisfaction with his/her medication

Self Assessment Questions:

Which of the following is true regarding the differences between ocrelizumab and ofatumumab?

- A. Ocrelizumab is administered more frequently than ofatumumab
- B. Ocrelizumab is less efficacious than ofatumumab
- C. Ocrelizumab is administered intravenously, while ofatumumab is self-administered by patient
- D. Ocrelizumab requires a loading dose, while ofatumumab does not require a loading dose

What are the four domains of the Treatment Satisfaction Questionnaire for Medication version 1.4?

- A. Global satisfaction, effectiveness, side effects, convenience
- B. Global satisfaction, effectiveness, side effects, adherence
- C. Symptom change, adherence, side effects, convenience
- D. Symptom change, effectiveness, adherence, convenience

Q1 Answer: C Q2 Answer: A
ACPE Universal Activity Number 0121-9999-704-L01-P

A retrospective case-control study evaluating medications associated with inpatient falls in a single Veterans Affairs Medical Center

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Purpose: Falls, specifically in the older adult population, can lead to numerous adverse health consequences including bone fractures, head injuries, and increased length of hospital stay. In addition, falls greatly increase total medical costs. Although risk factors have been identified and studied, inpatient falls still occur at a high rate. In the Veteran population, inpatient falls occur at a rate of 4.3 falls per 1000 bed days of care. The purpose of this study is to identify medications associated with inpatient falls within a single Veterans Affairs medical center.

Methods: This single-center, case-control, retrospective study reviewed older adult patients admitted to the Robley Rex Veterans Affairs Medical Center in Louisville, KY from August 1, 2018 to August 31, 2023. Patients were included in the study if they were 65 years or older and admitted for at least a 48-hour period. Patients admitted to the intensive care unit (ICU) or hospice unit were excluded from the study. Patients with a documented inpatient fall were compared to inpatients without a fall and matched 1:1 for age, sex, length of hospital stay, and service type. The primary outcome of this study was to identify medications or classes of medications associated with inpatient falls at this site by evaluating medications administered within 24 hours prior to the fall. Secondary outcomes include evaluating disease states associated with falls, the frequency of medication changes after falls, the number of patients who experienced subsequent falls within the same admission, and the number of medications administered 24 hours prior to the fall, compared to the control group. The outcomes were evaluated using T tests for continuous variables and Chi Square or Fisher's Exact tests for nominal data.

Results/Conclusions: Pending

Learning Objectives:

Describe negative health consequences associated with inpatient falls.
Identify medications listed on the Beers Criteria that may increase the risk of falls in older adults.

Self Assessment Questions:

Which of the following is considered a negative health consequence of an inpatient fall?

- A. Decreased length of inpatient stay
- B. Becoming less active
- C. Increased risk of infection
- D. Polypharmacy

According to the Beers Criteria, which of the following medications may increase the risk of falls in older adults?

- A. Glipizide
- B. Lisinopril
- C. Benzotropine
- D. Enoxaparin

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-810-L05-P

Evaluation of a Pharmacist-Driven Inhaled Corticosteroid De-escalation Intervention in Veterans

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Purpose:

The 2023 GOLD guidelines recommend inhaled corticosteroids (ICS) in patients who experience COPD exacerbation(s) while receiving a long-acting beta agonist (LABA) plus long-acting muscarinic antagonist (LAMA) with eosinophils greater than or equal to 100 cells/ μ L. Guidelines also recommend consideration of ICS in patients on LABA or LAMA monotherapy with exacerbation(s) and eosinophils greater than or equal to 300 cells/ μ L. De-escalation of ICS should be considered if patients do not meet above criteria or experience adverse effects associated with ICS use. The purpose of this project is to determine the impact of a pharmacist-driven ICS de-escalation intervention within a veteran population.

Methods:

This quality improvement project is being conducted in the outpatient setting within the Robley Rex Veterans Affairs (VA) Medical Center in Louisville, Kentucky. Patients were selected using the VA Academic Detailing COPD Dashboard. This dashboard identifies patients with COPD who are potential candidates for therapeutic optimizations including ICS de-escalation. A focused medication review was completed by a pharmacist via electronic chart review, and a templated progress note was entered in the Computerized Patient Record System (CPRS) recommending ICS de-escalation and initiation of non-ICS alternatives if deemed appropriate. The patient's primary care provider was alerted to review the note for consideration of ICS de-escalation and consider referral to a pharmacist for management of ICS de-escalation. Patient charts are being reviewed before, three months, and six months after the pharmacist note entry. The primary endpoint is the number of patients with de-escalated ICS including those with reduced ICS dose and patients with discontinued ICS. Secondary endpoints include number of COPD exacerbations, number of patients with discontinued ICS, number of non-ICS alternatives initiated, number of referrals to pharmacists for ICS de-escalation, and number of documented adverse events to ICS.

Learning Objectives:

Recognize when patients with COPD may benefit from ICS de-escalation
Outline a standardized process for pharmacist-driven ICS de-escalation

Self Assessment Questions:

Which of the following would increase risk of COPD exacerbation following ICS de-escalation?

- A. Eosinophils $\geq$ 300 cells/ μ L
- B. FEV1 < 50%
- C. CAT score > 10
- D. All of the above

Which of the following should be evaluated prior to de-escalating ICS therapy?

- A. History of COPD exacerbations in the last year
- B. History of ICS de-escalation failure
- C. Recent eosinophils
- D. All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-551-L01-P

Impact of Fentanyl Pushes Versus Continuous Infusion for Analgesedation in Critically Ill Patients: A Retrospective Review

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The 2013 Clinical Practice Guidelines for the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption (PADIS) in Adult Patients in the ICU emphasized treatment of pain prior to sedation. Clinicians widely use fentanyl continuous infusion for analgesedation, however, this strategy may heighten the risk of adverse effects associated with opioid use. A push dose bolus strategy may better match the pharmacokinetic profile of fentanyl. Limited evidence demonstrates utility in as-needed fentanyl boluses in critically ill mechanically ventilated patients. This retrospective cohort study seeks to compare the impact of fentanyl continuous infusions with fentanyl push doses on medical intensive care unit length of stay in the mechanically ventilated patient population. It is designed to descriptively review patients within the TriHealth system between July 1, 2021 and July 31, 2023. Adult patients at least 18 years of age admitted to the medical intensive care unit, requiring mechanical ventilation, and received fentanyl as part of their analgesedation regimen for at least 48 hours will be included. Patients will be excluded if they do not meet inclusion criteria, are diagnosed with active status epilepticus, on a paralytic infusion, if they are part of a protected population, have sedation and analgesia ordered with comfort care titration parameters, intubated due to COVID-19, or were admitted to a non-medical intensive care unit. Data will be collected via chart review and will be used to assess the primary outcome of medical intensive care unit length of stay. Secondary outcomes address potential differences seen between continuous and as-needed fentanyl administration including hospital length of stay, time on ventilator, total morphine milliequivalent used, time in goal RASS, time in goal behavioral pain scale, time without delirium, and drug utilization costs. Results and conclusion will be reported at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe potential advantages of push-dose fentanyl over continuous infusion fentanyl in mechanically ventilated patients.

Identify adverse effects associated with general opioid use.

Self Assessment Questions:

Push dose fentanyl administration has the following benefits over continuous infusion fentanyl:

- A. Ease of administration
- B. Decreased total opioid exposure
- C. Drug accumulation
- D. Slower offset of action after discontinuation

Which of the following adverse effects would you expect a patient to experience after prolonged opioid exposure?

- A. ileus
- B. diaphoresis
- C. myelosuppression
- D. mucositis

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-828-L08-P

Impact of stewardship methods on antimicrobial utilization in BMT patients

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Purpose: Despite efforts to address antimicrobial resistance, it remains a threat to global health. A major contributor to resistance is antimicrobial overuse, with an estimated 30-50% of use in health care facilities deemed inappropriate or unnecessary. Bone marrow transplant (BMT) patients are frequently exposed to long courses of broad-spectrum antimicrobials due to their high-risk immunocompromised status. Antimicrobial stewardship programs (ASPs) play an important role in optimizing this therapy with evidence-based methods. Recently, the ViziEnt Transplant & Immunocompromised Workgroup collaborated to establish antimicrobial utilization reports in BMT patients across a national sample of hospitals. Their results demonstrated significant prescribing variations for multiple classes of antimicrobials. The primary objective of the study is to evaluate the characteristics of ASPs and institutional practices that correlate with antimicrobial utilization in the BMT population.

Methods: In this multi-center observational study, a 22-item survey tool was developed to address the study aims. ID pharmacists and physicians involved in ASPs at hospitals included in the ViziEnt BMT antimicrobial utilization report were eligible to complete the survey. The survey tool asked for organizational-level information, including hospital name and demographic information; availability of stewardship tools; screening practices; multi-drug resistance rates; preferred regimens for febrile neutropenia, C. Diff infection, antibiotic and antifungal prophylaxis; and a rank list of stewardship methods based on perceived impact on antimicrobial utilization. An independent samples t-test was used to compare survey responses to antimicrobial utilization data with respect to 4 major drug categories: C. Diff agents, antipseudomonals, fluoroquinolones, and antifungals. A multiple regression analysis was then performed to analyze the relationship between antimicrobial utilization and stewardship practices.

Results/Conclusions: Data collection and analysis are currently ongoing. Outcomes of the study will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the scope of antimicrobial stewardship practices and their role in improving antimicrobial utilization

Recognize the benefits of reporting unit-specific antimicrobial utilization data

Self Assessment Questions:

Which of the following is an antimicrobial stewardship strategy that assists treatment decision-making without requiring direct communication between ordering provider and stewardship team member?

- A. Handshake stewardship
- B. Institutional guideline availability
- C. Prospective audit and feedback
- D. Prior authorization

Which antifungal prophylaxis initiation strategy would you expect to reduce antifungal utilization most significantly?

- A. Starting prophylaxis at time of admission for BMT procedure
- B. Starting prophylaxis on the day of transplantation
- C. Starting prophylaxis on day +5 following transplant
- D. Starting prophylaxis at hospital discharge

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-847-L01-P

Characterization of Carboplatin-Induced Ototoxicity in Breast Cancer Patients at a Large Academic Medical Center

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Platinum-based chemotherapy drugs are widely used in the treatment of various cancers, including breast, ovarian, lung, and head and neck cancers. While these agents are proven effective in a variety of combination therapies the low selectivity for cancerous cells causes severe systemic toxicities including nephrotoxicity, myelosuppression, hepatotoxicity, and ototoxicity. While ototoxicity is a possible effect seen between all platinum-based chemotherapies, there are notable studies showing cisplatin has a much higher prevalence of ototoxicity than other platinum agents like carboplatin. There is no sufficient data that characterizes which dosing schemes, combination therapies, or maximum exposures have an increased risk of hearing deficiencies. In addition, there is limited evidence determining if therapy discontinuation, decreased dose, or modified therapy will impact ototoxicity.

To better understand the incidence of carboplatin-induced ototoxicity in this population and better characterize the prescribing habits of our providers, we evaluated data in a subset of patients who reported the toxicity. Authors also examined the effects that dose reduction, discontinuation or continuation of present therapy had on previously reported ototoxicity. In this single center, retrospective review authors identified patients referred to OSUWMC Department of Audiology with a history of carboplatin use for breast cancer between October 2018 and May 2023 treated at the Stefanie Spielman Comprehensive Breast Center.

The primary outcome was to identify the incidence of carboplatin-induced ototoxicity at the Stefanie Spielman Comprehensive Breast Center within a five-year span. The secondary outcome was to assess the prescribing practice after a change in hearing was identified, and to observe what effect, if any, these changes had on the previously identified ototoxicity.

Learning Objectives:

Identify the incidence of carboplatin-induced ototoxicity at the Stefanie Spielman Comprehensive Breast Center within a five-year span

Define the best prescribing practice after a change after carboplatin-induced ototoxicity is identified,

Self Assessment Questions:

Which of the following best describes the national incidence of carboplatin-induced ototoxicity in breast cancer patients across the United States

- A. 0.15
- B. 0.1
- C. 0.05
- D. Not well defined in current literature

What interventions could be used to improve monitoring, and evaluation?

- A. Dot phrases for improved documentation
- B. Clinical practice guideline for standardization
- C. Automatic referrals after 10 exposures or more
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-799-L05-P

Putting the F-U-N Back in Febrile Neutropenia: Febrile Neutropenia Infections and Outcomes in Outpatient-Eligible Low-Risk Populations

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Febrile neutropenia (FN) is a serious complication in cancer patients requiring hospitalization for intravenous (IV) antibiotic therapy. National guidelines suggest patients with FN at low risk of infection can safely receive outpatient management with oral antibiotics. The Multinational Association for Supportive Care in Cancer (MASCC) can identify low-risk patients and prevent unnecessary hospitalizations. This study aims to evaluate the management of low-risk FN patients using the MASCC score at a large medical center and assess patient outcomes.

This is an IRB approved, retrospective cohort study that will assess outcomes of patients who met low-risk FN criteria of the MASCC score who received early antimicrobial switch ≤ 48 hours of starting IV antibiotics. Eligible patients for outpatient management based on the MASCC score will be stratified into two arms: (i) patients who received early oral switch ≤ 48 hours of starting IV antibiotics and (ii) patients who received IV antibiotics for >48 hours. Adults presenting to Henry Ford Hospital with diagnostic criteria for FN and receiving systemic anti-cancer therapy (SACT) for solid tumor malignancies will be included. Patients with hematological malignancies, concomitant prophylactic antimicrobial use for another condition, and hepatic or renal insufficiency will be excluded. Secondary endpoints include time to defervescence, hospital length of stay, adverse events related to antibiotic therapy, all-cause readmission, and mortality within 30 days. This study will be powered using the following assumptions: alpha 0.05 and β^2 0.2. Ratio match of 1:2 for early oral antimicrobial switch to prolonged IV antibiotics was conducted. Categorical variables will be compared via Chi-Square test or Fisher's exact test. Continuous variables will be compared using student's t-test and Mann Whitney U-test. Multivariable regression will be used to identify exposures independently associated with unplanned healthcare encounters. For all analyses, $P < 0.05$ will be considered statistically significant.

Results and conclusion: To be presented.

Learning Objectives:

Review 2018 ASCO/IDSA guideline update for appropriate antibiotic therapies for low-risk FN patients based on the MASCC score.

Identify missed opportunities for outpatient management of low-risk FN patients.

Self Assessment Questions:

Which of the following patients would be considered as low-risk based on the MASCC score?

- A. A 48 yo F with metastatic breast cancer receiving SACT who presents to the ED with a mild cough and body aches
- B. A 75 yo M with lung adenocarcinoma receiving SACT with a PMH of COPD who is experiencing severe symptoms of shortness of breath and presents to the ED with a recorded temperature of 39.9C
- C. A 69 yo M with ALL receiving SACT who is receiving voriconazole due to having disseminated invasive aspergillosis one month ago
- D. A 56 yo F with ovarian cancer receiving SACT with a PMH of HIV and ESRD who presents to the ED with a BUN:SCr of 75

Based on updated literature, what is the recommended empiric therapy for patients managed outpatient with febrile neutropenia who are at low risk of infection?

- A. Meropenem 2 g IV every 8 hours + vancomycin IV (dosing per hospital protocol)
- B. Ciprofloxacin 500-750 mg PO every 12 hours + amoxicillin/clavulanate 500 mg every 8 hours
- C. Linezolid 600 mg PO every 12 hours + cefpodoxime 200 mg PO every 12 hours
- D. Tobramycin 7 mg/kg IV (dosing per hospital protocol)

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-655-L01-P

Addition of Antibiotic End Dates Prior to ICU Discharge

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Purpose: The purpose of this study is to assess the role pharmacists can have in preventing overuse of antibiotics in the intensive care unit (ICU) setting.

Methods: Pharmacists will educate ICU providers at Sparrow Hospital to add end dates to their antibiotic orders prior to patient's ICU discharge. This study will be observing pneumonia indications $\leq$ community-acquired (CAP), hospital-acquired (HAP), and ventilator-associated (VAP). The preferred lengths of therapy are based on recommendations from Infectious Diseases Society of America and American Thoracic Society. Once end dates are determined, pharmacists will put a note in the patient's chart so there is a plan for the next providers to follow. A retrospective chart review will look at patients from October 2022 to March 2023 and compare them to post-implementation data. The primary outcome is the percentage of patients who received guideline-recommended length of therapy. Secondary outcomes will be: changing antibiotics from intravenous to oral, antibiotic prescribed on discharge from ICU, length of ICU stay, and length of hospital stay. Patients will be included if they are 18-years-old and over, admitted into the ICU, diagnosed with pneumonia, or originally diagnosed with sepsis. Patients will be excluded if they are immunocompromised, have died less than 7 days from ICU admission, or died during antibiotic treatment. Patients will also be excluded if CAP treatment was less than 4 days and HAP/VAP treatment was less than 6 days.

Preliminary Results: 11/35 (31%) in the pre-intervention group met guideline-recommended length of antibiotic therapy. 11/15 (73%) in the post-intervention group met guideline-recommended length of antibiotic therapy.

Preliminary Conclusion: Pharmacist intervention prevents the overuse of antibiotics in the intensive care unit (ICU) setting.

Learning Objectives:

Recognize the appropriate time for adding antibiotic end dates

Select guideline-recommended antibiotic therapy for patients

Self Assessment Questions:

Patient is a 60 year old male with past medical history of hypertension and diabetes mellitus. Symptoms on admission include: cough producing green mucus, shortness of breath, and fever. He has had no recent hospitalizations. Chest x-ray showed presence of infiltrates indicative of pneumonia. He was empirically started on ceftriaxone and azithromycin for community-acquired pneumonia. Today is day 3 of antibiotics, respiratory culture came back negative, atypical pneumonia panel came back negative, and he has been afebrile for more than 48 hours. O2 saturation 98% on room air, HR 110 bpm, RR 20 bpm. When would you consider adding an antibiotic end date?

- A. Add end date for total of 5 days of antibiotic treatment
- B. Add end date for total of 7 days of antibiotic treatment
- C. Add end date for total of 10 days of antibiotic treatment
- D. Add end date for total of 14 days of antibiotic treatment

Patient is a 45 year old female admitted for pneumonia. She was empirically started on ceftriaxone and azithromycin. Her respiratory culture grew *Pseudomonas* and her atypical pneumonia panel was negative. What changes should be made regarding her current antibiotic regimen?

- A. Continue azithromycin and switch ceftriaxone to cefepime
- B. Continue azithromycin and ceftriaxone, add piperacillin-tazobactam
- C. Discontinue azithromycin and switch ceftriaxone to cefepime
- D. No changes need to be made, continue current regimen

Q1 Answer: A Q2 Answer: C

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

Therapeutic Drug Monitoring of Enoxaparin Post Hematopoietic Stem Cell Transplant

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Purpose:

Patients who undergo hematopoietic stem cell transplant (HSCT) are hypercoagulable and exposure to chemotherapy causes prolonged thrombocytopenia, making optimal venous thromboembolism (VTE) prophylaxis and treatment challenging. In patients on enoxaparin, elevated anti-Xa levels are associated with an increased risk of bleeding, which is increased during periods of thrombocytopenia. The objective of this study is to retrospectively review anti-Xa levels obtained in recipients of allogeneic HSCT, who are being treated with enoxaparin to determine if empiric dosing of enoxaparin should be augmented in this population.

Study Design:

This is a single-center, retrospective, cohort study. The primary objective of this study is to identify a safe and effective dose of enoxaparin for the treatment of VTE in patients post-HSCT. The secondary objective is to assess any correlation between HSCT and elevated anti-Xa levels. This project was approved by Michigan Medicine IRB.

Methods:

Adult patients aged 18 years or older who received an allogeneic HSCT and are being treated with a therapeutic dose of enoxaparin at Michigan Medicine were included in this study. Patients who received oral anticoagulants were excluded. Data collected included patient information related to demographics, enoxaparin doses including any dose changes, anti-Xa levels, indication for an allogeneic HSCT and anticoagulation treatment, and any bleeding events.

Results/Conclusions:

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

Learning Objectives:

Discuss anticoagulation treatment and monitoring in hematopoietic stem cell transplant patients

Review the pharmacokinetics of enoxaparin

Self Assessment Questions:

Which of the following anti-Xa parameters can be monitored to assess the safety and efficacy of enoxaparin?

- A. Trough
- B. Random
- C. Peak
- D. A and C

Allogeneic hematopoietic stem cell transplant (alloHSCT) recipients have an increased risk of which of the following?

- A. Bleeding complications
- B. Thrombotic complications
- C. Thrombocytopenia
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-503-L01-P

Prevalence of Sexually Transmitted Bacterial Infections in Patients in a Ryan White Human Immunodeficiency Virus Clinic

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Purpose:

Sexually transmitted bacterial infections (STIs) pose a serious threat to public health. The STIs rates have been increasing among men who have sex with men (MSM) and transgender women (TGW) who have sex with men. Therefore, bacterial STI prevention strategies in this patient population are under investigation, including the use of doxycycline post-exposure prophylaxis (PEP). This study examined the rate of bacterial STIs before doxycycline PEP implementation including patients either living with human immunodeficiency virus (HIV) or taking pre-exposure prophylaxis (PrEP) for HIV.

Methods:

A retrospective descriptive study was conducted on patients who received care at the UofL Ryan White Clinic for HIV or PrEP from March 2021 to September 2023. Patients were included in the study if they were living with HIV or taking PrEP for HIV and had condomless intercourse as well as more than one sexual partner in the previous 12 months. Exclusion criteria included vulnerable populations and patients routinely taking doxycycline. The primary objective was the incidence of bacterial STIs in patients with HIV and patients taking PrEP when receiving standard of care treatment for STIs. Secondary objectives included incidence of each bacterial STI, rate of STIs between patient groups with differing baseline characteristics, rate of STIs between patients with HIV and patients taking PrEP for HIV, and rate of patients who received treatment if an STI was contracted. Data was obtained by chart review in reverse chronological order from the electronic medical record and REDCap®, C. Patients were collected in accordance with the first appointment date and examined to determine if the patient had an STI during any appointment date during the designated time period.

Results/Conclusion: Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss a patient population at increased risk of contracting STIs

Describe the potential role of post-exposure prophylaxis doxycycline in preventing contraction of STIs

Self Assessment Questions:

Which of the following is true regarding risk of STI contraction?

- A. Patients on preexposure prophylaxis for HIV are also protected against STIs
- B. The rate of STIs in the United States is decreasing every year
- C. The rate of STIs has been increasing among MSM and TGW who have sex with men
- D. STIs are easily treated without concern for antimicrobial resistance or significant associated complications

Doxycycline prophylaxis has the potential to prevent which STIs?

- A. Chlamydia
- B. Gonorrhea
- C. Syphilis
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-598-L01-P

Improving post-discharge antimicrobial use: a quasi-experimental study

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Approximately 40% of all antimicrobial exposure associated with an acute-care hospitalization is prescribed at the time of discharge, however most antimicrobial stewardship programs (ASPs) restrict their activities to inpatient antimicrobial-prescribing. Several studies have demonstrated that post-discharge antimicrobial use is often inappropriate, often unnecessary or sub-optimal dosing of antimicrobial agents. It is recognized that post-discharge antimicrobials are an important target for antimicrobial stewardship, however inpatient metrics often do not capture or evaluate these prescriptions. A potentially effective strategy to improve post-discharge antimicrobial use is a post-prescription audit-and-review (PPR) focused solely on prescriptions for patients soon to discharge.

The study is a multi-site, stepped-wedge cluster-randomized trial, with randomization occurring at the site-level. One facility entered the intervention stage every 2 weeks, and continued documenting intervention for 2.5-3 months, no sites performed the intervention for longer than 6 months. During the intervention, a medical team pharmacist performed a discharge-PPR every weekday for patients on medicine services. The primary outcome for the study is the post-discharge antimicrobial days of therapy per 100 admissions. Secondary outcomes include inpatient days of therapy (per 100 admissions), length of stay, and 30-day hospital re-admission rates. Locally, our goal is to quantify pharmacist interventions during the discharge planning process.

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

Learning Objectives:

Identify the potential impact of pharmacist driven post-prescription audit-and review process on discharge antimicrobial stewardship.

Recognize barriers to implementing a post-discharge audit-review antimicrobial stewardship program for a hospital system.

Self Assessment Questions:

What percentage of antimicrobial exposure associated with an acute-care hospital stay is prescribed at the time of discharge?

- A. 0.25
- B. 0.4
- C. 0.75
- D. 0.8

Studies have found that what percentage of post-discharge fluoroquinolone prescriptions were either unnecessary or sub-optimal?

- A. 0.25
- B. 0.4
- C. 0.75
- D. 0.8

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-632-L01-P

Factors Associated with Attendance to Diabetes Education Classes and Impact on Health Outcomes

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Purpose:

The ambulatory pharmacy residency program offers diabetes education classes to patients within the physician network of Saint Joseph Health System. A series of 4 classes, each lasting 2 hours, are offered virtually and in person at differing times of day. Each class covers a different topic related to diabetes management. Many patients who are referred to classes do not attend. The purpose of this project is to assess characteristics associated with attendance and compare outcomes among patients who attended versus those who did not attend.

Methods:

Patients scheduled between July 1 2022 and December 31 2023 were included. Retrospective chart review was used to collect variables, including: age, sex, number of classes attended, A1c before and after classes, participation in pharmacist collaborative practice clinic, social determinants of health (SDOH) screening results, diagnosis of depression, and no-show rate prior to class. A1c post-class was collected 90 days after projected class completion. Exclusion criteria included patients with pre-diabetes, patients who never scheduled, and second-time attendances.

Results:

103 patients were identified. 53% did not attend any classes; 52% had unmet social needs. A greater proportion of people who attended at least 1 class attended pharmacist clinic (70 vs. 30%). Baseline A1c was higher for patients who didn't attend (9.7%) compared with attendance at 1 class (8%). Mean A1c 90 days after projected completion was 7.4% in the cohort that attended vs. 9.6% for non-attendance.

A greater proportion of people with depression or social isolation did not attend any classes (25 vs. 18%). A greater proportion of patients with self-identified poor health literacy did not attend any classes (15 vs. 7%).

Conclusions:

Trends suggest improved A1c after group education. Attending pharmacist clinic may improve attendance in classes. Barriers to involvement in group education may include depression, social isolation and poor health literacy.

Learning Objectives:

Identify social determinant of health-related factors that may lead to reduced likelihood of attendance at group diabetes education classes.

Describe health outcomes impacted by pharmacist-led diabetes education classes.

Self Assessment Questions:

Which of the following social factors has been shown to negatively impact attendance rates of diabetes group education classes?

- A. Lower A1c
- B. Younger age
- C. Poor health literacy
- D. Social isolation

Which of the following health outcomes has been determined to be impacted by pharmacist-led group education classes?

- A. Improved A1c and decreased hospitalizations for hypoglycemia and hyperglycemia
- B. Improved blood pressure and total cholesterol
- C. Increased body weight and A1c
- D. Decreased diabetes-related knowledge

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-682-L01-P

Evaluation of Statin Use in People with Human Immunodeficiency Virus

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Purpose: People living with HIV (PWH) are at an increased risk of cardiovascular disease due to the inflammatory nature of the HIV virus. Even after suppressive antiretroviral therapy (ART), PWH have a higher level of immune activation and corresponding inflammation. Couple this with the increased life expectancy resulting from improvements in ART and the metabolic adverse effects of some ART, and the risk of cardiovascular events for PWH is significantly higher than the general population. The 2018 ACC/AHA guideline on the management of blood cholesterol lists HIV as a "risk-enhancing factor" and encourages the consideration of HIV status when evaluating atherosclerotic cardiovascular disease (ASCVD) risk and statin initiation. Despite this guidance, studies suggest that statins are under-prescribed in PWH. Previous concern for drug interactions between statins and older antiretroviral agents could be to blame; however, newer ART agents mitigate or nullify this concern completely. The purpose of this study is to evaluate the statin prescribing habits of Saint Joseph Health System (SJHS) providers for patients with HIV.

Methods: This is a retrospective chart review of adult patients at two primary care and one infectious disease office within SJHS. Patients were identified via a search report of the HIV registry and were included if they had been seen by their SJHS provider within the last year. Data collected includes the most recent lipid panel, current ART, relevant comorbidities, allergies/intolerances, drug interactions, ASCVD risk, liver function tests, and statin agent, along with demographic data. The primary objective is the percentage of patients appropriately treated with statins according to the ACC/AHA hyperlipidemia guidelines. Secondary objectives include subgroup analyses of statin appropriateness within each statin treatment group and number of drug interactions between a statin and ART agent.

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

Learning Objectives:

Explain the causes of statin under-prescribing in patients with HIV.

Identify patients with HIV that may benefit from statin therapy.

Self Assessment Questions:

Which statin is least likely to have clinically relevant drug interactions with antiretroviral therapy?

- A. Atorvastatin
- B. Pravastatin
- C. Rosuvastatin
- D. Simvastatin

A moderate-intensity statin should be considered in which patient?

- A. 58-year-old with diabetes and an ASCVD risk of 10.5%
- B. 26-year-old with HIV and an LDL of 200 mg/dL
- C. 31-year-old with HIV and an ASCVD risk of 2.3%
- D. 45-year-old with HIV and an ASCVD risk of 7.1%

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-532-L02-P

INDUC DOAC Trial: What is the incidence of venous thromboembolism and ischemic stroke with concomitant use of apixaban, rivaroxaban or dabigatran with CYP or P-gp inducers?

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Direct oral anticoagulants (DOACs) have become ubiquitous in the treatment of venous thromboembolism (VTE) and for stroke prevention in patients with atrial fibrillation. While drug interactions are scarce, literature focuses primarily on cytochrome P-450 (CYP) inhibitors. A paucity of evidence exists to aid clinicians in managing interactions related to CYP or p-glycoprotein (P-gp) induction and the clinical significance of increased risk of VTE and ischemic stroke. Current guidance from the 2023 Guideline for the Diagnosis and Management of Atrial Fibrillation are to avoid the combination of DOACs and inducers, but concurrent use of these agents is still seen in clinical practice. This retrospective cohort study will evaluate VTE and ischemic stroke incidence in two patient groups: Those receiving a CYP or P-gp inducer (rifampin, carbamazepine, phenytoin, phenobarbital, or primidone) concurrently with a DOAC (apixaban, rivaroxaban and dabigatran) versus those receiving a DOAC alone. Patients prescribed a DOAC within a Trihealth facility between January 1, 2013, through December 30, 2022, will be identified. Patients will be included in both groups if they are ≥ 18 years of age, are prescribed a DOAC for the treatment of VTE or prevention of ischemic stroke secondary to atrial fibrillation and included in the DOAC and inducer group if they have had at least 14 days of concomitant use of a DOAC and inducer. Pregnant and incarcerated patients will be excluded. The primary outcome is the combined incidence of ischemic stroke and/or VTE. Secondary outcomes include mortality while on treatment, incidence of stroke, incidence of VTE, time on therapy, time to event, medication changes on discharge, and major bleeding. Results will be reported at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe anticoagulation options and pharmacokinetic considerations for VTE and stroke prevention in atrial fibrillation

Discuss literature surrounding CYP/P-gp induction and DOAC use

Self Assessment Questions:

What recommendation is made for the management of DOACS and inducing agents according to the 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation

A. Double the dose of inducing agent

B. Avoid use

C. Increase the dose or frequency of DOAC

D. Stop inducing agent

Which of these medications would increase the risk of thrombosis if taken with a DOAC

A. Amiodarone

B. Fluconazole

C. Fenofibrate

D. Phenytoin

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-641-L01-P

Gap Analysis of Medication Monitoring for Multiple Sclerosis Specialty Medications

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Purpose: The use of specialty medications is increasing, and health-system specialty pharmacies (HSSPs) and ambulatory pharmacists embedded in specialty clinics play a significant role in optimizing medication monitoring to ensure patient safety and improve disease outcomes. The University of Wisconsin (UW) Health Multiple Sclerosis (MS) Clinic has an established ambulatory lab monitoring protocol, but whether medication management is standardized across the HSSP, and neurology clinic remains unexplored. This project seeks to standardize MS medication monitoring across pharmacy and clinic departments across UW Health to improve monitoring compliance. Methods: This single-center, quality improvement project included a gap analysis to compile and compare required lab monitoring parameters between the MS clinic delegation protocol (frame of reference), pharmacist note documentation within electronic health records, refill protocol, and drug information resources. A retrospective chart review evaluated MS patients who refilled prescriptions under the UW specialty Medication Therapy Management (MTM) program between September 1, 2022, to September 30, 2023. Eligible patients were at least 18 years of age, had an active MS medication order, and were followed in the clinic by one of the four UW MS specialists. Patients were excluded if they were on intravenous MS therapy, unenrolled from the specialty MTM program, reported not taking the MS medication, or had no MTM notes to review. Subgroups analyzed included the chronic therapy group prescribed the MS medication before March 1, 2023, and the new therapy group prescribed or switched to current therapy on or after March 1, 2023. The primary outcome was lab compliance. Gap analysis revealed specification is needed if complete blood counts should be monitored with or without differential and if liver function tests include bilirubin levels or only transaminases. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the benefits of standardizing laboratory monitoring parameters between protocols and pharmacist note documentation

Recognize the risks associated with multiple sclerosis medications that necessitate additional lab monitoring

Self Assessment Questions:

Which of the following represents a requirement for classification as a specialty medication?

A. Yearly cost of more than or equal to \$1,000 USD

B. Initiation of therapy by a primary care physician

C. Extensive patient counseling/monitoring is necessary

D. Available via traditional distribution methods

Which of the following is the most common adverse drug event seen with most multiple sclerosis medications?

A. Hepatotoxicity

B. Neurotoxicity

C. Nephrotoxicity

D. Cardiotoxicity

Q1 Answer: C Q2 Answer: A
ACPE Universal Activity Number 0121-9999-666-L04-P

Assessing the Impact of a Pharmacist-Driven Opioid Use Disorder Consult Service

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Purpose: Medications for opioid use disorder (MOUD) are the standard of care for opioid use disorder (OUD), a highly prevalent condition in hospitalized patients, due to demonstrated reductions in both morbidity and mortality. Initiating or continuing MOUD while patients are hospitalized is complex. Pharmacists are well equipped to help ensure optimal outcomes for patients with OUD. The purpose of this study is to evaluate the impact of a newly established pharmacy-integrated medication assisted recovery (MAR) OUD consult service on MOUD initiation or continuation, appropriateness and safety of dosing, and continuity of care.

Methods: Subjects with at least one of OUD, opioid overdose, or opioid abuse on their active problem list at the time of either an emergency department or inpatient encounter between 7/1/2022 and 6/30/2023 will be included. Encounters will be excluded if the patient eloped or left without being evaluated by a provider. The primary outcome will be proportion of encounters with initiation or continuation of MOUD when an OUD MAR consult is ordered or not ordered. Secondary outcomes include appropriate use (adjunctive medications, documentation of COWS, ECG prior to methadone), safety (precipitated withdrawal, over sedation either noted in the medical record or leading to held doses, naloxone administration), time to initiation, discharge against medical advice, and coordination of follow up and will only be compared among the patients with MOUD ordered during an included encounter. Outcomes will be compared between groups using chi squared tests for categorical variables and student's t-test for continuous variables.

Results/Conclusions: Of the 1574 encounters meeting inclusion criteria, 1343 did not include a consult to the MAR OUD service. Data collection and analysis are ongoing.

Learning Objectives:

Identify the benefits of initiating medications for opioid use disorder (MOUD) in patients with OUD.

Recognize safe and effective practices in prescribing and monitoring MOUD therapy.

Self Assessment Questions:

Initiation of medications for opioid use disorder (MOUD) have been associated with what outcome?

- A. Increased rates of discharge against medical advice
- B. Decreased rates of cardiovascular disease
- C. Increased rates of illicit opioid use
- D. Decreased rates of all-cause mortality

Which of the following is true regarding use of methadone or buprenorphine?

- A. Buprenorphine can be initiated immediately provided the patient is not sedated
- B. Methadone is associated with QRS widening on ECG
- C. Inappropriate administration of buprenorphine can precipitate opioid withdrawal
- D. At least 24 hours must have passed from the time of last use of another opioid before methadone can be started

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-694-L01-P

GIT on SGLT2-I: Genitourinary Infections in T2DM patients on SGLT2-Inhibitors

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Purpose: Reported side effects of sodium glucose co-transporter inhibitors (SGLT2i) include diabetic ketoacidosis (DKA) and genitourinary infections (GUI). With the expansion of FDA approved indications for SGLT2i, significant health and economic burden on patients and health systems are expected due to increased exposure. Identification of risk factors for adverse effects can improve prescribing and enhance safe and effective drug utilization. The purpose of this study is to determine whether the predisposed level of glucose control can increase the risk of developing a genitourinary infection in patients on SGLT2i.

Methods: This study is an IRB-approved, retrospective cohort study. Patients aged 18 and older who were on an SGLT2i and developed a genitourinary infection from 8/30/2019 to 8/30/2023 will be included. The intervention groups are defined as patients with type 2 diabetes mellitus who developed a genitourinary infection while on an SGLT2i compared to those patients not on an SGLT2i. The primary outcome is to determine the impact of glucose control on the risk of genitourinary infections with SGLT2i. Secondary outcomes include determining the impact of glucose control on the risk of DKA with SGLT2i and describing the incidence of recurrent genitourinary infections in patients on SGLT2i. Data collection will include patient demographics, SGLT2i agent, diagnosis of genitourinary infection, and A1c at the time of SGLT2i initiation and time of infection. DKA diagnosis will be collected on patients who are on an SGLT2i. All data collected will be analyzed using descriptive statistics, Mann-Whitney U, and Chi-squared test, as appropriate. Estimated target sample size is 260 patients, assuming an alpha of 0.05 and beta of 0.2.

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

Learning Objectives:

Discuss which adverse effects patients with T2DM are at risk for.

Indicate the risk factors of developing a urinary tract infection for a patient on an SGLT2i.

Self Assessment Questions:

Based on previous literature, which adverse effect is associated with patients with T2DM receiving SGLT2i?

- A. Genitourinary infections
- B. Hypertension
- C. Chronic Kidney Disease
- D. Myocardial infarction

The provider started empagliflozin in a 70-year-old female with T2DM and HFrEF with an A1c of 12. Two months later, she presents with a UTI. Which of the following is not a known risk factor for this patient developing a UTI?

- A. Age
- B. Female
- C. T2DM
- D. HFrEF

Q1 Answer: A Q2 Answer: D
ACPE Universal Activity Number 0121-9999-616-L01-P

Impact of a Pharmacist-Involved Sepsis Alert on Time to Antimicrobial Administration in the Emergency Department at a Rural Community Health-System

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Purpose.

In the management of sepsis, pharmacists can play a crucial role within the healthcare team by ensuring the timely initiation of antimicrobials. In August of 2022, our institution implemented a sepsis alert system to rapidly identify patients meeting criteria for severe sepsis and septic shock. As part of the implemented protocol, pharmacist involvement is required for evaluation of empiric antimicrobial therapy for patients identified as having septic shock. The purpose of this study is to assess the impact of a pharmacist-involved sepsis alert on time to antimicrobial administration in the emergency department of a rural community health system after facility-wide implementation of a sepsis alert for patients with septic shock.

Methods.

This was a single-center retrospective study evaluating the time to antibiotic administration in patients with septic shock in the emergency department before and after the implementation of a pharmacist-involved sepsis alert system. Patients were included if they were at least 18 years of age meeting criteria for septic shock in the emergency department over our 18-month retrospective study period. Patients were excluded if incarcerated or actively pregnant. The primary outcome was time to administration of the first antimicrobial agent. Secondary outcomes included time from order entry to antimicrobial administration, incidence of septic shock initially identified as severe sepsis, appropriate antimicrobial agent selection, and frequency of antimicrobial orders entered by a pharmacist instead of the prescriber.

Summary of Preliminary Results.

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

Conclusion Reached.

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

Learning Objectives:

Describe the goals of timely antimicrobial administration in septic shock
Recall successful characteristics of interventions to improve SEP-1 bundle compliance

Self Assessment Questions:

For what reason do the 2021 Surviving Sepsis Guidelines cite for administering broad-spectrum antimicrobials within one hour of recognition of septic shock?

- A. To decrease length of stay
- B. To improve antimicrobial tolerability
- C. To reduce mortality
- D. To administer antimicrobials prior to blood culture collection

Which of the following is a common characteristic of interventions utilized to improve SEP-1 bundle compliance?

- A. Interdisciplinary teamwork and collaboration
- B. Prioritization of antimicrobials over fluid resuscitation
- C. Avoiding the use of protocols and order sets for sepsis in the emergency department
- D. Avoiding the use of performance improvement metrics

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-835-L01-P

Short-Course IV Beta-Lactams for Uncomplicated Urinary Tract Infections

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Purpose: Urinary tract infections (UTIs) rank among the most common infections requiring antibiotic therapy. Currently, the Infectious Diseases Society of America (IDSA) 2011 Guidelines for Uncomplicated UTIs recommend a 3 to 7-day course of oral beta-lactam agents when other recommended agents are not feasible. However, given increasing bacterial resistance rates of fluoroquinolones and sulfamethoxazole/trimethoprim (SMX/TMP), when patients are admitted they often receive intravenous beta lactams empirically. In recent years, studies have demonstrated the efficacy of shorter courses of antimicrobial therapy for UTIs compared with longer courses but there is limited data regarding the use of intravenous beta lactams for uncomplicated UTIs. This study aims to compare treatment failure rates of uncomplicated UTIs with short courses of intravenous (IV) beta-lactams (3 days or less) versus longer courses of beta-lactams (greater than 3 days).

Methods: This single-center, retrospective, non-inferiority cohort study, conducted at a large academic teaching hospital, identified adult patients with uncomplicated urinary tract infection through the University of Kentucky Business Intelligence and Center for Clinical and Transitional Science. Patients were excluded if the UTI was classified as being complicated (male gender, pregnant female, urinary obstruction, Foley catheter during treatment, urinary obstruction, hydronephrosis, renal/ureteral calculi, vesicointestinal fistula, urinary stents, urostomy, nephrostomy tubes, and pyelonephritis). The primary outcome assessed was treatment failure defined as the need for retreatment with additional antibiotic therapy within 30 days. Secondary outcomes include incidence of C. Difficile infections within 30 days of antibiotic therapy, hospital readmission within 30 days of discharge, and outpatient encounters for urinary-related symptoms within 30 days.

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

Learning Objectives:

Review common antimicrobials used in the treatment of uncomplicated urinary tract infections
Identify benefits of utilizing shorter courses of antimicrobial treatment

Self Assessment Questions:

Which of the following may be a benefit(s) to a patient receiving the shortest effective duration of antimicrobial treatment?

- A. Decreased hospital length of stay
- B. Fewer adverse effects/complications of antimicrobial therapy
- C. Decreased risk of C. Difficile infection
- D. All of the above

2. Which of the following oral beta lactams have a bioavailability less than 50%?

- A. Cefdinir
- B. Amoxicillin
- C. Cefpodoxime
- D. Cephalexin

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-705-L01-P

Characterization of multi-modal analgesia following post-surgical discharge

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Purpose: Multimodal analgesia has been integrated into clinical practice guidelines as a standard of care for post-surgical pain management. Multimodal approaches offer pain relief and reduce opioid consumption post-operatively. With additional medications come the risks of polypharmacy, financial strain, and adverse drug reactions. Stewardship efforts for post-operative pain medications, however, are poorly studied. The primary outcome of this study is to characterize the duration of post-operative multimodal analgesics. Secondary outcomes include determining the prescribing rates of individual agents at discharge, individual refill rates, and characterizing prescribing trends per surgery type.

Methods: This study will be a single-center, retrospective chart-review of patients who have been discharged from a large, academic medical center following an inpatient procedure. Post-operative patients over the age of 18 admitted inpatient following non-cardiothoracic procedures will be included. Patients who have received out-patient or cardiac procedures will be excluded from the study. Patient chart reviews will be conducted in Epic to assess the occurrence of refills and the total days of medication exposure in the 6 months following the patient's procedure. Initial patients will be selected from 1/1/2023-6/30/2023 or for 200 patients, whichever occurs first, with data usage from chart review encompassing 6 months of data collection post-procedure. Demographics to be collected include procedure type, sex, age, and baseline opioid usage. Data will be managed by REDCap. Agents of interest will include duloxetine, muscle relaxants (methocarbamol, cyclobenzaprine, tizanidine), prescription non-steroidal anti-inflammatory drugs (NSAIDs), gabapentinoids, and lidocaine 5% transdermal patches. Descriptive statistics will be used to describe demographics, agents used, and total therapy time. These will be measured by adding the days' supply of medication at discharge plus noted refills for each agent, and further stratified by procedure and agent.

Results/Conclusions: Data analysis is in progress. Preliminary results and conclusions will be presented at the 2023 GLPRC.

Learning Objectives:

Identify current goals and agents involved in multimodal analgesia

Recognize current gaps in literature addressing potential harms of multimodal analgesia

Self Assessment Questions:

Which of the following is true regarding multimodal analgesia?

- A. Multimodal analgesia seeks to reduce the need for opioids in post-surgical pain control
- B. Post-operative pain guidelines do not recognize multimodal approaches
- C. By using multimodal approaches, patients should have less exposure to potential adverse drug events
- D. Agents involved in multimodal analgesia are often prescription only medications, avoiding non-prescription options

Which of the following is true regarding current literature on multimodal analgesia?

- A. Current literature adequately addresses the potential harms of all agents in multimodal analgesia
- B. Evidence suggests multimodal analgesia does not have any financial harm for patients
- C. Optimal duration of multimodal analgesic agents is well defined
- D. Risks associated with polypharmacy from multiple analgesics are not well studied

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-824-L08-P

Evaluation of Beta-Lactam Antibiotics in Patients with Hypoalbuminemia and Enterobacteriales Bacteremia

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Purpose:

Hypoalbuminemia is common among patients in the intensive care unit and is prevalent in sepsis. Pharmacokinetic and pharmacodynamic properties of medications may be significantly impacted by hypoalbuminemia. Unbound drug exits the bloodstream faster with low albumin, resulting in increased volume of distribution and drug clearance leading to compromised target concentration attainment, especially with time-dependent antimicrobials. Ceftriaxone and ertapenem are highly protein bound (85-95%) and retain activity against many organisms within Enterobacterales order. The purpose of this study was to evaluate outcomes in critically ill patients with hypoalbuminemia and Enterobacterales bacteremia treated with highly protein bound antimicrobials.

Methods:

A retrospective study was conducted of patients admitted to the University of Louisville Health- UofL Hospital and University of Louisville Health- Jewish Hospital between January 1, 2017, and August 31, 2023. Adult patients admitted to an ICU having ≥ 1 blood culture positive for an Enterobacterales organism, serum albumin ≤ 2.5 g/dL, and received culture-driven antimicrobial treatment for > 72 hours were included. Patients with carbapenem resistant Enterobacteriaceae or polymicrobial bacteremia, pregnant patients, and incarcerated patients were excluded. Hypoalbuminemic patients were divided into two groups, those treated with highly protein-bound antimicrobials (ceftriaxone and ertapenem) and those treated with all other antimicrobials. The primary outcome of the study is rate of treatment failure defined as: an escalation to broader spectrum antibiotics (anti-pseudomonal agents or carbapenems) or repeat positive blood cultures. Secondary outcomes included mortality, ICU and hospital length of stay, and time to infection resolution. Time to infection resolution was defined as fever resolution (temperature $< 100.4^{\circ}\text{F}$), resolution of leukocytosis ($< 12 \times 10^3/\mu\text{L}$), and/or negative blood cultures.

Results/Conclusion:

Data analysis is in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss pharmacokinetic and pharmacodynamic changes that may occur in patients with hypoalbuminemia.

Identify potential impact of the administration of highly protein bound antimicrobials, ceftriaxone and ertapenem, in patients with hypoalbuminemia.

Self Assessment Questions:

Which of the following drug properties can be affected by hypoalbuminemia?

- A. Absorption
- B. Clearance
- C. Log P
- D. Excretion

Which of the following antimicrobials is highly protein bound?

- A. Piperacillin-tazobactam
- B. Cefepime
- C. Ceftriaxone
- D. Levofloxacin

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-685-L01-P

Evaluation of the Role of a Pharmacist in the Management of Gestational Hypertension in an Obstetrics and Gynecology (OB/GYN) Clinic

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Hypertensive disorders of pregnancy complicate 1 in 7 hospital deliveries and have been identified as a leading cause of maternal and fetal death. The American College of Obstetricians and Gynecologists (ACOG) recommends weekly hypertension appointments in patients with gestational hypertension and initiation of pharmacologic intervention when blood pressure reaches 160/110 mmHg or above. Pharmacists are trained to assess blood pressure and equipped with pharmacokinetic knowledge to dose medications in pregnant patients, presenting an opportunity for pharmacist-driven management gestational hypertension. The purpose of this study is to determine the role of a pharmacist in gestational hypertension management in an OB/GYN clinic.

This single center, retrospective study will evaluate patients 18 years and older with an ICD-10 diagnosis code of gestational hypertension. Patients will be included if they have an Indiana University (IU) Health OB/GYN provider and delivered at the IU Health Bloomington Hospital from July 2022 to July 2023. Patients who delivered outside of IU Health Bloomington Hospital, have an existing diagnosis of chronic hypertension, and who demonstrate noncompliance with scheduled appointments will be excluded. The primary outcome of the study is the number of patients who transition from gestational hypertension into pre-eclampsia, eclampsia, or HELLP syndrome. Secondary outcomes include the number of patients who are appropriately prescribed blood pressure lowering treatment and preterm deliveries secondary to gestational hypertension. This data will be used to help evaluate the role a pharmacist would serve in the management of gestational hypertension and create a pharmacist driven protocol. The results and conclusions of this study will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify potential maternal and fetal consequences of uncontrolled gestational hypertension.

Discuss potential opportunities for pharmacist intervention in the management of gestational hypertension.

Self Assessment Questions:

At what blood pressure does ACOG recommend initiation of pharmacologic therapy?

- A. 130/80 mmHg
- B. 140/90 mmHg
- C. 160/110 mmHg
- D. 120/80 mmHg

Which of the following is a true statement?

- A. Gestational hypertension is defined by ACOG as a blood pressure of greater than or equal to 140/90 mmHg occurring after 20 weeks of gestation
- B. Hypertensive disorders of pregnancy complicate 1 in 20 hospital pregnancies
- C. Patients with gestational hypertension or preeclampsia WITH severe features are eligible for ambulatory blood pressure management
- D. Magnesium sulfate is ineffective for seizure prophylaxis

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-673-L01-P

Medication Use Evaluation: Assessing the Impact of Conversion from Nicardipine to Clevidipine in Hypertensive Patients at a 200-bed Community Hospital

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This retrospective medication use evaluation will be conducted at a 200-bed community hospital, spanning a six-month period from October 1, 2023, to March 31, 2024. It will include adult patients who require intravenous antihypertensive therapy for various clinical indications. The study is structured into two distinct phases: the Nicardipine Phase (October 1, 2023 - December 31, 2023) and the Clevidipine Phase (initiated after Pharmacy and Therapeutics approval on January 1, 2024, through March 31, 2024). During both phases, patient data will be recorded in the institution's electronic health records system, Cerner. Data collection will encompass Nicardipine and Clevidipine dosing, the effectiveness of blood pressure control, and any adverse events experienced, specifically reflex tachycardia and hypotension. Additionally, cost-related information within the organization will be captured, as well as total volume of Nicardipine and Clevidipine administered. Upon the completion of data collection, a comprehensive analysis will occur, evaluating dosing strategies, blood pressure control outcomes, adverse event profiles, cost considerations, total volume utilization, and the overall impact on the institution's practices. The results from this assessment will be presented following the conclusion of the Clevidipine Phase on March 31, 2024. This is designed to offer valuable insights into the transition from Nicardipine to Clevidipine in hypertensive patients at 200-bed community hospital with a particular focus on patient safety, therapeutic efficacy, economic implications, and broader clinical ramifications.

Learning Objectives:

Describe the comparative effectiveness and safety profiles of Nicardipine and Clevidipine in managing intravenous antihypertensive therapy in adult patients across different clinical indications.

Identify potential areas for improvement in clinical practice and patient care through an analysis of the impact of transitioning from Nicardipine to Clevidipine on blood pressure control outcomes and adverse event profiles in adult patients requiring intravenous antihypertensive therapy.

Self Assessment Questions:

What adverse events were specifically monitored during both phases of the study involving Nicardipine and Clevidipine administration?

- A. Nausea and vomiting
- B. Bradycardia and hypertension
- C. Reflex tachycardia and hypotension
- D. Insomnia and anxiety

Which of the following is a contraindication for the use of Clevidipine but not Nicardipine?

- A. Hypertensive crisis
- B. Severe aortic stenosis
- C. Lipid emulsion hypersensitivity
- D. Chronic obstructive pulmonary disease

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-837-L01-P

Assessment of Therapeutic Approaches: Necrotizing Soft Tissue Infections and the Choice Between Empiric Vancomycin + Clindamycin and Linezolid

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Purpose: Necrotizing skin and soft tissue infections (NSTI) are life-threatening infections that require prompt diagnosis, antibiotics, and surgical intervention.

Historically, clindamycin has been used in the treatment of NSTI due to its toxin-suppressing effects against streptococcus pyogenes. However, due to emerging resistance as well as the risk of acute kidney injury (AKI) with vancomycin, linezolid has been used more recently. Our institutional guidelines were recently updated to include linezolid-based regimens as a potential first-line option for empiric treatment of NSTIs. There are limited data comparing vancomycin + clindamycin regimens vs. linezolid-based regimens in patients with NSTI.

Methods: This single-center, retrospective cohort study included patients aged 18 - 99 years with NSTI who received either vancomycin + clindamycin OR linezolid in combination with broad-spectrum gram-negative and anaerobic therapy (cefepime + metronidazole OR piperacillin-tazobactam OR meropenem) while admitted to the surgical intensive care unit (ICU) at a level 1 trauma and quaternary referral academic medical center for surgical debridement between January 1, 2017, and June 30, 2023. Patients were excluded if they received an antibiotic regimen for less than 24 hours, received one antibiotic regimen and were then switched to the other study regimen, transferred from outside hospital after receiving at least one surgical debridement, had a pre-existing diagnosis of chronic kidney disease or end-stage renal disease, or were readmitted within the study period such that only the first admission would be included. The primary outcome of the study was number of surgical debridements. Secondary outcomes included rates of acute kidney injury (AKI), duration of antibiotics, recurrence of infection necessitating return to operating room (OR), and necrotizing infection clinical composite endpoint (NICCE) success.

Results and Conclusions: Preliminary results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the efficacy of various antibiotic regimens in patients with necrotizing soft tissue infections.

Recognize the potential benefits of linezolid-based regimens to vancomycin + clindamycin-based antibiotic regimens in patients with necrotizing soft tissue infections.

Self Assessment Questions:

Which of the following pathogens would you suspect to be the most likely cause of NSTI?

- A. Pseudomonas aeruginosa
- B. Streptococcus pyogenes
- C. Listeria monocytogenes
- D. Serratia marcescens

Why might linezolid be beneficial for initial empiric therapy in patients with NSTI?

- A. Does not require renal dose adjustment
- B. Lower incidence of C. difficile infections
- C. Does not require therapeutic drug monitoring

D. All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-653-L01-P

Clostridioides difficile Infection Incidence Before and After Initiating a Two-step Testing Protocol

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Purpose: In 2022, our institution implemented a two-step testing protocol for Clostridioides difficile Infection (CDI) to reflect the changes within guidelines. Both a PCR and a toxin test are now required for a suspected CDI. The addition of the toxin detection test can help providers delineate between colonization of Clostridioides difficile (C. difficile) and an active CDI. The purpose of this study is to assess the utility of the two-step testing protocol in reducing the number of unnecessary treatments for CDI.

Methods: This is a retrospective, single-center, pre-post intervention cohort study comparing CDI treatment utilization before and after the implementation of the two-step testing C. difficile protocol. Those who were at least 18 years old and had either a PCR and/or toxin test were included in this study. The primary endpoints are comparing the number of patients who received active treatment for CDI before and after the implementation of the two-step testing. Key secondary endpoints include investigating thirty-day and sixty-day outcomes for patients who were PCR positive, and toxin negative who did not receive active CDI treatment versus patients who received treatment. Thirty-day and sixty-day outcomes will be defined as hospital readmission rates for CDI as the primary reason for admission. The other secondary endpoint will include the review of pharmacists' impact on treatment outcomes regardless of C. difficile testing results.

Conclusions: Results are currently still in progress. Final findings will be presented at the Great Lakes Conference.

Learning Objectives:

Identify the difference between colonization and an active infection of Clostridioides difficile.

Recognize appropriate C. difficile therapy for a patient who is PCR positive and toxin negative.

Self Assessment Questions:

Which of the following test results may indicate that a patient is colonized with C. difficile and does not have an active infection?

- A. PCR (+); Toxin (+)
- B. PCR (-); Toxin (+)
- C. PCR (-); Toxin (-)
- D. PCR (+); Toxin (-)

BT is a 68 yo F with that presents to the ED with complaints of abdominal pain and loose stools for the past 2 days. She had been previously treated at an OSH for C. difficile infection 2 weeks ago with a 10-day course of oral vancomycin with no symptom relief. The C. difficile test resulted as PCR (+); Toxin (-). Which of the following would be the most appropriate course for BT?

- A. Repeat another 10-day course of PO vancomycin
- B. Patient is most likely a C. difficile colonizer; no further treatment is warranted.
- C. Patient qualifies for fulminant C. difficile treatment with PO vancomycin and metronidazole.
- D. Patient should be treated with a 4-week PO vancomycin taper to treat her CDI

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-509-L01-P

Impact of Insulin Copay Cap Legislation on Savings, Adherence, and Utilization Among Health Plan Medicare Beneficiaries

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Background: High insulin costs are associated with patient non-adherence to their prescribed use of insulin which can lead to further health complications. At the beginning of 2023, the implementation of the Inflation Reduction Act (IRA) capped insulin copayments for Medicare beneficiaries at \$35 for each 30-day supply of insulin.

Purpose: The purpose of this study was to determine the effect of the insulin copay cap legislation on member copayments for insulin between 2022 and 2023, while also identifying relationships between copayments for insulin and adherence, average income, and gender.

Methods: A retrospective claims analysis was conducted for Medicare beneficiaries of a single health plan; members were included if they had at least two paid insulin claims between the periods of January 1, 2022, to June 30, 2022, and January 1, 2023, to June 30, 2023. Adherence was measured using the proportion of days covered. Members were categorized into an average income range by their zip code based on the 2020 US Census data.

Results: There were 71 members in the 2022 cohort and 59 in the 2023 cohort. After the implementation of the IRA, there was a statistically significant decrease in the average of member copayments for insulin between 2022 (\$68.15) and 2023 (\$54.34) ($p < 0.001$). Although the overall ANOVA model was not significant, post hoc comparisons indicated a trend in which the adherence in the $\leq \$60,000$ income group was lower than both the $\$70,000-79,999$ ($p = 0.01$) and $\$80,000-89,999$ ($p = 0.04$) income groups.

Conclusions: The insulin copay legislation significantly lowered insulin copayments for Medicare beneficiaries of the studied health plan, and a trend was identified between member income and their level of adherence. Despite IRA implementation, GLP-1 utilization continued to increase. Further research will be needed to assess IRA impact on adherence between average income groups.

Learning Objectives:

Recognize the impact of the Inflation Reduction Act on insulin copayments for Medicare beneficiaries.

Indicate important factors in social determinants of health.

Self Assessment Questions:

After implementation of the Inflation Reduction Act, how much is a 30-day supply of insulin for Medicare beneficiaries?

- A. 20
- B. 35
- C. 40

D. 50

Which of the following is considered a social determinant of health?

- A. Astigmatism
- B. Hemoglobin A1c
- C. Income
- D. Anemia

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-772-L04-P

Comparison of Prescribing Patterns of Naloxone in a Veteran Population

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Purpose: Naloxone is the most commonly prescribed antidote for opioid overdose and the expansion of dosage forms, particularly to intranasal products, has allowed for increased use outside the hospital. In the community setting, it's been found that 34% of opioid overdose reversals involved at least 2 doses of naloxone 4mg intranasally. An 8mg intranasal product was approved by the FDA in 2021, yet there are no recommendations for use of one product over the other. This study aims to review and analyze data to determine if there is a difference in prescribing patterns of the naloxone 4mg product and the naloxone 8mg product at Veteran Health Indiana (VHI).

Methods: This study is a retrospective analysis utilizing VA Computerized Patient Record System (CPRS) to perform chart reviews of patients prescribed naloxone 4mg and naloxone 8mg at VHI. Patients to be evaluated for inclusion require an active prescription of intranasal naloxone between 4/1/2022 and 4/1/2023 and patient age ≥18 years. Patients are excluded from the study if naloxone was prescribed by a non-VHI provider, naloxone was prescribed in another dose other than 4mg or 8mg and naloxone was prescribed in another dosage form other than intranasal spray. The primary endpoint is comparison of prescribing patterns of naloxone 4mg and naloxone 8mg. Several secondary endpoints include total naloxone prescription numbers from each month, number of patients with repeated naloxone prescriptions, discipline of prescriber and dose of naloxone prescribed, type of clinic and dose of naloxone prescribed and reason for receiving naloxone and dose prescribed.

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

Learning Objectives:

Recognize patient specific factors that influence the risk of opioid-related adverse events.

Explain the advantages of utilizing a naloxone dosing protocol.

Self Assessment Questions:

Which patient specific factor(s) would contribute to the risk of opioid-related serious adverse events?

- A. Active oxycodone prescription
- B. History of major depressive disorder
- C. A and B
- D. Access to opioid reversal agent

What is a potential advantage of implementing a naloxone dosing protocol?

- A. Educate prescribers on effective naloxone dosing
- B. Establish a standard of care
- C. Increase patient access
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-848-L08-P

Evaluation of Time to Administration of Levetiracetam for Seizures after Transition to IV Push from Infusion in the Emergency Department

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Status epilepticus, defined as seizures lasting longer than 5 minutes, is associated with significant morbidity and mortality, where the risk increases with the duration of the seizures. Levetiracetam is an anti-epileptic medication used for the treatment of seizures and status epilepticus. Levetiracetam is commonly made as an intravenous (IV) infusion administered over 15 minutes. However, there have been several recent retrospective reviews that have evaluated the safety of undiluted intravenous push (IVP) doses. The objective of this study is to evaluate the time from order verification to administration of levetiracetam undiluted IVP compared to IV infusions. A single-center retrospective analysis will be conducted evaluating patients treated for status epilepticus or seizures with at least one dose of levetiracetam administered in the emergency department (ED) at the University of Wisconsin Health SwedishAmerican Hospital (SAH). Patients who received levetiracetam treatment, either IVP or IV infusion, between July 1, 2023, and December 31, 2023, will be evaluated for inclusion in this study. This time frame was selected by investigators due to SAH transitioning from IV infusion to IVP doses for adult patients on September 19, 2023. Patients must be ≥18 years old, have presented to SAH for status epilepticus or seizures, and have been treated with at least one dose of IV levetiracetam while in the ED. Patients will be excluded if they are < 18 years old or ≥90 years old, pregnant, a prisoner, transferred to or from an outside hospital, or did not have appropriate weight documentation. The primary endpoint is the average time in minutes from order verification to administration time of levetiracetam undiluted IVP compared to IV infusion. Secondary endpoints include the appropriateness of dose based on indication and weight. Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the long-term effects of prolonged seizure activity

Review the difference in times to administration between levetiracetam infusions and intravenous push doses

Self Assessment Questions:

What is status epilepticus as defined by the 2012 Neurocritical Care Society Guidelines?

- A. Seizures lasting longer than 30 minutes with recovery between seizures
- B. Seizures lasting longer than 5 minutes without recovery between seizures
- C. 5 seizures in a row lasting 20 seconds each without recovery between seizures
- D. Seizures lasting longer than 15 minutes with recovery between seizures

Which of the following is the highest dose of levetiracetam evaluated to be safe for undiluted IV push administration?

- A. 2,000 mg
- B. 1,500 mg
- C. 3,000 mg
- D. 4,500 mg

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-574-L01-P

Naloxone distribution from the emergency department at a community teaching hospital

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Purpose: The emergency department is a key point of access to health care for individuals in the community with substance use disorder. The Opioid Prescribing Engagement Network (OPEN), a subsection of the Michigan Emergency Department Improvement Collaborative (MEDIC) is dedicated to improving negative outcomes related to opioids by providing naloxone rescue kits to emergency department patients at a high risk for opioid overdose. Since 2022, our health system has been enrolled in this program and standard workflows have been established for the emergency care team including the emergency room pharmacists. The purpose of this quality assessment was to explore the characteristics of patients who were candidates to receive a naloxone rescue kit through the OPEN/MEDIC program to increase the distribution rate at discharge.

Methods: This initiative consisted of a retrospective cohort review of high-risk patients who were candidates for a naloxone rescue kit at discharge from the emergency department during the study period of November 2022 to November 2023. High-risk patients were defined as those presenting with opioid overdose, current opioid withdrawal, or receiving or seeking treatment for opioid use disorder. Patients were stratified into two groups based on whether they did or did not receive a naloxone rescue kit. The primary outcome was to determine factors associated with patients receiving a naloxone rescue kit at discharge. Secondary outcomes included specific differences in demographic and clinical characteristics among three high-risk primary diagnoses and percentage of patients who were offered a kit but did not leave the emergency department with a kit. A multivariate logistic regression was conducted for the primary outcome to determine areas for improvement and optimization of the naloxone dispensing process.

Results/Conclusions: In progress

Learning Objectives:

List the primary opioid-related diagnoses designated by OPEN/MEDIC as high-risk patients who should be offered a naloxone kit prior to discharge

Describe the workflow for dispensing a naloxone kit to a patient in the emergency department

Self Assessment Questions:

For which of the following diagnoses should patients always be offered a naloxone kit prior to discharge from the emergency department (according to OPEN/MEDIC criteria)?

- A. opioid overdose
- B. receiving or seeking treatment for opioid use disorder
- C. opioid withdrawal
- D. all of the above

Naloxone for administration via which route is provided in the naloxone kit distributed to patients from the emergency department?

- A. intramuscular naloxone
- B. intranasal naloxone
- C. oral naloxone
- D. subcutaneous naloxone

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-572-L01-P

Time of Prior Authorization Decision Compared to Literature at Community Health Network

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Over the past decade, the use of prior authorization (PA) by health insurance companies has been on the rise. This process can take days to weeks to process as providers have to fill out the information needed by insurance companies. This can lead to a gap in patient care, including delayed or disrupted treatment. Specialty pharmacies are utilized for the dispensing of high cost and uncommon medications for patients with complex disease states. Due to the type of medications these pharmacies handle, numerous PAs are seen throughout the workday. Having staff who are trained and knowledgeable about completing PAs can speed up the processing time leading to a shorter gap in patient care.

Since January 2023, Community Health Network's specialty pharmacy (CHNSP) has had technicians who are trained to complete and submit PAs on behalf of providers. This allows providers to be able to focus more on patient care and less on unnecessary paperwork. Another benefit is PAs are completed and submitted as soon as they come in to allow for quicker patient availability. This study will describe the average time to PA decision for CHNSP compared to literature. It will also be looking at different factors that could affect PA approval time including location, different insurance companies, and medications within the network.

Learning Objectives:

Describe the average time it takes for a decision to be made on a PA at Community Health Network Specialty Pharmacy compared to usual care literature

Identify different factors that could potentially affect PA turnaround time

Self Assessment Questions:

When comparing CHNw Specialty Pharmacy's PA approval turnaround time to literature, it is

- A. faster than literature
- B. slower than literature
- C. the same as literature
- D. unable to determine

Which of the following factors was NOT evaluated for potentially affecting PA turnaround time?

- A. Medication the PA was for

B. Provider who wrote the script
C. Location script was sent from
D. Patient's Insurance
Q1 Answer: A Q2 Answer: B
ACPE Universal Activity Number 0121-9999-834-L99-P

Olanzapine for Highly Emetic Chemotherapy Regimens (O-HER): Implementing Evidence-Based Guideline Directed Therapy

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Topic Designation: Disease State/Drug Therapy

Purpose:

In 2018, olanzapine was added to the National Comprehensive Cancer Network (NCCN) supportive care antiemesis guidelines, as a category 1 recommendation, for highly emetic chemotherapy (HEC) regimens. In January of 2023, through provider-approved standing orders, olanzapine was added to the antiemetic premedications for HEC regimens, including doxorubicin, carboplatin, or cisplatin at a rural community health system. The purpose of this study is to assess the impact on incidences of nausea and vomiting after initiating olanzapine for patients receiving HEC regimens.

Methods:

Prior to data collection, this study was submitted to the Ephraim McDowell Regional Medical Center Institutional Review Board for exemption, which was approved. A report was generated from the electronic health record (EHR) to identify the patients that received doxorubicin, carboplatin AUC ≥ 4 , or cisplatin ≥ 40 mg/m² from January 1, 2022 to December 31, 2022 and January 1, 2023 to August 31, 2023 to compare incidences of nausea and vomiting before and after the addition of olanzapine to HEC regimens. Patient eligibility for inclusion was confirmed through individual chart review of the patient's EHR. Data collected included age, sex, ethnicity/race, highly emetic chemotherapy regimen, reports of nausea or vomiting, reports of fatigue, discontinuation of regimen due to nausea or vomiting, number of additional visits for fluids or antiemetics, and dose reductions of highly emetic regimen. The primary outcome was the incidence of nausea and vomiting in patients receiving HEC regimens. Secondary outcomes included the number of patients with HEC regimens discontinued due to nausea or vomiting, number of additional visits for fluids or antiemetics, number of HEC dose reductions, and number of patients reporting fatigue.

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

Learning Objectives:

Describe the standards of care for highly emetic chemotherapy antiemetic therapy
Explain the role of olanzapine in antiemesis for patients receiving highly emetic chemotherapy

Self Assessment Questions:

Which of the following antiemetic regimens is the preferred recommendation by NCCN for highly emetic chemotherapy?

- A. Olanzapine
- B. Aprepitant + Dexamethasone
- C. Olanzapine + Aprepitant + Ondansetron + Dexamethasone
- D. Olanzapine + Palonosetron + Dexamethasone

How is olanzapine dosed around highly emetic chemotherapy regimens?

- A. Day 1, 2, 3, and 4
- B. Daily
- C. Once weekly
- D. Day 1

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-569-L01-P

Reduced Dosing of Intravenous (IV) Insulin for the Treatment of Hyperkalemia

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Background/Purpose: Untreated hyperkalemia has the potential to cause severe cardiac arrhythmias, leading to medical emergencies and possible death. Intravenous (IV) insulin is a cornerstone in the treatment of hyperkalemic emergencies due to its ability to shift potassium back into the cells, thereby lowering serum potassium levels. IV insulin carries the risk of causing severe hypoglycemia, leading to adverse patient outcomes. At UnityPoint Health Meriter, the standard IV insulin dose for treatment of hyperkalemia is 10 units. Lower doses of IV insulin have been studied showing non-inferior reductions in potassium levels with a lower incidence of hypoglycemia.

Methods: A retrospective chart review was conducted assessing hospitalized patients 18 years or older who were treated with IV insulin 10 units for hyperkalemia between the months of June 2023 to September 2023. In the prospective 4 months, UnityPoint Health Meriter will trial the use of 5 units of IV insulin as the starting point for the treatment of hyperkalemia. Data collection includes dose of IV insulin administered, pre- and post-IV insulin potassium levels, blood glucose post IV insulin dose, hypoglycemia interventions if indicated, hypothesized cause of hyperkalemia, and renal status during encounter. The results of this review will be used to determine if utilizing a lower dose of IV insulin when treating hyperkalemia is warranted to reduce potential patient harm while maintaining clinically effective potassium reductions.

Results/Conclusions: Data analysis is currently in progress and Results and Conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize therapies that help to lower potassium levels in patients with hyperkalemia.
Identify patients at risk of developing hypoglycemia after insulin administration based on their risk factors.

Self Assessment Questions:

Of the following, which list correctly describes therapies used to lower plasma potassium concentrations?

- A. IV insulin; Sodium bicarb; sodium zirconium
- B. Calcium gluconate; IV insulin; dialysis

- C. Furosemide; IV insulin; sodium zirconium
- D. Albuterol; IV insulin; Calcium carbonate

Which of the following is a risk factor that results in an increased risk for developing hypoglycemia with IV insulin?

- A. Older age ($\geq$ 75 years old)
- B. Chronic kidney disease
- C. Insulin naive patients
- D. All the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-511-L01-P

Pharmacist-Led Penicillin Allergy De-labeling in the Inpatient Setting

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Purpose: Penicillin allergies are commonly reported in patient charts even though these reactions stem from a drug intolerance, historical reporting, or are defined as unknown reactions. As beta-lactam antibiotics are mainstays of treatment in many infections, penicillin allergies can result in coverage that is ineffective or inefficient. The purpose of this study is to implement a patient interview strategy that will assist in de-labeling penicillin allergies to provide safer and more effective treatment.

Methods: To evaluate the potential for de-labeling, a protocol has been developed to assess the nature of the patient's reported allergy via pharmacist interview. This interview will document the patient's prior reaction to penicillin, specific causative agent, the symptoms experienced, the length of time since the reported reaction, and any subsequent treatment with beta-lactams following the initial insult. Based on the patient's response to the questionnaire, these reactions will then be divided into no/low risk, moderate risk, and high risk of allergic reaction.

If a patient is no/low risk of allergic reaction, the allergy will be removed from their chart and the intervention will be documented. These patients will also be educated on the results of the de-labeling. Patients with a confirmed allergy will be properly labeled as high-risk patients and have the reaction type and relevant information documented in their chart. For those patients that experienced delayed reactions to treatment or were unsure of their reaction, this information will be entered into the patient's electronic health record and the patient's interest in allergy testing will be determined. Data for this study will be collected from October 20, 2023, to March 1, 2024.

Results/Conclusion: Data collection is in progress. Results and conclusions from this study will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify opportunities for de-labeling in patients with falsely reported penicillin allergies.

Reproduce the interviewing methods used in this study to safely de-label patients with false penicillin allergies.

Self Assessment Questions:

Which of the following patients is a good candidate for possible penicillin allergy de-labeling?

- A. A patient who has experienced hives when using cephalexin but had no reaction to cefazolin while admitted.
- B. A patient who has a childhood history of rash with amoxicillin/clavulanate.
- C. A patient who developed angioedema because of treatment with ceftriaxone five years ago.
- D. A patient who experienced swelling of the throat when prescribed amoxicillin five years ago.

You have just interviewed a patient and determined that they are unlikely to have a true allergy to penicillin since they have received beta-lactams several times while hospitalized. The patient is uncomfortable with removing the allergy from their health record and is not interested in a follow-up with an allergist for testing. What is the appropriate next step?

- A. De-label the patient anyway based on clinical judgment.
- B. Do nothing to the patient's allergy record as the patient wishes that the allergy be listed.
- C. Change the allergy to an intolerance as the patient has tolerated other beta-lactams.
- D. Leave the allergy in the record but place a note with the names of the medications they have been able to tolerate.

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-527-L01-P

Efficiency of Non-Emergent Hyperglycemia Management in the Pediatric Emergency Department

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Purpose: Non-emergent hyperglycemia, if left untreated, can perpetuate hyperglycemic crises such as diabetic ketoacidosis or hyperglycemic hyperosmolar state; both are associated with increased morbidity and mortality. To prevent transition to these hyperglycemic crises, early identification of hyperglycemia and prompt insulin administration in the emergency department (ED) are essential. This project aims to evaluate the current state of non-emergent hyperglycemia management in the ED of a pediatric level 1 trauma center.

Methods: This is a retrospective chart review of visits to the ED that received at least one administration of rapid acting insulin. The primary outcome is the average time between the first recorded hyperglycemic value (glucose $\geq$ 200 mg/dL), to insulin order and administration. Secondary outcomes include average time from a blood glucose of $\geq$ 300 mg/dL to insulin order and administration, average time from ED arrival to first blood glucose result, average time between the blood glucose level obtained immediately prior to the insulin order to insulin order and administration, and the average time between the insulin order and administration.

Results: Our institution is currently averaging 204 minutes and 237 minutes between the identification of hyperglycemia and insulin order and administration, respectively. For a glucose $\geq$ 300 mg/dL, the average times to order and administration are 188 minutes and 222 minutes, respectively. On average there are 36.5 minutes between ED arrival and first blood glucose and 34.2 minutes between order placement and administration. Lastly, the average time between last glucose to insulin order and administration is 35.3 minutes and 69.3 minutes, respectively.

Conclusion: Patients who present to the Nationwide Children's Hospital ED with non-emergent hyperglycemia are experiencing treatment delays greater than goal metrics of insulin order and administration within one hour of hyperglycemia identification. A quality improvement project is starting Spring 2024 to target this issue.

Learning Objectives:

Outline non-emergent hyperglycemia management strategies in the emergency department.

Describe how delays in insulin ordering and administration can impact the emergency department patient

Self Assessment Questions:

What is a recommended approach for non-emergent hyperglycemia management in the emergency department?

- A. intravenous insulin drip
- B. subcutaneous rapid-acting insulin injection
- C. Oral antihyperglycemic medications
- D. subcutaneous long-acting insulin injection

What is the current state and future goal of non-emergent hyperglycemia management at this institution?

- A. Current state: meeting goal metrics; Future goal: continue current processes
- B. Current state: meeting goal metrics; Future goal: identify and target reasons behind delays
- C. Current state: not meeting goal metrics; Future goal: continue current processes
- D. Current state: not meeting goal metrics; Future goal: identify and target reasons behind delays

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-588-L01-P

Fistula Rates after Otolaryngology Flap Procedures with Prophylactic Intravenous Levothyroxine Usage

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Purpose: The prevalence of head and neck cancers is increasing worldwide. In conjunction with chemoradiation, surgical resection and reconstruction with free flaps is common during the treatment of these cancers. Fistulas can develop after these procedures due to several risk factors including established and temporary hypothyroidism. While the use of prophylactic IV levothyroxine in euthyroid patients following total laryngectomies has been described, the purpose of this study is to determine if the use of prophylactic levothyroxine decreases fistula rates in other otolaryngology procedures including pharyngectomies, glossectomies, and mandibulectomies.

Methods: This retrospective chart review included patients with a history of chemoradiation, who underwent an otolaryngology flap procedure, at IU Health from January 1, 2018 to September 1, 2023. Exclusion criteria included age less than 18 years old, prior use of levothyroxine, and hyper- or hypothyroidism at baseline. Data was compared between patients receiving IV levothyroxine for 4 or more days versus those receiving IV levothyroxine for less than 4 days. The primary endpoint was rate of fistula formation. Secondary endpoints included reoperation and infection rates during admission, length of stay, readmission rates, use of oral levothyroxine and new onset hypothyroidism within 90 days of discharge. Additionally, a cost analysis will be completed.

Results and Conclusions: Data collection is in process. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify risk factors for fistula development.

Recall the half-life of levothyroxine in euthyroid, hypothyroid, and hyperthyroid patients.

Self Assessment Questions:

A patient's past medical history includes atrial fibrillation, chronic obstructive pulmonary disease, dyslipidemia, and hypothyroidism. Which of the following is a risk factor for fistula development?

- A. Atrial fibrillation
- B. Chronic obstructive pulmonary disease
- C. Dyslipidemia
- D. Hypothyroidism

Which of the following is the anticipated half-life of levothyroxine in a patient with hyperthyroidism?

- A. 3 to 4 days
- B. 6 to 7 days
- C. 9 to 10 days
- D. 12 to 13 days

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-539-L01-P

Incidence of dexmedetomidine Induced Cardiovascular Adverse Drug Events in Patients with Cirrhosis.

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Purpose: Clinical practice guidelines recommend dexmedetomidine as a first line agent to achieve sedation in mechanically ventilated patients. Based on its mechanism of alpha-2 agonism, dexmedetomidine provides the advantage of minimal impact on respiratory drive. However, this MOA can induce cardiovascular adverse drug reactions (CV ADRs) such as hypotension and bradycardia. Dexmedetomidine is hepatically metabolized, and clearance is largely determined according to hepatic blood flow. Patients with conditions that reduce hepatic blood flow may accumulate therapy, and this may be associated with a higher risk of CV ADRs. The purpose of this study is to assess the impact of severity of liver disease on the incidence of clinically significant CV ADRs in patients with cirrhosis receiving dexmedetomidine for sedation.

Methods:

This is an IRB-approved retrospective, observational, propensity-adjusted, case-control study completed at an academic medical center. Patients were included if they had cirrhosis defined by ICD 9 and 10 codes, were admitted to the intensive care unit from July 1st, 2018, through June 30th, 2023 and received dexmedetomidine.

Vulnerable populations, patients receiving mechanical circulatory support, patients receiving electrical pacing, and heart transplant recipients were excluded. Cases were defined as those experiencing a CV ADR by documentation of a MAP <60 mmHg, HR <55 BPM and/or SBP <90 mmHg plus a clinical intervention 60 minutes from the CV ADR. Controls were patients that did not have a clinically significant CV ADR. The primary outcome was the odds of experiencing a CV ADR based on liver disease severity represented by a novel scoring system called the ALBI (albumin-bilirubin) grade. The secondary outcome included a multivariable logistic regression analysis to determine other risk factors for the development of CV ADRs.

Results and Conclusions:

Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Describe dexmedetomidine's place in therapy as a sedative for mechanically ventilated patients

Define key principles of hepatic metabolism of medications in cirrhosis

Self Assessment Questions:

Which of the following adverse effects are more common with dexmedetomidine compared to other continuous infusion sedatives used for mechanically ventilated patients?

- A. Bradycardia
- B. Pancreatitis
- C. Hypertriglyceridemia
- D. Tachycardia

Which of the following would decrease the elimination of a medication with a hepatic extraction ratio of 0.9?

- A. Increased blood flow to the liver
- B. decreased blood flow to the liver
- C. Increased protein binding
- D. decreased protein binding

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-613-L01-P

Pharmacist Interventions in Chronic Kidney Disease in an Ambulatory Care Setting

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Statement of Purpose:

This quality improvement project aims to explore the potential of a pharmacist-led protocol for interventions in patients with Chronic Kidney Disease. The primary objective of this project is to determine the impact of these interventions on patient renal function as shown by change in eGFR. Secondary endpoints include other laboratory markers of renal function and physician satisfaction with pharmacy recommendations.

Statement of Methods:

Phase 1 of this study utilized an EMR report to identify eligible active clinic patients with Chronic Kidney Disease on their problem list. Inclusion criteria includes CKD diagnosis and an appointment at the investigation site within the past two years. Exclusion criteria includes <18 years old, ESRD on dialysis and history of kidney transplant. A chart review for each patient was performed by a pharmacy resident or pharmacy student to identify opportunities for interventions such as renal dose adjustments, discontinuation of nephrotoxic medications/supplements, and recommendation of renoprotective therapies. Once these opportunities were identified, they were communicated through the EMR to the patient's primary care provider using a preset note template. The intervention type, provider acceptance rate, and provider satisfaction with the process were recorded for each attempted intervention. Phase 2 of this study will include a post-intervention chart review for each patient for whom a provider was contacted and will occur in the months following intervention implementation. This phase will include data collection and analysis of the primary and secondary endpoints to determine the impact of the pharmacist-led interventions.

Summary of Results:

Results from Phase 1 are currently being collected and will be presented at the Great Lakes Pharmacy Residency Conference. Phase 2 will be carried out by a future medical resident at the investigation site to allow for full implementation of pharmacy interventions.

Conclusion Reached:

Will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define Chronic Kidney Disease and state the common contributing factors to disease development.

Recognize gaps in care for specific patients with Chronic Kidney disease and develop an action plan for addressing these gaps.

Self Assessment Questions:

Which of the following medications is commonly associated with nephrotoxic potential?

- A. Carvedilol

- B. Ibuprofen
- C. Famotidine
- D. Metformin

Which of the following patients would most likely benefit from SGLT-2 therapy?

- A. A 31 year-old male with Type 1 diabetes mellitus and chronic kidney disease.
- B. An 82 year-old female with Type 2 diabetes mellitus, chronic kidney disease, and a history of recurrent UTIs.
- C. A 58 year-old male with heart failure and chronic kidney disease.
- D. A 73 year-old female with chronic kidney disease, unintentional weight loss, and hypotension.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-557-L01-P

Continuous Glucose Monitor Utilization and Outcomes in Latino Populations

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Purpose: Literature evaluating continuous glucose monitoring (CGM) demonstrates that utilization leads to significantly greater reduction in A1C in patients with type 1 and type 2 diabetes, compared to utilization of fingerstick blood glucose monitoring (BGM) alone. CGM improves HbA1c, reduces diabetes-related hospitalizations, and decreases emergency room service visits for people with diabetes using intensive insulin regimens. Evidence shows that CGM is underutilized in pediatric and adult populations who are Black, Indigenous, and people of color (BIPOC). There is a need to increase access to CGM and evaluate the use and impact in diverse populations to prevent continued health disparities. To improve access to CGM, Eskenazi Health added CGM devices to formulary on a financial assistance program that primarily serves patients unable to qualify for other health insurance plans, known as Eskenazi Health Financial Assistance Program (EH FAP). CGM devices were approved for anyone with diabetes and EH FAP coverage taking insulin or a sulfonylurea. The purpose of this study is to assess the clinical impact of improving CGM access through formulary addition specifically in Hispanic/Latino populations receiving care at Federally Qualified Health Centers.

Methods: A retrospective, cohort study of 10 Federally Qualified Health Centers (FQHC) was conducted for all patients with continuous glucose monitor fills at an Eskenazi Health outpatient pharmacy between June 2022 and December 2023. Patients were excluded if they were less than 18 years old or had an active pregnancy. The primary outcome was HbA1c pre and post CGM use. Secondary outcomes included CGM uptake and adherence. Adherence was measured utilizing Proportion of Days Covered (PDC), defined as number of days ðœœcoveredðœœ in study period over number of days in study period.

Results: Data collection is ongoing.

Conclusions: Final results will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the benefits of CGM in people with type 1 and type 2 diabetes

Recognize gaps in the literature related to ethnic/racial disparities in the care of people with diabetes using CGM

Self Assessment Questions:

According to current literature, which one of the following outcomes is a benefit of CGM for people with diabetes?

- A. Improved HbA1c
- B. Decreased hypoglycemia
- C. Reduced diabetes related hospitalizations
- D. All of the above

Which one of the following is a gap in the literature regarding CGM in diverse populations?

- A. There is little to no data on CGM clinical outcomes within marginalized communities
- B. There are no studies that assess the impact of CGM persistence in pediatric patients with T1DM
- C. There are no studies that evaluate initiation of CGM in diverse populations
- D. There is no data on disparities related to CGM access

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-591-L01-P

Retrospective Institutional Evaluation of the Incidence of Thrombocytopenia in Patients Undergoing Continuous Renal Replacement Therapy and Prolonged Intermittent Renal Replacement Therapy

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Purpose: Thrombocytopenia is commonly noted in critically ill patients as a result of many different etiologies, including, but not limited to, sepsis, shock, or medications. Critically ill patients receiving renal replacement therapy (RRT) may be on concomitant heparin, raising concerns for heparin-induced thrombocytopenia (HIT). However, recent literature suggests that thrombocytopenia may occur due to continuous renal replacement therapy (CRRT) itself. The primary objective of this study is to evaluate the incidence of thrombocytopenia in patients receiving both continuous renal replacement therapy and prolonged intermittent renal replacement therapy (PIRRT). We hope to implement our findings into practice to optimize anticoagulant usage and thrombocytopenia treatments in RRT. The primary outcome will be incidence of thrombocytopenia after initiating CRRT and/or PIRRT, as defined by a drop in platelet count to less than $150 \times 10^9/L$ in a previously non-thrombocytopenic patient. Methods: This retrospective observational analysis aims to evaluate thrombocytopenia in patients receiving CRRT, PIRRT, or both in a single admission. Data will be gathered from patients using TABLO[®] machines admitted to a single institution from November 2019 to October 2023. Results and Conclusion: Of the patients included in this study undergoing CRRT and/or PIRRT, 32/51 (62.7%) experienced thrombocytopenia either during RRT or within 24 hours of RRT completion. Mean baseline platelet count was $250.7 \times 10^9/L$ and mean percent change in platelet count was a decrease of 41.1%. Data analysis is currently in process and full results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review current evidence of thrombocytopenia in CRRT

Describe the ASH guideline recommended treatment plans for patients with HIT

Self Assessment Questions:

A patient is admitted to the ICU without previous exposure to heparin products. The patient is started on a heparin infusion for atrial fibrillation. Which of the following is an appropriate time frame to see a decrease in platelets suggestive of HIT?

- A. < 1 day
- B. 1-5 days
- C. 5-10 days
- D. > 10 days

What is a preferred anticoagulant in critically ill HIT patients in renal failure?

- A. argatroban
- B. rivaroxaban
- C. fondaparinux
- D. enoxaparin

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-805-L05-P

Comparison of SMOFlipid and Intralipid in Critically Ill Adult Surgical Patients receiving Parenteral Nutrition

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Previous research suggests that use of the soybean oil-based lipid emulsion may be associated with a higher likelihood of complications in patients receiving parenteral nutrition. Potential factors contributing to this include oxidative stress, elevated omega-6 fatty acids and phytosterols, and low α -tocopherol content. Lipid formulations containing higher concentrations of omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), such as the four-lipid blend emulsions, may offer anti-inflammatory advantages, lower infectious risk, and reduced rates of hepatotoxicity. In June 2021, SMOFlipid (SMOF), a four-lipid emulsion blend, was approved for formula use at Michigan Medicine. This study aims to evaluate the clinical outcomes in critically ill adult surgical patients receiving SMOF versus those receiving Intralipid (IL), a soybean oil-based lipid emulsion.

This single-center retrospective cohort study includes all critically ill adult surgical patients requiring parenteral nutrition for > 72 hours from June 1, 2021, to June 30, 2023. Those admitted to these intensive care units (ICU) that did not receive recent major surgery prior to admission or major surgery during admission were excluded. Patients who received SMOF were compared to those who received IL, with a required 72-hour duration of lipid therapy on a single formulation. The primary outcome is ICU length of stay. Secondary outcomes include mortality, hospital length of stay, ICU readmission, liver function, infectious sources, phosphate levels, and the requirement of insulin infusion. Data collected includes patient information related to demographics, comorbidities, nutritional disposition, parenteral nutrition treatment details, and clinical outcomes.

This study provides additional data to assess the difference in outcomes in patients receiving SMOF versus those receiving IL. Comparison of different lipid formulations in the critically ill adult surgical population will help to optimize nutrition management in patients requiring parenteral nutrition.

Learning Objectives:

Identify potential differences in outcomes between critically ill adult surgical patients receiving SMOFlipid versus those receiving Intralipid

Discuss the role of different lipid formulations in optimizing nutrition management in critically ill adult surgical patients

Self Assessment Questions:

Which has NOT been associated with soybean oil-based lipid emulsions?

- A. Increased amounts of phytosterols
- B. Elevated levels of omega-6 fatty acids
- C. Low α -tocopherol content
- D. Elevated levels of omega-3 fatty acids

How might the use of SMOFlipid impact clinical outcomes compared to Intralipid in critically ill adult surgical patients?

- A. Increased risk of infection
- B. Increased immunomodulating effects
- C. Increased oxidative stress
- D. Increased rates of hepatotoxicity

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-738-L01-P

Cytomegalovirus Reactivation Rates: Graft Versus Host Disease Prophylaxis Post-Transplant Cyclophosphamide Based Regimen Compared to Prior Standard of Care

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Background: A common and potentially life-threatening infection post-transplant is cytomegalovirus (CMV) during the time of t-cell dysfunction. The recently published phase three randomized controlled trial looking at tacrolimus (FK) and methotrexate (MTX) vs. post-transplant cyclophosphamide (PTCy), FK, and mycophenolate (MMF) post-allogeneic hematopoietic stem cell transplant for graft versus host disease (GVHD) prophylaxis reported a significant reduction in GVHD and improved relapse-free survival at 1-year post-transplant within the PTCy, FK, and MMF group. The trial results for CMV breakthrough rates were significantly lower than previously reported. Since changing to PTCy in early 2023 post-transplant CMV reactivation in transplant recipients remains a concern. With expanding PTCy to other donor types from the traditional haploidentical protocol there is a need to better quantify CMV risk within other transplant populations.

Objective: The primary purpose of this study is to determine the rates of CMV reactivation in the setting of PTCy with or without letermovir. The results of this study could highlight the importance of adjusting modifiable risk factors for CMV reactivation such as other immunosuppressive agents on board.

Methods: This retrospective study included all adult patients undergoing allogeneic hematopoietic stem cell transplant from an HLA-matched related donor, matched unrelated, or a 7/8 mismatched donor, after reduced-intensity conditioning. Patients were transplanted at Indiana University Health between July of 2022 and July of 2023. The primary endpoint was the incidence of clinically significant breakthrough CMV reactivation at day 100 post-transplant between sirolimus/FK and PTCy/FK/MMF group. Key secondary endpoints include CMV mortality, CMV reactivation rates for those on letermovir by day 7 compared to day 100, the incidence of graft versus host disease, all-cause mortality, peak CMV plasma, and the proportion of patients still on immunosuppressants at day 100.

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

Learning Objectives:

Identify the appropriate CMV prophylactic agent for CMV seropositive recipients within the bone marrow transplant population.

Select patients at high risk for CMV reactivation based on CMV reactivation patient risk factors.

Self Assessment Questions:

Which of the following is an appropriate CMV prophylactic options for CMV seropositive recipients in the bone marrow transplant population?

- A. Valganciclovir (oral) 900 mg BID for 7 days followed by once daily for 21 days.
- B. Ganciclovir (IV) 5 mg/kg/ dose every 12 hours for 7 days then once daily for 218 days
- C. Letermovir (oral) 480 mg once daily through day 100
- D. Acyclovir (oral) 800 mg twice daily through day 100

Which of the following patients is considered at high-risk factor for CMV reactivation in the bone marrow transplant population?

- A. Recipient who is CMV seronegative status with a seronegative donor
- B. Patient who is receiving GVHD treatment with steroids >1mg/kg/day
- C. Patient who has a matched related donor
- D. Patient who has a matched unrelated donor

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-523-L01-P

Ambulatory Pharmacist Impact on Diabetes-Related Statin Quality Measure in Primary Care Clinics

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Purpose: The value of using statins for primary and secondary prevention of clinical atherosclerotic cardiovascular disease (ASCVD) in patients with type 2 diabetes mellitus (T2DM) has been well established. The benefits of using statins in the T2DM population has long been recognized by the Centers for Medicare and Medicaid Services (CMS). CMS holds Medicare plans accountable for statin utilization in patients with T2DM through the statin use in persons with diabetes (SUPD) measure. With the knowledge and tools needed to improve statin utilization, ambulatory pharmacists play an important role in chronic disease state management, particularly in conditions of diabetes and hyperlipidemia. This quality improvement initiative aims to evaluate the number of SUPD care gaps closed before and after ambulatory pharmacist intervention within the Trinity Health Medical Group (THMG) primary care clinics in the greater Muskegon Michigan area between July 2023 and February 2024. **Methods:** This quality improvement initiative will be performed using a prospective cohort of patients eligible for SUPD care gap closure as defined by the Pharmacy Quality Alliance. Eligible patients will be identified by using reports from a pre-specified third-party payer. Identified patients will be further reviewed for applicable exclusions from the SUPD quality measure specifications. The primary endpoint is the number of SUPD care gaps closed following intervention. Secondary endpoints include the percent change in the composite SUPD quality measure score, number of patients meeting exclusion criteria, documentation of statin allergy or intolerance, number of patients with attempted statin re-challenge, and reason for not prescribing a statin. **Conclusion:** Data analysis is currently in progress and results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the purpose and specifications of the SUPD quality metric

Discuss the ambulatory pharmacist's role in addressing the SUPD quality measure

Self Assessment Questions:

Which of the following is a goal of the SUPD quality metric?

- A. Improve cardiovascular outcomes for patients
- B. Increase statin utilization among patients with type 2 diabetes
- C. Reduce A1C below 6% for patients with diabetes
- D. A and B

Ambulatory pharmacist responsibilities for the SUPD quality measure include which of the following?

- A. Evaluating patients for SUPD exclusions
- B. Patient outreach phone calls
- C. Prescribing a statin via collaborative practice agreement
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-520-L01-P

Risk Factors for Acute Kidney Injury Post Liver Transplant

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Purpose: This study aims to identify clinical characteristics associated with acute kidney injury (AKI) following liver transplant.

Methods: A retrospective cohort study was conducted on liver transplant (LT) patients between 9/30/2020 and 9/30/2022. Patient data were collected through chart review, excluding those under 18 years of age, receiving thymoglobulin induction, or undergoing consistent renal replacement therapy pre-transplant. Factors influencing AKI were assessed, including demographics, baseline features, and perioperative events. The Kidney Disease: Improving Global Outcomes (KDIGO) guidelines defined AKI and the various stages. Statistical analyses included t-tests, Mann-Whitney U tests, Fisher's Exact tests, bivariate correlations, and logistic regression modeling.

Summary of Prelim results: Out of 100 patients screened, 98 were included, with 63.2% experiencing AKI post LT. Among AKI patients, 51.6% were female compared to 25% in the non-AKI group. Significant differences were observed in height (168.5cm vs. 174.5cm) and BMI (32.7 vs. 28.5) between AKI and non-AKI groups. Notable demographic disparities included a higher incidence of NAFLD in the AKI group (33.9% vs. 11.1%) and lower albumin levels (3.1g/dL vs. 3.5g/dL) pre-LT. AKI patients received higher diuretic doses post-transplant. Regression analysis revealed that increased height (OR 1.07; 95% CI, 1-1.12; p 0.008) and higher pre-operative albumin (OR 4.48; CI 1.79-11.2; p 0.001) were associated with a decreased incidence of AKI while NAFLD (OR 5.37; CI, 1.43-20.2; p 0.013) was associated with an increased incidence of AKI. When obesity is included and NAFLD excluded due to collinearity, obesity was associated with an increased incidence of AKI (OR 2.8, 1.02-7.6; p 0.045).

Conclusions reached: Following LT, AKI was prevalent and associated with lower height, lower pre-operative albumin, NAFLD, and obesity. Secondary outcomes of length of stay, graft survival, CKD, and 1-year mortality did not differ between groups. Further studies are warranted in investigating obesity as a modifiable risk factor for AKI after LT.

Learning Objectives:

Describe risk factors for acute kidney injury after liver transplantation

Describe how acute kidney injury impact patient outcomes

Self Assessment Questions:

Which of the following increase the risk of developing acute kidney injury after liver transplant?

- A. Increased height
- B. Obesity
- C. Contrast
- D. Increased pre-operative albumin

Which of the following patient (secondary) outcomes increased with acute kidney injury in this study?

- A. Length of stay
- B. Mortality
- C. Chronic kidney disease
- D. None of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-531-L01-P

Effect of Home Antihypertensive Regimen on Hemodynamic and Clinical Outcomes While Using Angiotensin II in Kidney Transplant Recipients

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Purpose: Theoretical concerns exist when using angiotensin II as a vasopressor in patients previously receiving angiotensin receptor blocking agents (ARBs).

Angiotensin II is a first-line vasopressor agent when needed for DDKT at our center. The purpose of this study was to assess the hemodynamic and clinical effects of ARBs on angiotensin II use in the perioperative setting of kidney transplant.

Methods: This is a single-center, retrospective, cohort study. Subjects ≥ 18 years, with hypertension on antihypertensive medication therapy at the time of DDKT, who received angiotensin II as the first-line vasopressor support in the peri-transplantation period, were included. Patients were grouped based on their home antihypertensive regimen to either ARB or non-ARB cohorts. The primary outcome was hemodynamic response as defined by total duration of angiotensin II usage, time with SBP < 120 mmHg while on angiotensin II, and need for additional continuous infusion vasopressor support. Cumulative incidence of adverse drug events, hospital, and ICU length of stay were also assessed.

Summary of Results: A total of 44 patients were assessed (10 in the ARB, 34 in the non-ARB cohort). No difference was observed in duration of angiotensin II (14.3 and 26.4 hours, $P=0.138$), total perioperative time with SBP < 120 mmHg (2.8 vs 3 hours, $P=0.404$) or need for second vasopressor (30% vs 32.4%, $P=0.606$) in the ARB and non-ARB cohorts. Hospital and ICU length-of stay were similar between groups at 4.2 vs 5 days ($P=0.096$) and 5.8 vs 6.7 days ($P=0.124$), respectively. There was no difference observed in cumulative adverse drug effects between groups ($P>0.05$).

Conclusion: Despite theoretical differences in response and package insert warnings, no hemodynamic or clinical differences were observed in patients' response to angiotensin II while receiving ARBs.

Learning Objectives:

Discuss risk factors associated with developing hypotension in the perioperative period.

Describe the theoretical and clinical implications of using ARBs and angiotensin II in the kidney transplant perioperative setting.

Self Assessment Questions:

Which of the following is a risk factor associated with developing hypotension during the perioperative transplant period?

- A. Anti-hypertensive medications
- B. Vasopressors
- C. Robotic-assisted transplant surgery
- D. Fluid resuscitation

Theoretically, a patient taking an ARB is expected to be a _____ to angiotensin II compared to a patient taking an ACE inhibitor.

- A. Fast-responder
- B. Slow-responder
- C. Non-responder
- D. Mixed-responder

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-671-L01-P

Implementing Advanced Medication Preparation to Reduce Turnaround Time in Oncology Infusion Clinics

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Outpatient oncology infusion treatments have substantially increased due to being favored by healthcare systems for their benefits of increased patient satisfaction, reduced complications, and improved cost-effectiveness compared to inpatient care. This rapid influx of patients seeking outpatient infusion treatments has created a pressing challenge: how to efficiently accommodate the growing demand while maintaining efficient patient throughput. In response, some healthcare institutions have adopted advanced preparation programs, a strategic approach where oncology medications are compounded and prepared in advance of patients' appointments. This shift aims to alleviate prolonged turnaround times, a critical source of dissatisfaction for both patients and staff. Several successful studies have demonstrated substantial reductions in turnaround times through the implementation of advanced preparation programs. These improvements were achieved with minimal increases in medication waste.

Froedtert Hospital has explored preliminary means of advanced preparation processes, beginning with optimizing oncology pre-medications. This involved identifying medications with standard doses and extended beyond-use dates, as well as collaborating with physicians to convert treatment plans to oral alternatives.

Furthermore, Froedtert explored batching of standard-dose pembrolizumab (Keytruda) and nivolumab (Opdivo) as a means to eliminate technician preparation time, thereby enhancing the patient and infusion staff experience.

This project aims to expand and formalize advanced preparation workflows across all enterprise oncology infusion sites, focusing on verification and patient specific compounding prior to patient arrival. The primary objective is to reduce infusion appointment turnaround time from patient rooming to appointment end time. Secondary objectives include the development of standardized workflows for evaluating medications suitable for advanced preparation, change in medication preparation turnaround time, measure medication waste and cost incurred, staff satisfaction, IV robot optimization, and participation in manufacturer spoilage programs. By optimizing infusion processes, this quality improvement initiative has the potential to substantially enhance the delivery of oncology care within the Froedtert enterprise.

Learning Objectives:

Explain the appropriate considerations when qualifying medications for advanced prep processes

Recognize the potential outcomes of advanced preparation implementation

Self Assessment Questions:

All of the following are considerations when qualifying medications for advanced prep workflows, except:

- A. Cost
- B. Medication stability
- C. Volume
- D. Provider preference

What is the primary objective of this advanced prep implementation project?

- A. Increase utilization of manufacturer spoilage programs
- B. Decrease medication waste
- C. Decrease turnaround time
- D. Improve nurse satisfaction

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-758-L04-P

Comparison using 100mL versus 150mL of hypertonic saline boluses to determine the overcorrection rate for the treatment of symptomatic hyponatremia in the elderly population

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Background: Elderly patients are commonly affected by hyponatremia due to higher incidence of diuretic use, impaired thirst response, and increased dependence on others for water, among other reasons. Recommendations for treatment of acute symptomatic episodes of hyponatremia include administering a 3% hypertonic saline bolus of 100 mL or 150 mL over 10 to 20 minutes. Adverse effects are more prevalent when sodium levels rise more than 10 mEq/L within 24 hours. Current guidelines do not recommend using 100 mL bolus over a 150 mL bolus of 3% hypertonic saline for symptomatic hyponatremic patients. The purpose of this study was to determine if the use of 150 mL bolus of 3% hypertonic saline had a higher incidence of overcorrection compared to a 100 mL bolus of 3% hypertonic saline in symptomatic, elderly patients.

Methods: This was a retrospective, single-center chart review. Patients aged 65 years or older with a serum sodium level of 120 mEq/L or less and presenting to the emergency department with symptoms were eligible for inclusion. Patients were excluded if they were part of a protected patient population, did not have a repeat sodium level within four hours after bolus, or had a glucose-corrected sodium greater than 120 mEq/L. If there were multiple admissions, the first admission was included. The primary endpoint was the overcorrection rate of sodium levels within 24 hours defined as an increase of more than 10 mEq. Secondary endpoints included incidence of adverse effects, overcorrection of sodium at four hours and 48 hours, timing of overcorrection, number of 3% hypertonic saline boluses, and additional fluids the patient received two hours prior to bolus and 24 hours after receiving the bolus. The outcomes will be analyzed using the appropriate tests.

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

Learning Objectives:

Recall the guideline recommendations for the treatment of acute symptomatic episodes of hyponatremia

Recognize the risk factors for adverse effects associated with rapid sodium correction

Self Assessment Questions:

The Alliance of Academic Internal Medicine recommends which of the following regarding treatment for an acute symptomatic episode of hyponatremia?

- A. Vasopressin antagonist
- B. Salt substitution
- C. 3% hypertonic saline
- D. 0.9% normal saline

What is the recommended maximum increase in sodium levels within the first 24 hours of treatment to prevent adverse effects?

- A. 5 mEq/L
- B. 10 mEq/L
- C. 8 mEq/L
- D. 14 mEq/L

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-801-L05-P

Impact of Hydrocortisone Regimen on Reversal of Shock in Hospitalized Patients with Septic Shock: A Retrospective Review

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Purpose: There is mixed guidance between the 2021 SSC and the 2017 CIRCI Guidelines regarding hydrocortisone dosing strategy in septic shock. The SSC recommends 200 mg of hydrocortisone per day whereas, the CIRCI guidelines recommend < 400 mg of hydrocortisone per day. Per these recommendations, the two most common dosing strategies of hydrocortisone are low-dose hydrocortisone at 50 mg every 6 hours (200 mg per day) and high-dose hydrocortisone at 100 mg every 8 hours (300 mg per day). The purpose of this study is to evaluate the effects of the two different dosing strategies of hydrocortisone on reversal of shock.

Methods: Data will be collected through retrospective chart review of patients who received hydrocortisone 50 mg every 6 hours or 100 mg every 8 hours. Chart review will consist of approximately 240 patients hospitalized at four network hospitals from January 1, 2016 to June 30, 2023. Patients identified will then be separated randomly into equal groups for comparison. The following baseline data will be collected: age, sex, race, weight, height, BMI, comorbidities (diabetes mellitus, hypertension, chronic liver disease, end stage renal disease, congestive heart failure, COPD, cancer, HIV), and location of admission. Clinical data will include SIRS, qSOFA, mechanical ventilation, etomidate use, duration of vasopressor and corticosteroids, fludrocortisone use, and infection characteristics. The primary endpoint is difference in shock reversal between groups. Additional efficacy endpoints include 28- and 90-day mortality, vasopressor requirements, and shock recurrence. Endpoint information will include shock reversal, mortality, vasopressor requirements, shock recurrence, and adverse drug events. All data will be recorded without patient identifiers and maintained confidentially. Safety endpoints include new infection, gastrointestinal bleed, and hyperglycemia. Statistics will be analyzed using SPSS software.

Results/Conclusion: Final results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the standard of care for the management of septic shock.

Identify patients with septic shock appropriate to receive stress dose steroids.

Self Assessment Questions:

Within what time frame should antibiotics be administered in patients with septic shock?

- A. 30 minutes
- B. 1 hour
- C. 3 hours
- D. 6 hours

Which of the following patients would be appropriate to initiate stress dose hydrocortisone therapy in?

- A. A 64-year-old patient who presented to the ED with septic shock whose MAP is currently 70 on norepinephrine and vasopressin.
- B. A 31-year-old patient with septic shock who has received appropriate fluid resuscitation and whose MAP is 62.
- C. A 54-year-old patient with septic shock who has received appropriate fluid resuscitation and whose MAP is currently 59 on norepinephrine and vasopressin.
- D. A and C.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-739-L01-P

Evaluation of MTXPK.org for Predicting High-Dose Methotrexate Elimination

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High-dose methotrexate (HDMTX), defined as a dose ≥ 500 mg/m², is used in the treatment of acute lymphoblastic leukemia (ALL), lymphoma, and osteosarcoma. MTX, a folate analog, is primarily excreted via the kidneys and delayed clearance of the medication can result in increased toxicity. Leucovorin, an analog of tetrahydrofolate, is a vital part of cell recovery following HDMTX and glucarpidase is an FDA approved rescue agent for patients with delayed clearance. MTXPK.org is an online pharmacokinetic modeling tool designed to utilize patient specific information to simulate a predicted MTX serum concentration versus time curve. This curve is intended to help guide clinical decision making and administration of glucarpidase. Development of this model was based primarily on pediatric ALL data and validated using data from studies in pediatric and young adult patients.

The primary objective of this study is to determine the real-world validity of the MTXPK.org tool in adult patients. This will be done by comparing the difference in time to elimination of MTX between the MTXPK.org predicted elimination model and real-world time to elimination. Secondary objectives include time from treatment to return to baseline serum creatinine in those that develop acute kidney injury with or without glucarpidase and determining factors associated with poor predictive capabilities of the modeling tool.

This is a retrospective, single-center, cohort study using patient data from University of Michigan Health between September 2014 to December 2023. Adult patients with a diagnosis of ALL or lymphoma and having received HDMTX will be included. Patients will be excluded if serum methotrexate levels or creatinine are missing and if they received therapy at an outside hospital. REDCap will be used for secure data collection. This project was approved by the Michigan Medicine Internal Review Board.

Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the pharmacokinetics of methotrexate

Discuss the utility of MTXPK.org in predicting adult MTX clearance based on study results

Self Assessment Questions:

Which of the following is true?

- A. MTX is eliminated primarily via the kidneys
- B. HDMTX is defined as a dose ≥ 500 mg/m²
- C. Delayed MTX clearance can result in increased nephrotoxicity
- D. All of the above

Which of the following best describes the primary outcome of this study?

- A. Evaluate the use of glucarpidase after HDMTX administration
- B. Determine the real-world validity of the MTXPK.org tool in adult patients
- C. Determine factors associated with poor predictive capabilities of MTXPK.org
- D. Determine the rate of adverse drug reactions with HDMTX administration

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-879-L01-P

Assessing Bleeding Risk in Saint Joseph Health System Patients on Oral Anticoagulation: Determining the Need for a Pharmacy-To-Dose Oral Anticoagulant Service

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Purpose: Patients on warfarin are known to have increased bleeding risk due to various factors that may significantly increase the international normalized ratio (e.g., change in diet, drug-drug interactions, complicated regimens, alcohol consumption, etc). Though the direct oral anticoagulants (DOACs) have been touted as a safer option, a retrospective study on Veterans Affairs patients demonstrated no significant difference in total bleeding or mortality risk when comparing rivaroxaban and warfarin in patients with severe renal dysfunction, particularly when doses were not appropriately adjusted. Necessary dose adjustments were made more frequently and both major bleeding rates and mortality risk were lowered when these patients were followed by a pharmacist. Another retrospective study evaluated a new pharmacy-to-dose (PTD) oral anticoagulant protocol. The authors documented a relative risk reduction of 44% in the likelihood of the primary outcome, medication errors, after the PTD protocol was implemented. While it is unknown whether a PTD service could be reasonably implemented at Saint Joseph Health System (SJHS), a 254-bed community hospital, we aim to determine if pharmacist intervention on oral anticoagulant dosing would be beneficial at SJHS by comparing our bleeding rates to national data.

Methods: Retrospective chart review was completed on adult patients admitted to SJHS from July to November 2023 who received at least one dose of an oral anticoagulant and at least one follow-up complete blood count (CBC). A bleeding classification system created by the Bleeding Academic Research Consortium was applied to this population to determine if the primary outcome of clinically relevant bleeding occurred. Secondary outcomes included clinically insignificant bleeding and INR values greater than 4.5 without bleeding. Patients undergoing surgical procedures or patients presenting with any known bleeds prior to admission were excluded.

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

Learning Objectives:

Define each category of the primary outcome, clinically relevant bleeding, as well as the secondary outcomes, clinically insignificant bleeding and supratherapeutic INR values.

Review published data on the impact of pharmacist intervention on oral anticoagulant dosing and how a pharmacy-to-dose oral anticoagulant protocol could be implemented at a community hospital.

Self Assessment Questions:

What is the renal function cutoff for a dose adjustment of rivaroxaban 15 mg in nonvalvular atrial fibrillation?

- A. CrCl < 30 mL/min
- B. CrCl < 60 mL/min
- C. CrCl 15-50 mL/min
- D. CrCl 15-60 mL/min

Which of the following would be classified as type 3a bleeding per the Bleeding Academic Research Consortium?

- A. Non-actionable bleeding
- B. Overt bleeding and a hemoglobin drop of 3-5 g/dL
- C. Bleeding related to coronary artery bypass grafting
- D. Fatal bleeding

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-530-L01-P

A Comparison of Targeted High-Range versus Low-Range Anti-Xa Goal for Intravenous Unfractionated Heparin in Patients with Mechanical Circulatory Support Devices

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Background/rationale: Patients presenting with cardiogenic shock are commonly supported by mechanical circulatory support (MCS) devices. Complications including bleeding and thrombosis may result from the MCS devices or the concurrent use of systemic anticoagulation. The most commonly used systemic anticoagulation is intravenous heparin with a targeted therapeutic range of anti-Xa from 0.3 to 0.7 units/mL. However, in the current literature, there have been bleeding events reported at different observed anti-Xa levels ranging from 0.1 to 0.7 units/mL. Based on published data suggesting that a lower anti-Xa goal may decrease the incidence of bleeding while providing adequate anticoagulation, our institution reduced the heparin anti-Xa therapeutic goal from 0.3 to 0.7 units/mL to 0.2 to 0.5 units/mL. **Methods:** This retrospective, single-centered, quasi-experimental study aims to evaluate the safety and efficacy of targeting a low-range anti-Xa goal in adult patients on IV heparin for MCS device(s) admitted to the cardiovascular or cardiothoracic surgical ICU. The primary outcome is to compare the incidence of bleeding events between the anti-Xa low-range versus the high-range goal. Secondary outcomes include the incidence of thrombotic events, protocol deviation, independent confounding risk factors of bleeding and thrombosis, ICU length of stay, and mortality. **Results/conclusion:** Data collection and analysis are ongoing and will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe risk factors that increases bleeding in patients on IV heparin with MCS devices

Identify the optimal anti-Xa goal range for IV heparin use with MCS devices

Self Assessment Questions:

Which of the following factors may contribute to bleeding in patients on IV heparin with MCS devices?

- A. Shear force created by the devices
- B. Degradation of von Willebrand factor multimers
- C. Concurrent use of IV heparin
- D. All of the above

Which of the following patients would likely have the highest risk of major bleeding in patients?

- A. 82 year old female with history of GI bleed, on IV heparin with MCS device, with anti-Xa level at 0.7 units/mL
- B. 24 year old female with history of DVT, on IV heparin with MCS device, with anti-Xa level at 0.3 units/mL
- C. 45 year old male with history of prostate cancer, on IV heparin with MCS devices, with anti-Xa level at 0.4 units/mL
- D. 68 year old male with history of hematuria, on IV heparin with MCS device, with anti-Xa level at 0.4 units/mL

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-731-L01-P

Pharmacist-Driven Evaluation on the Use of Post-Operative Pain Medications at Discharge in a Rural Community Hospital

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The opioid epidemic is a widespread issue across the nation and has become extremely prevalent in rural areas of Eastern Kentucky. Pharmacists in rural community hospitals have unique opportunities to work closely with providers to ensure safe use of post-operative opioid pain medications. The purpose of this project is to use the data collected to form an opioid stewardship committee that will further benefit the safety and well-being of our patients.

This study is a single center, retrospective, observational study monitoring the use of opioids being prescribed for post-operative pain at discharge. The data collected will be reviewed from July-December 2023 and will consist of baseline demographics, opioid naivety, home morphine milligram equivalents (MME), prescribing physician, type of surgery performed, name, dose, frequency and day supply of opioid prescribed, and if naloxone was co-prescribed. Results will be filtered for how many prescriptions are >3 days, >7 days, and MME >50. If patients are prescribed MME >50 we will collect information on the naloxone prescription rate at discharge. All results will be used to determine if the opioid prescription was appropriately prescribed.

After reviewing 550 patient charts, 399 patients were sent with an opioid prescription at discharge after surgical intervention. Of these 399 patients, 397 were sent with an opioid prescription that was deemed appropriate based on the above criteria (≤3 day supply and ≤50 MME). There were 0 naloxone prescriptions sent in for any patients prescribed an opioid at discharge.

Within St. Claire HealthCare, the general surgeons are good stewards of opioids at discharge. The data show that we may need to have more discussion with our patients regarding naloxone and the importance of this during emergent situations of accidental overdose. An opioid stewardship committee would benefit St. Claire HealthCare's patient safety in the inpatient and outpatient setting.

Learning Objectives:

Discuss the importance of an opioid stewardship program in a rural healthcare facility.

Recognize when an opioid prescription is appropriate as a discharge medication for post-operative pain.

Self Assessment Questions:

What is a key principle for opioid stewardship

- A. Opioids should never be prescribed for pain management
- B. Opioids should be prescribed at the lowest effective dose for the shortest amount of time that provides pain control
- C. Patients should always be treated as if they are abusing opioids
- D. Opioids should be reserved for only end of life care

What amount of morphine milligram equivalents (MME) is considered "high risk" per the Centers for Disease Control and Prevention (CDC) for when naloxone should be offered to patients

- A. ≤100
- B. ≤90
- C. ≤75
- D. ≤50

Q1 Answer: B Q2 Answer: D
ACPE Universal Activity Number 0121-9999-825-L08-P

Analysis of Safe Order Verification Metrics

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At Michigan Medicine's University Hospital, there has been an increasing number of orders verified per shift (> 800 orders) which has contributed to pharmacist burnout and dissatisfaction. It is known that higher verification rates lead to more errors, however, there is not a published number of orders verified per hour that minimizes medication errors. The objective of this process improvement project is to identify the number of orders verified per pharmacist per hour that minimizes errors and delays in therapy and improves job satisfaction.

This is a retrospective secondary database study Michigan Medicine's University Hospital. The study includes both pre- and post-intervention data collection and surveys. Order data points include the number of orders verified, dispense code, drug, route of administration, and order action. iVent data points include the number and type of iVent. Order data provides information regarding workload while iVent data helps characterize pharmacist interventions. The survey was conducted over a two-week period and was distributed to pharmacists on each shift. The survey contained questions to evaluate interruptions and stress level. After evaluation, a recommendation for additional verification support at the time of highest order volume (1530-1930) was made and implemented. A similar survey was dispersed during the intervention period and post-intervention data will be collected to assess the impact of the intervention.

Previous research has shown that high order volume increases the number of errors at the verification step. Therefore, evaluating metrics can help demonstrate what an appropriate number of orders per hour is to provide optimal patient care. Additionally, a dissatisfier among pharmacists who staff in the central pharmacy is the workload of the primary verifier role. Feedback has shown that pharmacists feel high levels of burnout and stress due to order verification volume and resulting time constraints to evaluate each order.

Learning Objectives:

Recall available literature on order verification metrics
Describe initiatives to improve order verification metrics

Self Assessment Questions:

As number of orders increases, number of errors _____.

- A. Increases
- B. Decreases
- C. Stays the same
- D. None of the above

Additional verification help correlated to a decrease in _____.

- A. Order volume
- B. Phone calls
- C. iVents
- D. Stress

Q1 Answer: A Q2 Answer: D
ACPE Universal Activity Number 0121-9999-800-L05-P

Comparison of Medical Weight Management Outcomes in Patients Managed by a Primary Care Provider Alone versus Co-Managed by a Pharmacist

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Obesity is a highly prevalent chronic disease associated with many adiposity-related conditions that increase morbidity and mortality. Practice guidelines recommend consideration of medication therapy for treatment of obesity for patients with a BMI ≥ 27 kg/m² with at least one associated co-morbid condition or a BMI > 30 kg/m². The objective of this study is to evaluate if patients co-managed by a clinical pharmacist operating under a Collaborative Drug Therapy Management (CDTM) protocol for medical weight management will have a higher percent weight loss after three months compared to patients managed by their primary care provider (PCP) alone. This is an IRB-approved retrospective cohort study analysis of adult patients who are obese or overweight with a qualifying weight-related condition who were initially seen in one of 10 primary care clinics for medical weight management from January 2023 to June 2023. The two patient cohorts that will be compared are those managed by their PCP alone and those co-managed by a pharmacist operating under an established CDTM protocol. Patients were included if they were ≥ 18 years old and were prescribed weight loss medication(s) during a medical weight management appointment with their PCP/pharmacist. Patients were excluded if they were pregnant/lactating, had current or previous management by a weight loss clinic, or had a lapse in medication therapy lasting longer than 30 days. The primary outcome of this study is percent change in weight after three months of PCP-led versus pharmacist co-managed medical weight management. Secondary outcomes include the percent of patients achieving $\geq 5\%$ body weight loss at three months and the use of medication(s) with an FDA-approved indication for weight loss versus off-label use with provider approval. Final results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize which patients may qualify for medical weight management based on BMI and co-morbid conditions.
Discuss pharmacological agents used for medical weight management that are FDA-approved for weight loss as well as agents that are used off-label.

Self Assessment Questions:

Which patient(s) described below may qualify for medical weight management?

- A. A 45-year-old female with a BMI of 25 kg/m² and a past medical history of hypertension
- B. A 62-year-old male with a BMI of 34 kg/m² and no past medical history
- C. A 23-year-old female with a BMI of 42 kg/m² and a past medical history of type II diabetes
- D. B and C

Which of the following medications does NOT have an FDA-approved indication for weight loss?

- A. Contrave

B. Qsymia
C. Trulicity
D. Wegovy

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-587-L01-P

Warfarin to DOAC Inpatient Conversion

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Pharmacologic anticoagulation is indicated in a variety of health conditions for the treatment and prevention of vascular thrombosis. For several indications, DOACs are preferred over warfarin according to national guidelines due to similar (or lower) rates of major bleeding and ease of monitoring. These include patients with non-valvular atrial fibrillation or venous thromboembolism, which are our target populations. The outpatient Froedtert Anticoagulation Clinic has an established workflow for transitioning patients from warfarin to a DOAC. For this project, we have applied similarities from the outpatient workflow to the inpatient setting to promote optimization of anticoagulation for inpatients within the Froedtert Health system. Ultimately, the goal of this project is to ensure patients are on the most appropriate anticoagulation regimen.

A workflow was implemented for inpatient pharmacists to identify warfarin patients eligible for anticoagulation optimization and prompt the anticoagulation clinic to facilitate transition to a DOAC. Patients are excluded if they have a mechanical heart valve, antiphospholipid syndrome, severe liver impairment (Child-Pugh Class C), a grade 3 CYP3A4 or PJP drug interaction, or weigh greater than 150 kg. The pharmacist may provide a specific recommendation for a DOAC or simply recommend this drug class, while taking cost into consideration. There will be 3 months of retrospective data collection to analyze prescriber/clinic outreach events and the success rate of anticoagulant conversion. This workflow will be initiated for the medicine and cardiology services at Froedtert Hospital and on all inpatient units at Froedtert Menomonee Falls Hospital and Froedtert West Bend Hospital.

Our primary outcome is the success rate of converting patients from warfarin to a DOAC that were intervened upon during admission (measured 1 month post-discharge). The secondary outcome is the change in average pharmacist satisfaction scores with the process for DOAC conversion which will be assessed using a numerically scored electronic survey.

Learning Objectives:

Discuss appropriate use of direct oral anticoagulants (DOACs) based on ACC/AHA guideline recommendations and warnings/precautions to DOAC use

Discuss clinical factors to consider if transitioning a patient from warfarin to a DOAC

Self Assessment Questions:

In which of the following scenarios do ACC/AHA guidelines recommend direct oral anticoagulants (DOACs) as a first line option, considering warnings and precautions?

- A. Anticoagulation for a patient with atrial fibrillation and a mechanical mitral valve
- B. Anticoagulation for a patient with non-valvular atrial fibrillation who weighs 170 kg and is taking rifampin
- C. Anticoagulation for a patient with a new, unprovoked pulmonary embolism
- D. Anticoagulation for a patient with antiphospholipid syndrome

Which of the following is NOT an important consideration when transitioning a patient from warfarin to a direct oral anticoagulant (DOAC)?

- A. CYP3A4 drug interactions
- B. Prescription insurance coverage
- C. Class 3 obesity
- D. If the patient has a UTI

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-751-L01-P

Pharmacist Impact on Fall Reduction in Older Adults with a High Anticholinergic Burden

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Purpose:

Older adults are commonly exposed to anticholinergic medications, which places these individuals at a higher risk of serious complications. A higher anticholinergic burden is correlated with greater risk of morbidity and mortality, longer hospital length of stay, institutionalization, and functional or cognitive decline. Increased incidence of falls is the most common indicator of decline in these patients. It is crucial to determine which patients are at highest risk by evaluating anticholinergic burden and identifying opportunities for deprescribing. The purpose of this quality initiative is to measure anticholinergic-associated falls in older adults after medication review visits with an ambulatory pharmacist.

Methods:

A chart review will be conducted to determine patients in the Trinity Health Geriatrics and Internal Medicine primary care offices who are 65 years and older with a current prescription for medication(s) with anticholinergic properties. The anticholinergic burden scale (ABS) will be utilized to calculate a score for each patient. Patients with a score of >3 will be selected for inclusion in the intervention group. Patients with a score of <3 will be excluded. Ambulatory pharmacists will schedule patients with an ABS of >3 for a medication review visit to assess opportunities for deprescribing and provide education on fall risk mitigation. Patients selected will have a baseline fall history that will be re-evaluated every 3 months by a pharmacist. The primary endpoint of this initiative is the number of overall falls in patients with an anticholinergic score of >3 before and after pharmacist intervention. Additional data will be collected including patient demographics, therapy interventions, and hospitalizations resulting from falls.

Results and Conclusions:

In progress.

Learning Objectives:

Recognize the consequences of increased fall risk in older adult patients.

Discuss the role of a pharmacist in fall prevention strategies for older adults.

Self Assessment Questions:

What is the concern with increased fall risk in older adults?

- A. Decreased functionality
- B. Decreased quality of life
- C. Increased morbidity and mortality
- D. All of the above

What anticholinergic medication is commonly used in older adults?

- A. Aspirin
- B. Diphenhydramine
- C. Empagliflozin
- D. Lisinopril

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-597-L01-P

Safety and Efficacy of an Updated Diabetic Ketoacidosis-Hyperosmolar Hyperglycemic State Protocol

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Purpose: In June 2023, Union Health revised the diabetic ketoacidosis (DKA)-hyperosmolar hyperglycemic state (HHS) protocol. The revised orderset is a pre-defined, nursing driven protocol. The protocol was changed to empower nursing to adjust insulin, electrolytes and intravenous fluids based on the predefined protocol. The goal of this study is to compare the safety and efficacy of the current protocol to treat DKA and HHS to the previous protocol.

Methods: This single-center, retrospective, study will examine patients treated for DKA/HHS in the emergency department/intensive care unit between January 1, 2023 and December 31, 2023. The new DKA/HHS protocol was implemented on June 20, 2023. Patients will be categorized in the current protocol (June 20 – December 31, 2023) and previous protocol (January 1 – June 19, 2023). The primary outcome of this study is to compare time to resolution of DKA/HHS. Secondary outcomes will include number of adjustments made to IV fluids, incidence of hypoglycemia, re-opening of anion gap > 24 hours post closure, hyperkalemia, and hypokalemia. Patients will be identified for inclusion using the electronic medical record via manual chart review. Patients included in this study will have a diagnosis of DKA/HHS, use of DKA/HHS orderset, and administration of an insulin infusion. Excluded patients will be those who are less than 18 years of age, pregnant, breastfeeding, and prisoners. Baseline characteristics of patients include: age, gender, race, weight, BMI, glycosylated hemoglobin A1c, osmolality, and venous pH. Baseline characteristics and study outcomes will be gathered via manual chart review.

Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the components of DKA/HHS resolution.

Identify safety concerns of DKA/HHS treatment.

Self Assessment Questions:

Which of the following is considered diagnostic criteria for HHS?

- A. Serum bicarbonate < 10 mEq/L
- B. Ketouria
- C. Blood Glucose > 600 mg/dL and osmolality > 320 mOsm/kg
- D. pH < 7

Based on the values listed, which shows resolution of DKA?

- A. Blood Glucose 185 mg/dL; serum bicarbonate 18 mEq/L; anion gap 14
- B. Blood Glucose 247 mg/dL; serum bicarbonate 17 mEq/L; anion gap 19
- C. Blood Glucose 263 mg/dL; serum bicarbonate 15 mEq/L; anion gap 16
- D. Blood Glucose 176 mg/dL; serum bicarbonate 16 mEq/L; anion gap 11

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-654-L01-P

Evaluation of Appropriate Duration of Therapy with Nonbenzodiazepine Benzodiazepine Receptor Agonist (non-BzRA) Drug Utilization in a Community Health System

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Statement of Purpose: Recent updates to insomnia clinical practice guidelines re-emphasized the need for proper deprescribing and switching of medical interventions for the management of both acute and chronic insomnia. While nonbenzodiazepine benzodiazepine receptor agonists (non-BzRAs) are noted as viable alternatives to traditional benzodiazepines for sleep management, they are not without long-term risk. The American Academy of Sleep Medicine reports that the use of sedative-hypnotic drugs for >4 weeks lead to decreased efficacy; furthermore, long-term use of non-BzRAs is shown to increase patients' risks for dependence and withdrawal symptoms. In the interest of best practice and patient safety, it is imperative to reserve non-BzRAs for acute insomnia management, or patients who have trailed and failed therapy discontinuation. The purpose of this research project is to evaluate the current landscape of utilization of non-BzRAs throughout the Saint Joseph Family Medical Center via a retrospective medication use evaluation.

Statement of Methods Used: In this retrospective cohort study, a hospital-wide patient list was generated over a 12-month period, spanning from July 1, 2022, to July 1, 2023. Patients were included in this analysis if they received an inpatient or outpatient administration of either zolpidem, eszopiclone, or zaleplon. The following data was obtained for each patient encounter: age, gender, related diagnosis, drug name, dose, EPIC-defined patient risk score, and total length of therapy. Patients were grouped by length of non-BzRA therapy for < 14 days, 15-28 days, 29-42 days, 42-365 days, or >365 days. All data was extracted from the electronic health record (EHR) and manually validated. The data was evaluated with descriptive statistics.

Summary of (preliminary) results to support conclusion: Pending, to be presented at Great Lakes.

Conclusions Reached: Pending, to be presented at Great Lakes.

Learning Objectives:

Review literature regarding current utilization of nonbenzodiazepine BZRA for management of transient and chronic insomnia.

Recognize the potential roles of a pharmacist in non-BzRA deprescribing and sleep education.

Self Assessment Questions:

Which of the following is the most significant concern regarding long-term use of non-BzRAs, in the context of insomnia management?

- A. Increased efficacy in sleep induction and maintenance of sleep
- B. Higher risk for abuse potential and drug diversion
- C. Reduced risks for dependence and withdrawal symptoms
- D. Decreased efficacy and higher risk for dependence and withdrawal symptoms

Which of the following is NOT a currently proposed field of support for pharmacists in sleep medicine?

- A. Offering sleep education and hygiene techniques
- B. Provision and education of OTC and herbal sleep aid alternatives
- C. Prescribing of alternative hypnotics with lower overall risk under collaborative practice agreements
- D. Leading deprescribing protocols for various hypnotic and sedative agents

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-526-L01-P

Comparison of Sodium Zirconium Cyclosilicate, Sodium Polystyrene Sulfonate, and Patiromer on Potassium Lowering in Patients with Acute Hyperkalemia

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Purpose:

Currently, there are limited studies evaluating and comparing potassium binders for the treatment of acute hyperkalemia. Due to this limited data, my research aims to determine whether a particular potassium binder is more effective than the others at potassium lowering.

Methods-

This quality improvement project has been approved by the Ascension Institutional Review Board. Since this project is a retrospective chart review, data will be pulled for the following years: patients that received sodium zirconium cyclosilicate from September 2022-September 2023, patients that received sodium polystyrene sulfonate from September 2021-September 2023, and patients that received patiromer from September 2021-September 2022. Patients received at least one dose of one of the potassium binders studied, sodium zirconium cyclosilicate, sodium polystyrene sulfonate, or patiromer, along with standards of care: regular insulin, dextrose, calcium gluconate, albuterol, or furosemide. The primary outcome is the net change in potassium over 24 hours. Patient's baseline potassium level before sodium zirconium cyclosilicate, sodium polystyrene sulfonate, or patiromer is initiated will be obtained as well as the potassium levels after a potassium binder is administered will be collected. The secondary outcomes include the number of patients that needed additional doses of one of the potassium binders studied, the length of hospital stay after incidence of hyperkalemia, the need for hemodialysis, and the number of patients that experienced adverse reactions such as nausea, vomiting, or edema. Data analysis is currently ongoing and results will be presented at the Great Lakes Pharmacy Conference.

Learning Objectives:

Review current literature regarding novel potassium binders in acute hyperkalemia

Discuss the advantages and disadvantages associated with the use of sodium zirconium cyclosilicate, sodium polystyrene sulfonate, and patiromer

Self Assessment Questions:

Sodium polystyrene sulfonate is associated with which of the following adverse reactions:

- A. Colonic necrosis
- B. Hypermagnesemia
- C. Hypercalcemia
- D. Hyponatremia

Which of the following potassium binders has the quickest onset of action:

- A. Sodium zirconium cyclosilicate
- B. Sodium polystyrene sulfonate
- C. Patiromer
- D. They all have the same onset of action

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-504-L01-P

Evaluation of Intravenous (IV) Lidocaine Continuous Infusions for Pain

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Small studies and case reports suggest continuous infusion of IV lidocaine is a safe and effective option for neuropathic pain refractory to other treatments. The purpose of this medication use evaluation is to assess the utilization of IV lidocaine continuous infusions for pain in the context of the dosing and monitoring guidance at a large academic medical center. This was a single-center, retrospective review of IV lidocaine continuous infusion administrations for pain in patients admitted between January 1, 2022, and August 31, 2023. Any patient who received IV lidocaine continuous infusion for pain was included. The primary outcome included exploring IV lidocaine continuous infusion utilization under the new indication of neuropathic or opioid-refractory pain and assessing compliance with institutional dosing and monitoring guidance while also evaluating the safety profile as a secondary outcome. Compliance was assessed by determining if patients were ordered proper cardiac and serum level monitoring and identifying if the continuous infusion was administered within institutional dosing parameters. Data points that were collected to assess the safety profile risk included serum lidocaine levels, adverse effects potentially related to the continuous infusion, and the infusion rate during supratherapeutic levels and/or documented adverse effects. A total of 20 patients were included in this study. Preliminary results related to the primary outcome show compliance to serum lidocaine level monitoring and to institutional dosing parameters, but do not show compliance to recommended cardiac monitoring. When evaluating the safety profile risk associated with IV lidocaine continuous infusion, there were only a few patients that had reported adverse effects. However, preliminary results showed an unclear picture whether these adverse effects were directly correlated to the lidocaine infusion itself, rate of infusion, and/or documented serum levels.

Learning Objectives:

Review systemic lidocaine pharmacological properties as they relate to pain management.

Discuss potential monitoring and safety considerations associated with intravenous lidocaine continuous infusions for pain.

Self Assessment Questions:

What is an advantage of systemic lidocaine over other neuropathic adjuvants for pain management?

- A. Rapid onset of action
- B. Prolonged duration of analgesia
- C. Limited systemic effects
- D. Exclusive local action on nerve endings

What is generally recommended when administering intravenous lidocaine continuous infusions for pain management?

- A. Monitoring blood pressure only
- B. Frequent cardiac and lidocaine level monitoring
- C. Avoiding any monitoring, as lidocaine is generally well-tolerated
- D. Relying on patient-reported adverse events

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-827-L08-P

Assessing Appropriateness of Vancomycin Population Kinetics in Adults with BMI-Adjusted Volume of Distribution

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Vancomycin is a glycopeptide antibiotic with broad gram-positive coverage. Its hydrophilic properties allow adequate bloodstream and organ concentrations, but it does not accumulate in adipose tissue. Volume of distribution (Vd) may be reduced in patients with excess adipose tissue. The bactericidal potential of vancomycin is optimized based on total exposure, quantified as area under the curve divided by the minimum inhibitory concentration (AUC₂₄/MIC). When used to treat most invasive infections, the target AUC₂₄/MIC is 400-600 (mg*h)/L. Calculation of AUC is optimally derived from peak and trough concentrations, which has been validated to provide efficacy while minimizing the risk of nephrotoxicity.

If patient-specific levels are unavailable, pharmacokinetic estimates are applied to guide maintenance dosing. This method utilizes population-based kinetics from data collected during prior studies. A commonly accepted Vd for population-based dosing is 0.7 L/kg. This is the average from a pharmacokinetic study which did not provide body mass index (BMI) values and reported a mean patient weight of 67.8 kilograms. The population described does not adequately represent the patient population at our facility. A more precise method of estimation is warranted for overweight and obese patients.

This is a retrospective pharmacokinetic study of adult patients at Saint Joseph East Hospital in Lexington, Kentucky who had peak and random vancomycin concentrations drawn after administration of the first vancomycin dose. Patients receiving renal replacement therapy or vancomycin for surgical prophylaxis were excluded. The primary outcome is variance between historical and BMI-stratified population Vd estimates that would change the total daily dose. This will be assessed via McNemar's Test. The secondary outcome is accuracy of both population models when compared to concentration-driven calculations, and will be assessed for accuracy and precision using the mean bias error and root-mean-square error.

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

Learning Objectives:

Describe potential benefits of dosing and monitoring vancomycin based on AUC/MIC.

Identify patients who may be applied to traditional vancomycin population kinetics.

Self Assessment Questions:

Which of the following best describes outcomes related to vancomycin dosing and monitoring using AUC/MIC?

- A. Increased nephrotoxicity when compared to trough-based dosing.
- B. Vancomycin AUC/MIC of 400-600 (mg x h)/L is required for all infections.
- C. Trough levels alone are sufficient to estimate vancomycin AUC in all patients.
- D. Utilizing AUC/MIC for vancomycin dosing and monitoring is validated to provide efficacy and minimize nephrotoxicity for most invasive infections.

Which patient is most applicable to traditional vancomycin population kinetics?

- A. 51 year old male with a BMI of 28 kg/m² in septic shock who received several liters of fluid resuscitation.
- B. 65 year old male with a BMI of 22 kg/m² with normal renal function and a purulent skin and soft tissue infection.
- C. 48 year old female with a BMI of 31 kg/m², congestive heart failure, acute kidney injury, and possible methicillin-resistant Staphylococcus aureus pneumonia.
- D. 77 year old female with a BMI of 18 kg/m² who presents with renal impairment due to dehydration and likely urinary tract infection.

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-677-L01-P

Ensuring Integrity: Securing Health System Supply Chain against Recalled and Illegitimate Drugs

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Health-system pharmacy demands the responsibility of always ensuring safe medication delivery to all patients. Unsecured distribution channels lead to the risks of counterfeiting, diversion, and otherwise substandard drugs entering health systems, compromising patient care. As the pharmaceutical supply chain becomes increasingly complex, health systems must develop robust methods for ensuring the integrity of medications from the time of procurement to administration.

The purpose of this project is to ensure the integrity of drug supply chain at UW Health by achieving compliance with the Drug Supply Chain Security Act (DSCSA) and developing timely medication recall processes. Objectives include (1) assess baseline compliance with DSCSA standards and effectiveness of medication recall process, (2) plan and execute workflow to ensure 100% DSCSA compliance, (3) implement system to close gaps on drug recall management, and (4) assess efficiency and longitudinal benefit of novel workflows.

Current state understanding will be obtained by performing an internal gap analysis for DSCSA-related processes across UW Health sites, measuring scanning compliance and receiving/put away time, and seeking comparable best practices for health system drug recall management and DSCSA compliance. To execute DSCSA compliance measures, a project steering committee and site-specific implementation teams will be created as well as a project plan and timeline. Modifications will be made to the DSCSA project steering committee to add recall expertise, a timeline to expand recall software and processes will be developed, novel centralized recall workflow will be determined and disseminated across pertinent staff, then training will take place.

Finally, project success will be assessed, and final improvements will be made to ensure longitudinal success. Project implementation measures will be performed to meet 100% DSCSA compliance and timely recall response time throughout UW Health.

Learning Objectives:

Describe key components of the Drug Supply Chain Security Act (DSCSA)

Identify attributes of a suspect or illegitimate product

Self Assessment Questions:

What of the following is an in-scope provision of the Drug Supply Chain Security Act (DSCSA)?

- A. Product: Over-the-counter (OTC) medications
- B. Transaction: Drug transfer between two clinics under the same ownership
- C. Stakeholder: Wholesale distributors
- D. Requirement: Package-level traceability on November 27, 2022

Which of the following is a distinction that may lead you to believe a drug could be illegitimate?

- A. Foreign language on label
- B. Misspelled drug name
- C. Missing information on label
- D. All the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-768-L04-P

Presumed Augmented Renal Clearance and Antibiotic Treatment Failure

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Infections are one of the complications patients may face. Appropriate antibiotic choice, early administration, and appropriate dosing regimens are essential for infection eradication. Beta-lactams are the most frequently prescribed antimicrobials in acute care. Optimal beta-lactam efficacy is achieved when the antibiotic plasma concentration remains above the minimum inhibitory concentration of the pathogen throughout the dosing interval. Most beta-lactam antibiotics are renally cleared. Extending infusion times of beta-lactams is often used in an attempt to optimize treatment as it has consistently been shown to improve pharmacodynamic target attainment. Augmented renal clearance (ARC), commonly defined as a measured creatinine clearance (CrCl) greater than 130 mL/min, can decrease the efficacy of antibiotic therapy. Patients with presumed ARC being treated with beta-lactams may be at risk of shorter drug half-lives and thus suboptimal antimicrobial exposure. Suboptimal antimicrobial exposure may complicate the management of infections, increase healthcare cost, and worsen outcomes. The goal of this study is to determine if presumed ARC may lead to ineffective antibiotic treatment and treatment failure with beta-lactam antibiotics.

This study is a retrospective cohort study. Data will be collected utilizing chart review of patients who were on piperacillin/tazobactam, cefepime, or meropenem, and had positive systemic bacterial cultures. The patients will be divided into two cohorts, CrCl greater than or equal to 130 mL/min and CrCl less than 130 mL/min. CrCl will be calculated using the admission serum creatinine and the Cockcroft-Gault formula. The primary outcome measure will be the difference in treatment failure between patients with presumed ARC and patients without presumed ARC. The secondary outcome measure will be mortality during hospitalization. Data will be evaluated utilizing the chi-squared test, and an a priori alpha of 0.05 will be set for significance. Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the risk factors for developing ARC

Identify the clinical implications of ARC on renally eliminated medications

Self Assessment Questions:

Which of the following is a risk factor for developing ARC in critically ill patients?

- A. Age less than 50 years
- B. Female sex
- C. History of cardiovascular comorbidities
- D. History of diabetes mellitus

Which of the following is a clinical implication of ARC on the pharmacokinetics/pharmacodynamics of antimicrobials?

- A. Longer drug half-life
- B. Higher peak and trough drug concentration

- C. Lower blood plasma concentrations of renally excreted drugs
- D. Higher area under the curve drug concentration

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-555-L01-P

Analysis of Contingency Operations Knowledge and Impact of Implementation of Education and Trainings on Contingency Operations

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Purpose

The study aims to assess the operational implications of downtime with a focus on pharmacy, derive recommendations for improved downtime contingency planning, and assess updates made to current contingency plans in place at a metropolitan tertiary medical center. It is hypothesized that the review, development, education, and training of pharmacy downtime contingency operation plans will increase pharmacy personnel knowledge and comfortability during downtime contingency operations. The primary outcome is change in pharmacy personnel knowledge with pharmacy operations during downtime before and after implementation of education and trainings. Several secondary endpoints will be used to help determine current knowledge and efficacy education and trainings for contingency operations as well.

Methods

A contingency workgroup was developed that found current gaps in downtime processes, created a standard operating procedure and twenty tip sheets, and provided education on contingency operations to inpatient and outpatient pharmacies. Rapid experiments were done to test pharmacy staff knowledge on contingency operations. The contingency operations knowledge was assessed using a voice of the customer survey of the pharmacy service before and after implementation of education and trainings of contingency operations. Inclusion criteria consisted of all inpatient and outpatient pharmacy operations staff employed by VHI whom responded to either Voice of the Customer surveys. Pharmacy staff communications outside of the contingency planning workgroup regarding education and training implementation and/or Pharmacy Downtime Contingency Operations were excluded from the Voice of the Customer surveys. There were 90 inpatient and outpatient pharmacists and pharmacy technicians who met inclusion criteria and had the opportunity to complete both surveys. Both surveys were compared to each other to determine the difference in knowledge gained from the education and trainings.

Results and Conclusions

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

Learning Objectives:

Define downtime events in the medical setting.

Discuss the impact of creating contingency plans and providing education to pharmacy staff.

Self Assessment Questions:

How are downtime events defined in the medical setting?

- A. Any event in which any portion of the electronic health record is disrupted
- B. Any power outage
- C. Any unexpected employee absence
- D. Any medication shortage issues

Which of the following regulatory bodies requires contingency plans for healthcare systems?

- A. The Joint Commission
- B. Centers for Medicare and Medicaid Services
- C. Institute of Medicine
- D. All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-775-L04-P

Characterization of Antimicrobial Prophylactic Practices in United States Emergency Departments: A Multicenter Survey of Institutional and Pharmacy Practices

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Purpose: Almost 30% of emergency department (ED) visits are related to traumatic injuries. These patients are often prescribed prophylactic antimicrobials despite conflicting evidence surrounding efficacy and preferred regimens. There is limited standardization regarding antimicrobial prophylaxis following traumatic injury. This study's purpose is to characterize the use of prophylactic antimicrobial agents in EDs for traumatic indications. **Methods:** An online survey was developed using Qualtrics and distributed to emergency medicine pharmacists via the ACCP Emergency Medicine PRN and EM-PHARMNET listservs. Institution specific demographic data was collected and level of pharmacist involvement in empiric antibiotic therapy decisions. Traumatic indications surveyed included cartilaginous injury, facial and mandibular fractures, puncture wound-through-shoe, traumatic thoracostomy, and open extremity fracture. Data collected included existence of a protocol, preferred antimicrobial regimen, and duration of antimicrobial prophylaxis. Descriptive statistics were utilized to evaluate institutional practice differences. **Results:** Survey response rate was 61/597 (10.2%). Most respondents practiced at academic medical centers (50.8%) with level I trauma designations (55.7%) and have pharmacist coverage for trauma activations 17-24 hours per day (59%). Respondents reported being involved in empiric antimicrobial evaluation and agent selection at least 25% of time, with most characterizing their involvement as often (>50%-75% of time). Prophylactic antibiotics were used by respondents for cartilaginous injuries (42.6%), facial fractures (88.5%), mandibular fractures (67.2%), puncture wounds through shoe (83.6%), traumatic thoracostomy tube placement (44.2%) and open extremity fractures (100%). With open extremity fractures there were notable differences in agents used, especially for Gustilo Type III open fractures. **Conclusion:** There is consistent use of prophylactic antibiotics for facial fractures, puncture wounds through shoes, and open extremity fractures. However, prophylactic antibiotics are inconsistently utilized for cartilaginous injuries, mandibular fractures, and thoracostomy tube placement. Future studies with more granular data on antibiotic regimen selection are needed to establish specific guideline recommendations.

Learning Objectives:

Discuss the use of prophylactic antimicrobial agents in emergency departments based on various traumatic indications
Identify therapeutic regimen differences across various emergency departments in the nation

Self Assessment Questions:

Of the traumatic indications listed below, which is addressed by the EAST guidelines?

- A. Cartilaginous injuries
- B. Puncture wounds through shoes
- C. Open extremity fractures
- D. Facial/mandibular fractures

What is the most common class of antibiotics utilized for cartilaginous injuries?

- A. Cephalosporins
- B. Aminoglycosides
- C. Fluoroquinolones
- D. Glycopeptides

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-740-L01-P

Real-World Clinical and Economic Outcomes of an Adalimumab Biosimilar Switch Program

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PURPOSE: To report the real-world impacts of a biosimilar switch program in an employer/commercially insured population.

OBJECTIVES: To assess the real-world clinical and economic impacts of an adalimumab biosimilar switch on healthcare spending and utilization from an employer's perspective. Secondary objectives are to examine the real-world utilization and impact of adalimumab biosimilar use on health outcomes in an employer's population.

METHODS: This study will consist of two individual components. The first component will be a retrospective review using de-identified pharmacy and medical claims data from February 1, 2023 to May 30, 2024. The index date will be defined as the first date a patient received a biosimilar therapy for the treatment of an inflammatory condition or date required to switch off brand product (whichever comes first). For members who meet these criteria, the researcher will compile URAC goal status (met/not met) to be used in quality improvement initiatives.

The second component of the study will involve a prospective survey. The 10-minute Qualtrics survey will be sent via email to utilizing members who fit inclusion criteria for purposes of qualitative assessment of the patient experience.

PRELIMINARY RESULTS: On January 31, 2023, Adalimumab-atto (Amjevita) became the first biosimilar of adalimumab (Humira) available in the marketplace. In July 2023, numerous other biosimilar products launched on the market. The University of Michigan Prescription Drug Plan (PDP) had 368 distinct members utilizing adalimumab (Humira) between January 2023 date and June 2023, resulting in 3,454 claims and over \$21M in plan cost. Internal models have suggested that encouraging the use of Amjevita over Humira has the potential to save the University over \$10M per year, with additional savings potential possible from the biosimilars released to the market in July 2023. The real-world impacts of a biosimilar switch program in an employer/commercially insured population have not been reported.

Learning Objectives:

Discuss the real-world impact of an adalimumab biosimilar switch on healthcare spending.

Describe the real-world impact of adalimumab biosimilar utilization on health outcomes from an employer's perspective.

Self Assessment Questions:

According to the Food and Drug Administration (FDA), which of the following best defines a biosimilar product?

- A. A biological product that has a different strength and dosage form than the reference product.
- B. A biological product that is made from the same cell lines as the reference product.
- C. A biological product that is highly similar and has no clinically meaningful differences from an existing FDA-approved reference product.
- D. A biological product that is only used in medical emergencies.

Based on the preliminary results, what potential financial impact is suggested by using an adalimumab biosimilar for the University of Michigan Prescription Drug Plan (PDP)?

- A. No significant financial impact on the University.
- B. A potential cost savings of more than \$5M per year.
- C. A potential cost savings of more than \$10M per year.
- D. A potential cost savings of more than \$20M per year.

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-865-L04-P

Impact of Glucagon-like Peptide-1 Receptor Agonist Adherence Outreach Calls by Clinical Pharmacy Specialists

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GLP-1 RAs have revolutionized the treatment of type 2 diabetes mellitus (T2DM). While these medications have many benefits to patients, they come with an increased need for monitoring due to side effects, cost concerns, and necessary dose adjustments. Literature from 2020 states that, on average, a pharmacist will see a patient up to nine times more than their primary care physician. This gives pharmacists the unique position to address treatment barriers and educate patients on their multi-faceted disease states and medications. Connecting patients who were recently started on GLP-1 RA therapy with a pharmacist early in their treatment may lead to better patient retention on therapy. Modeling this hypothesis, Franciscan Health implemented a report-driven workflow to connect pharmacists with Medicare patients who were recently started on GLP-1 RA therapy. Along with assessing the quality and efficiency of the patient outreach process, the study's purpose was to assess the pharmacist's impact on patient adherence to GLP-1 RA therapy based on adherence outreach calls performed by ambulatory care clinical pharmacy specialists at Franciscan Health.

This was a retrospective cohort study. Medicare patients over 18 years of age who were started on a GLP-1 RA for T2DM between January 1, 2022 and December 31, 2022 were eligible for inclusion. Retrospective data collection included six months after initiation of GLP-1 RA therapy. The primary objective of the study was to evaluate patient adherence to treatment, defined as a portion of days covered (PDC). Secondary outcomes included rate of medication discontinuation at six months, rate of patient-reported side effects, change in A1c at three and six months, change in weight at three and six months, time to A1c goal, and time to maximum tolerated dose. Data will be characterized using descriptive statistics.

Learning Objectives:

Describe the relationship between adherence outreach calls made by pharmacists and patient adherence to GLP-1 RA therapy.

Identify patient outcomes on GLP-1 RA therapies including: change in A1c, change in weight, the rate of change of A1c and weight, rate of reported side effects, rate of therapy discontinuation, and time to maximum tolerated dose.

Self Assessment Questions:

During a patient outreach encounter with a pharmacist, which of the following may be addressed?

- A. Medication side effects
- B. Cost-related barriers to care
- C. Proper medication administration
- D. All of the above

Which of the following is the highest reported side effect with GLP-1 RA therapy found in this study?

- A. Pancreatitis
- B. Gallbladder disorders
- C. Gastrointestinal complications
- D. Hypoglycemia

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-857-L01-P

Efficacy of intravenous buprenorphine for acute pain in critically ill patients in a medical intensive care unit

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Purpose: Over 50% of patients report being in pain during their admission to an intensive care unit (ICU). The first-line management of pain in critically ill patients are opioids. The safety concerns seen with full-agonist opioids have encouraged providers to seek other pharmacologic options. The purpose of this retrospective cohort study was to compare the use of intravenous buprenorphine with or without a full agonist IV opioid versus a full-agonist IV opioid alone for acute pain in non-ventilated, non-surgical critically ill patients. Methods: This was an IRB-approved, retrospective cohort study evaluating non-surgical patients who received IV buprenorphine compared to full-agonist IV opioids while admitted to the medical intensive care unit at an academic medical center from January 1, 2020 to August 31, 2023. Patients were excluded if they were less than 18 years old, pregnant, incarcerated, currently using methadone or buprenorphine for opioid use disorder, on invasive mechanical ventilation, admitted to an outside hospital for greater than 24 hours prior to ICU admission, or transitioned to comfort care prior to or within 7 days of first primary analgesia dose. Patients with known or expected baseline severe cognitive impairment due to chronic, acute, or subacute neurological disorder or admitted for a primary neurologic condition were also excluded. The primary outcome was median pain score using the Defense and Veterans Pain Rating Scale (DVPRS) on day 3. Assuming no true difference between treatment groups and a standard deviation in day 3 pain scores of 1.6, a sample size of 50 buprenorphine patients and 100 IV agonist opioid patients will have 80% power with a 5% type 1 error rate to detect non-inferiority with a margin of 0.7 using a one-sided two-sample t-test. Results and Conclusions: Data collection is ongoing. Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the pharmacologic properties of buprenorphine for acute pain.

Identify patients who may benefit from IV buprenorphine over full-agonist IV opioids.

Self Assessment Questions:

What is the mechanism of action of buprenorphine?

- A. Partial mu-opioid receptor antagonist and a partial delta receptor agonist
- B. Partial mu-opioid receptor agonist and a full kappa receptor antagonist
- C. Full mu-opioid receptor antagonist and a full delta receptor antagonist
- D. Full mu-opioid receptor agonist and a partial kappa receptor agonist

Which of the following is a potential benefit of using IV buprenorphine compared to full IV opioid agonists?

- A. There is a ceiling effect of buprenorphine that limits analgesia
- B. There is no difference in the side effect profile when comparing buprenorphine to morphine
- C. There is a similar or greater decline in pain scores when comparing buprenorphine to morphine
- D. There is greater post-operative analgesic consumption when using buprenorphine

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-826-L08-P

Evaluation of the Use of Spontaneous Bacterial Peritonitis Antibiotic Prophylaxis in Patients with Cirrhosis and Acute Non-Variceal Gastrointestinal Bleeding

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Background: Patients with cirrhosis are at a higher risk of developing bacterial infections than the general population. The infection risk is amplified during an episode of acute variceal bleeding. Spontaneous bacterial peritonitis (SBP) is especially common in this patient population. Prophylaxis with ceftriaxone or ciprofloxacin is recommended in these patients to reduce the risk of infection (specifically SBP) and mortality. However, the role of antibiotic prophylaxis in patients with cirrhosis and non-variceal gastrointestinal (GI) bleeding is unclear and practice varies. Unnecessary antibiotics may increase patients' risk of exposure to negative outcomes like *Clostridioides difficile* infection.

Methods: This single-health system, retrospective, observational study is being conducted at UC Health, including patients at the University of Cincinnati Medical Center and West Chester hospitals. To be included, participants must be 18 years or older, have cirrhosis, and have at least one episode of acute non-variceal GI bleeding confirmed by esophagogastroduodenoscopy (EGD). Participants are excluded if they have active variceal bleeding, are on antibiotics for an indication other than acute SBP prophylaxis, die within 48 hours of EGD, or are pregnant. Data from January 2013 to July 2023 are being reviewed for inclusion in the study in reverse chronological order. Outcomes will be compared for patients who received antibiotic prophylaxis versus those who did not. The study was approved by the University of Cincinnati Institutional Review Board (IRB).

Outcomes: The primary outcome is the occurrence of SBP within 28 days after an episode of non-variceal GI bleeding in antibiotic prophylaxis patients versus non-prophylaxis patients. Secondary outcomes are measured in relation to the time the EGD took place and include the occurrence of rebleeding within 28 days, mortality at 3 months, and occurrence of *Clostridioides difficile* infection within 14 days.

Learning Objectives:

Recognize the indications, benefits, and risks associated with SBP prophylaxis for patients with cirrhosis.

Discuss the methods and findings of a PGY1 research project that examined the use of antibiotic SBP prophylaxis in patients with cirrhosis and non-variceal acute GI bleeding.

Self Assessment Questions:

Which of the following scenarios is NOT considered an indication for SBP prophylaxis in a patient with cirrhosis?

- A. Patient who had an episode of SBP two months ago
- B. Patient requiring treatment with lactulose for hepatic encephalopathy
- C. Patient with low ascitic fluid protein levels and a serum creatinine of 1.8 mg/dL
- D. Patient admitted for hematemesis and found to have bleeding esophageal varices

What is the safety outcome being measured in the PGY1 research project?

- A. Development of antibiotic resistance in the year following an episode of non-variceal GI bleeding
- B. Fluoroquinolone-associated adverse reactions in the fourteen days following an episode of non-variceal GI bleeding
- C. Cost associated with inappropriate use of antibiotics for SBP prophylaxis
- D. Development of *Clostridioides difficile* infection in the fourteen days following an episode of acute non-variceal bleeding

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-525-L01-P

Modeling Study Examining Opioid Poisoning in the Emergency Department of an Academic Based Community Medical Center

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Purpose/Background:

The Center for Disease Control's National Center for Health Statistics show there was an estimated 80,816 opioid poisoning deaths in the United States during 2021. Kentucky has a drug poisoning rate of 55.6 per 100,000 people, with opioids involved in 79.5% of deaths. Studies have shown higher rates of naloxone distribution among laypersons and emergency personnel could avert 21% of opioid poisoning deaths. The Medical Center at Bowling Green does not currently have any naloxone distribution programs in place. The aim of this study is to estimate the impact of naloxone intervention among opioid poisonings in the emergency department.

Methods:

This modelling study will assess the prevalence of opioid poisoning events that occurred in the emergency department between June 2022 and June 2023. Patients will first be identified through the electronic health record if they had received at least one dose of naloxone while in the emergency department. To measure the possible impact of a naloxone dispensing program, selection criteria will include six-month readmission rates, psychiatric consultations after an opioid poisoning event, concurrent buprenorphine use, inpatient admissions, and hospital length of stay. Through evaluation of state protocols to identify eligible candidates followed by a retrospective chart review, modelling of this data will be completed to see what percentage of patients would have benefited from naloxone in hand or a naloxone prescription. The data from this study will hopefully show the need for a naloxone dispensing program at The Medical Center at Bowling Green, and to help from policies for naloxone dispensing in the future.

Learning Objectives:

Recall the benefits of naloxone

Identify patients eligible to receive a naloxone prescription

Self Assessment Questions:

What is the onset of action for intranasal naloxone?

- A. 2 minutes
- B. 3-17 minutes
- C. 30 minutes

D. 2-5 minutes

Which patient is eligible for a naloxone prescription?

- A. Patient starting methadone for opioid addiction
- B. Patient with an oxycodone prescription and COPD
- C. Patient with a prescription for hydrocodone and lorazepam
- D. All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-797-L08-P

Evaluation of Heart Failure Readmissions and Goal Directed Medical Therapy in a Rural Kentucky Hospital

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Purpose

Heart failure (HF) is a debilitating condition that is associated with high mortality, high morbidity, and increased healthcare costs secondary to hospital admissions and readmissions. Goal Directed Medical Therapy (GDMT) is the mainstay of treatment of Heart Failure with Reduced Ejection Fraction (HFrEF) and has been proven to reduce mortality and morbidity associated with HFrEF. The purpose of this study is to evaluate opportunities available for optimization of care provided to a rural Kentucky HFrEF patient population by analyzing HFrEF readmissions that did not meet GDMT at the time of hospital discharge.

Methods

A single-center, retrospective, observational study was conducted at a 300-bed rural Kentucky hospital from June 1, 2021 to May 31, 2023. Included patients were 18 years or older, had a diagnosis of HFrEF, and had a readmission coded for heart failure within 30 days from the index admission. Patients were excluded if they had heart failure with preserved ejection fraction or combined systolic/diastolic heart failure. To evaluate if GDMT was appropriate, the discharge summary of the associated readmission was screened for appropriate medications and target doses.

Results

161 visits were screened, and 51 visits were documented to have HFrEF and were included in the study. Only one patient was found to be on all four pillars of GDMT, but this patient was not at target doses. 45.1% of patients were on an ARNI/ACEi/ARB with 8.7% on target doses. 88% were on appropriate beta-blockers, with 6.7% on target doses. 47.1% were on an MRA with 95.8% were on appropriate dosing. Only 21.6% of patients were on an SGLT2 inhibitor.

Conclusion

The current study revealed that there is much opportunity for improvement of GDMT in this institution's HFrEF population. To increase adherence with GDMT in HFrEF patients, providers must work to optimize regimens at each opportunity.

Learning Objectives:

Discuss guideline recommendations for appropriate medications in patients with heart failure with reduced ejection fraction.

Identify appropriate target doses of Goal-Directed Medical Therapy with associated mortality and morbidity benefit.

Self Assessment Questions:

Which medications below have proven mortality and morbidity benefit in patients with heart failure with reduced ejection fraction? Select ALL that apply. 1. Carvedilol

2. Sacubitril/valsartan 3. Furosemide 4. Empagliflozin 5. Spironolactone

A. 2, 4, and 5

B. 1, 2, 4, and 5

C. 1, 3, 4, and 5

D. 1, 2, 3, 4, and 5

Which medication below is at the appropriate Goal-Directed Medical therapy target dose for heart failure treatment?

A. Lisinopril 10 mg PO daily

B. Spironolactone 12.5 mg PO daily

C. Metoprolol succinate 100 mg PO daily

D. Sacubitril/valsartan 93/103 mg PO BID

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-545-L01-P

Assessing blood culture contamination rates in a West Virginia hospital: a single-center, retrospective, observational study

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PURPOSE: Blood culture contamination (BCC) can compromise the quality of patient care and lead to unnecessary antibiotic use and length of hospitalization.

BACKGROUND: BCC is a blood culture with a false positive result due to a commensal organism. BCC rates within an institution should be assessed regularly and are required to be reported with a goal of less than or equal to 3% contamination. This retrospective evaluation compared the laboratory defined contamination rates versus clinically correlated contamination rates. Based on the procedures of the microbiology laboratory, cultures within the institution are considered contaminated when one bottle is growing coagulase-negative staphylococci or Micrococcus spp. Clinically correlated BCC considers multiple factors when defining contamination including type of organism, time to positive results, number of positive bottles, and clinical judgement. Current contaminants according to the Clinical and Laboratory Standards Institute (CLSI) include: Bacillus spp., Corynebacterium spp., Cutibacterium spp., coagulase-negative staphylococci, Aerococcus spp., and Micrococcus spp.

METHODS: This single-center, retrospective, observational study collected patients 18 years of age and older with at least one blood culture via the electronic medical record during admission within the study timeframe. Patients were excluded if they had a positive blood culture obtained outside of the institution or if they were admitted to the general pediatric floor or the pediatric intensive care unit. Data collection and analysis is currently in progress. RESULTS and CONCLUSIONS: Results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify common pathogens that are considered blood culture contaminants.

Describe recommended practices that should be utilized to limit blood culture contamination rates.

Self Assessment Questions:

According to CLSI, which of the following organisms below is a commonly identified blood culture contaminant?

- A. Escherichia coli
- B. Staphylococcus aureus
- C. Candida albicans
- D. Staphylococcus epidermidis

Which of the following practices should be utilized to limit blood culture contamination?

- A. obtaining only one culture bottle
- B. collecting a blood culture immediately after applying the skin disinfectant
- C. collecting a blood volume between 20-30 mL
- D. not wearing gloves to collect cultures

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-833-L99-P

Impact of an Antibiotic Pocket Guide on Guideline-concordant Empiric Treatment for Inpatient Community-acquired Pneumonia

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Purpose

Community-acquired pneumonia (CAP) is a common cause of hospital admissions and data has shown concordance with guideline recommendations is associated with improved outcomes. An antibiotic pocket guide was designed and introduced locally as they have been shown to increase use of recommended agents in other settings. This study sought to evaluate the local impact of this antibiotic pocket guide on rates of guideline-concordant selection of initial CAP treatments.

Methods

A retrospective, pre-post, quasi-experimental study was conducted to evaluate concordance to antibiotic treatment guidelines following introduction of an antibiotic pocket guide within a community hospital that is part of a larger health system. The primary outcome was the rate of guideline-concordant empiric antibiotic selection for CAP patients pre- and post-introduction of the pocket guide. Secondary outcomes included the comparison of total duration of therapy and rates of C. difficile within 60 days of admission. Length of stay and all-cause mortality within 30 days of discharge were exploratory safety outcomes. Admitted patients over age 18 were included if initiated on antibiotics for pneumonia within 24 hours. Patients were excluded if additional indications were selected, if they had severe allergy precluding use of recommended agents, or if initiated on azithromycin or doxycycline monotherapy.

Results

This study included 300 randomly selected patients treated initially for CAP (150 per group). Baseline demographics between groups were similar except for recent hospitalization with IV antibiotics. The rate of guideline-concordance of empiric CAP regimens numerically increased between pre- and post-groups (35.3% vs 44.7%, p=0.099). A decrease in all-cause mortality from pre- to post-intervention (20% vs 10%, p=0.015) was observed.

Conclusion

Preliminary results show the introduction of an antibiotic pocket-guide did not result in a significant change in guideline-concordant initial CAP therapy in this study. Full results and conclusions will be presented at Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Select an appropriate empiric treatment regimen based on the 2019 IDSA CAP guideline recommendations

Recognize advantages of introducing an antimicrobial stewardship pocket guide

Self Assessment Questions:

What regimen would provide appropriate empiric coverage for an inpatient without risk factors for methicillin-resistant Staphylococcus aureus (MRSA) or Pseudomonas aeruginosa?

- A. Vancomycin and cefepime
- B. Azithromycin only
- C. Vancomycin and piperacillin-tazobactam
- D. Ampicillin-sulbactam and azithromycin

Which of the following is an observation seen in introducing a pocket guide?

- A. Increased use of preferred agents
- B. Increase in C. difficile rates
- C. Increase in mortality
- D. Inconsistent duration of therapy

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-510-L01-P

Clinical Outcomes of LCP-Tacrolimus Compared to Immediate Release Tacrolimus in Liver Transplant Recipients

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Purpose: Immediate release tacrolimus (IR-TAC) is the backbone of maintenance immunosuppression (mIMS) in liver transplant recipients (LTR). Limited data exists on the use of once daily, extended-release tacrolimus (LCP-TAC). This study aims to compare clinical outcomes of LTR who received IR-TAC vs LCP-TAC.

Methods: This was a retrospective cohort study of LTR between 01/01/2020 to 04/30/2021. Patients were categorized into 3 groups: IR-TAC, early LCP-TAC conversion, and late LCP-TAC conversion. Early conversion (EC) was defined as IR-TAC to LCP-TAC switch within 30 days post liver transplant (LT). Late conversion (LC) was defined as IR-TAC to LCP-TAC switch after 30 days post LT. All patients received basiliximab induction and mycophenolate maintenance. Steroid was tapered off by post-operative day 5. Primary endpoints were incidence of biopsy proven and empiric rejection. Secondary endpoints included differences in renal function, tacrolimus trough concentrations, and cytomegalovirus (CMV) viremia at 1-year.

Results: A total of 77 LTR were included (IR-TAC n=45; EC n=20; LC n=12). Baseline characteristics were similar across the 3 groups. There was no difference in the incidence of 1-year biopsy proven and empiric rejections across the 3 groups. At specified study periods, there was no difference in estimated glomerular filtration rate, tacrolimus trough concentrations, and CMV viremia.

Conclusion: Clinical outcomes associated with the use of LCP-TAC as part of maintenance immunosuppression following LT is comparable to IR-TAC. Timing to LCP-TAC conversion did not have significant impact on clinical outcomes.

Learning Objectives:

Identify the advantages of LCP-TAC compared to IR-TAC.

Identify the clinical outcomes associated with LCP-TAC in liver transplantation.

Self Assessment Questions:

What is one advantage of LCP-TAC compared to IR-TAC?

- A. More reliable pharmacokinetic profiles
- B. Improvement in hypertension
- C. Faster time to therapeutic tacrolimus levels
- D. Cheaper cost

Which of the following clinical outcomes was associated with LCP-TAC in liver transplantation?

- A. Increased estimated glomerular filtration rate
- B. Decreased estimated glomerular filtration rate
- C. No change in CMV viremia
- D. Decreased CMV viremia

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-500-L01-P

Liposomal Bupivacaine Versus Administration of Short-Acting Local Anesthetics Alone: Impact on Quality of Patient Analgesia and Post-Operative Opioid Therapy

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Purpose: Existing published experience with Liposomal Bupivacaine (LB) has led to editorial review and discussion on clinical versus statistical significance of pain outcomes and incremental value provided by therapy. The primary aim of this study is to internally evaluate the efficacy of LB as compared to use of traditional, short-acting local anesthetics alone in terms of patient-reported analgesia and aspects of opioid utilization and prescription.

Methods: This project will be a retrospective chart review with data obtained from the electronic medical record of patients 18 years or older receiving surgery at a Carle Health inpatient or ambulatory location from 1/1/2020 to 09/30/2023. The surgical procedures that utilize LB will be compared to similar surgical procedures where LB was not administered. Based upon inpatient versus outpatient surgical setting and timeframe following surgery, comparative efficacy within a period of 72 hours post-operatively will be assessed by patient-reported pain scores, administration of short-acting opioids for breakthrough analgesia, telephone or in-person encounters for uncontrolled pain and post-discharge opioid prescription quantities. Secondary outcomes relating to safety and treatment of opioid adverse effects such as nausea, vomiting and respiratory depression will also be analyzed.

Results: In process

Conclusions: In process

Learning Objectives:

Review pharmacology and use of local anesthetics in surgery

Discuss anticipated differentials in post-operative efficacy and safety outcomes between application of liposomal bupivacaine and use of short-acting local anesthetics alone

Self Assessment Questions:

What is a duration of analgesic effect that one might expect from local infiltration of liposomal bupivacaine?

- A. 6 hours
- B. 12 hours
- C. 72 hours
- D. 14 days

Which of the following is a possible outcome of liposomal bupivacaine reported in literature?

- A. Increased administration of naloxone
- B. Reduced patient-reported pain scores
- C. Decreased time to breakthrough analgesia use
- D. Increased breakthrough analgesia use

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-818-L08-P

Implementation of a ketorolac dose limit and evaluation of analgesic ceiling effect in an emergency department population

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Ketorolac is a common medication for pain control in the emergency department (ED), but it has a considerable risk of adverse effects like gastrointestinal hemorrhage and acute kidney injury. Based upon this risk, Carle Foundation Hospital (CFH) implemented a 15 mg single dose limit on all parenteral ketorolac orders. This study aims to evaluate analgesic efficacy of ketorolac across various pain etiologies by assessment of patient-reported pain scores in patients presenting to CFH ED before and after implementation of the lower single dose limit. This retrospective, single-center, observational study will examine data obtained from the CFH electronic medical record from 9/1/2021 to 8/31/2022 (before period) and 10/1/2022 to 9/30/2023 (after period). Patients included will be 18 years or older, presenting to CFH ED for pain, and received at least a single dose of parenteral ketorolac. Exclusion criteria will be receipt of an opioid medication greater than 30 minutes prior to ketorolac dose and patients presenting for migraine-related pain. The primary outcome is the difference in mean patient-reported pain score reduction before and after the 15 mg single dose limit was implemented. Secondary outcomes include the difference in requirement for additional analgesics after initial ketorolac administration, the difference in administration of repeat doses of ketorolac following the initial dose, and incidence of a gastrointestinal bleed or acute kidney injury within 30 days of ketorolac administration.

Learning Objectives:

Discuss the impact that limiting the maximum single dose of parenteral ketorolac has on analgesic efficacy

Describe the spectrum of possible dose-related adverse effects with parenteral ketorolac.

Self Assessment Questions:

What are the potential adverse effects associated with high doses of parenteral ketorolac?

- A. GI bleed and acute kidney injury
- B. GI bleed and oral ulcers
- C. Myocardial infarction and stroke
- D. Nausea and vomiting

What lowest maximum single dose of parenteral ketorolac has been shown in multiple studies to impart similar analgesic efficacy to higher, labelled doses?

- A. 30 mg
- B. 7.5 mg
- C. 15 mg
- D. 60 mg

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-823-L08-P

Development of an Outpatient Management Protocol for the Treatment of Tumor Lysis Syndrome (TLS)

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Purpose: Tumor lysis syndrome (TLS) is an oncologic emergency caused by the lysis of malignant cells and the release of contents into the bloodstream, leading to metabolic complications. Early identification, rapid initiation of hydration, and proper use of medications is crucial to patient outcomes and mortality rate. While there are NCCN guideline recommendations for the management of TLS, there is limited guidance on treatment in the outpatient setting, specifically. As a result, strategies vary among institutions and individual providers on how to manage this oncologic emergency. While, Norton Healthcare has standardized the management of TLS in the inpatient setting, there is a lack of a standardization at the Norton Cancer Institute (NCI) ambulatory clinics. The purpose of this process improvement project is to address the need to develop an outpatient TLS protocol at NCI, while retrospectively assessing the benefits of the protocol to patients treated at NCI in the past.

Methods: This process improvement project implemented the Plan-Do-Study-Act methodology. The Plan phase included the development of a standardized protocol for the outpatient management of patients with low-risk TLS at NCI clinics. In the Do phase, the developed protocol was applied retrospectively through chart review of patients diagnosed with TLS at any of the seven outpatient NCI clinics between July 1, 2019 and August 31, 2023. The Study phase consisted of analyzing the data to quantify the percentage of patients with optimization opportunities, characterizing the optimization opportunities for intervention, identifying potential avoided admissions, and quantifying the potential cost avoidance from mitigating hospital admissions and optimizing TLS medications in the outpatient setting. Revisions to the protocol were completed based on the results of the retrospective analysis in the Act phase including implementation of the protocol at NCI.

Results/Conclusions: To be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize risk factors that place patients at a high-risk for developing TLS.

Select an appropriate treatment option for TLS in the outpatient setting based on patient factors.

Self Assessment Questions:

Which of the following risk factors places the patient at high-risk for developing TLS?

- A. Tumor with a low cell proliferation rate
- B. Invasive ductal carcinoma of the left breast
- C. Acute Lymphoblastic Leukemia (ALL) with WBC of 150,000
- D. Acute Myeloid Leukemia (AML) with WBC of 8,000

KJ presents to the outpatient NCI clinic for a scheduled lab check on day 2 following chemotherapy for Chronic Lymphocytic Leukemia (CLL). KJ does not report any symptoms, but his results are significant for a uric acid of 8.7 mg/dL, potassium of 5.3 mEq/L, phosphorous of 6.4 mg/dL, corrected calcium of 7.6 mg/dL, and a Scr of 1.6 mg/dL (baseline Scr 1 mg/dL). The Hematologist diagnosis KJ with low-risk clinical TLS and starts appropriate IV fluids in the clinic. Select the most appropriate therapy for electrolyte abnormality correction for KJ based on the NCI outpatient TLS protocol.

- A. Allopurinol & Rasburicase
- B. Rasburicase, Sevelamer, & a Calcium Supplement
- C. Allopurinol & Sevelamer
- D. Allopurinol, Rasburicase, & Sevelamer

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-721-L01-P

Extending the Dosing Interval of Denosumab in Patients with Lung Cancer and Bone Metastases

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Purpose: Patients with lung cancer are at risk for developing bone metastasis. When a bone metastasis develops, patients are at risk for skeletal related events (SRE) defined by pathological fracture, spinal cord compression, or requiring radiation or surgery to bone. As a nuclear factor-kappa ligand (RANKL) inhibitor, denosumab inhibits osteoclast activation and is used to prevent skeletal related events in those with bone metastases. The established denosumab dosing interval when treating bone metastasis is every 4-weeks, which is frequently extended to sync the patient's denosumab dosing schedule with their chemotherapy treatment schedule.

The impact of extended dosing of denosumab has been investigated; however, the results have varied with some showing an increased risk for an SRE. Furthermore, studies have yet to evaluate a homogenous patient population (i.e., within the same malignancy).

Methods: This is an IRB approved, single-center, retrospective chart review evaluating the impact of denosumab 120 mg subcutaneous at different dosing intervals (<5 weeks, 5-11 weeks, and ≥ 12 weeks) in patients with either stage IV small-cell lung cancer (SCLC) or non-small-cell lung cancer (NSCLC). The study included patients who received two doses of denosumab 120 mg for the treatment of bone metastases between January 2017 and January 2023. Patients were excluded if they received bisphosphonates during denosumab therapy, lacked a diagnosis of bone metastasis, or were >89 years old. The primary outcome was to compare the number of skeletal related events between denosumab interval groups. The secondary endpoints included a comparison of time to SRE, time to death from start of denosumab, type of SRE, number of patients with more than one SRE, proportion of patients with hyper/hypocalcemia, and documented osteonecrosis of the jaw (ONJ).

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

Learning Objectives:

Explain the role of Denosumab in patients with metastatic cancer to the bone

Recognize agents that are used for the prevention of skeletal related events

Self Assessment Questions:

Which of the following is used for the treatment of bone metastasis?

- A. Zoledronic acid 5 mg IV every 12 months
- B. Zoledronic acid 4 mg IV as a single dose
- C. Denosumab 120 mg subcutaneously every 28 days
- D. Denosumab 40 mg subcutaneously every 28 days

What is the mechanism of denosumab in the treatment of bone metastasis?

- A. Inhibition of RANKL
- B. Inhibition of osteoblasts
- C. Working agonistically with osteoclasts
- D. Inhibiting the excretion of calcium through the kidneys

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-542-L01-P

Assessing the Impact of Midodrine on Intensive Care Unit Length of Stay in Refractory Septic Shock

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The utility of midodrine in liberating critically ill septic shock patients from intravenous vasopressors currently has conflicting literature. The purpose of this study is to assess the impact of midodrine on intensive care unit (ICU) length of stay in patients with refractory septic shock requiring vasopressor therapy of 0.2 mcg/kg/min of norepinephrine equivalents for more than one hour or 0.5 mcg/kg/min at any point prior to midodrine initiation. This study will further add to the existing body of literature that assesses midodrine utilization in patients requiring an unspecified quantity or dose of vasopressors.

This retrospective, single-center, cohort study will be performed at a 433-bed tertiary community hospital in Lexington, Kentucky. The study aims to compare refractory shock patients who were given midodrine versus patients who were not. All patients will have an inpatient encounter with a diagnosis of septic shock. Patients will be excluded if they did not meet criteria for refractory shock, if they were using midodrine prior to admission, if there was a known hypersensitivity to midodrine, if they required readmission to the ICU, or if midodrine was used for purposes other than ventilator liberation. The primary outcome will be ICU length of stay. Secondary outcomes will include hospital mortality, duration of vasopressors, 30-day readmission, hospital length of stay, incidence of bradycardia, vasopressor reinitiation, or midodrine prescription at discharge. In addition to the specified outcomes, additional data points will include doses of midodrine, use of mineralocorticoid agents, and hospital policy barriers to ICU discharge. Results will be evaluated for normality of distribution and appropriate statistical methods will be utilized to compare continuous and categorical variables. Data will use a 95% confidence interval and an alpha of 0.05 for significance.

Data collection is in progress. Results will be presented at the meeting.

Learning Objectives:

Recall the current guidelines and literature related to hemodynamic management in septic shock patients.

Describe the current utility and potential hemodynamic impact of midodrine in septic shock patients in the intensive care unit.

Self Assessment Questions:

According to the Surviving Sepsis Campaign guidelines, what is currently recommended as an appropriate medication to introduce for vasopressor de-escalation?

- A. Angiotensin II
- B. Midodrine
- C. Methylene Blue
- D. None of the above

What is midodrine currently FDA indicated for?

- A. Orthostatic Hypotension
- B. Dialysis-induced hypotension
- C. Vasopressor Liberation
- D. All of the above

Q1 Answer: D Q2 Answer: A

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

Forty-eight-hour broad-spectrum antibiotic de-escalation during inpatient hospital stays

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Purpose: Appropriate antibiotic selection is crucial when assessing a patient's disease state to ensure that the infection they are diagnosed with is being treated optimally. Antibiotic de-escalation and individualized antibiotic treatment regimens are equally as important when treating infections to both decrease antibiotic resistance and improve patient outcomes. This project is designed to assess the appropriateness of broad-spectrum antibiotic therapy and allow pharmacists to use their clinical expertise to provide safe, effective, and the most appropriate antibiotic recommendations to providers. **Methods:** A pharmacist-driven 48-hour Columbus Regional Health classified tier 3 antibiotic (cefepime, piperacillin-tazobactam, and meropenem) de-escalation process was designed and implemented in November 2023 within Columbus Regional Hospital. This single-center, retrospective chart-review evaluated admitted patients who presented to Columbus Regional Health and were on a continuous broad-spectrum antibiotic >48 hours. Pharmacist-driven interventions began November 14th, 2023. The pre- and post-implementation periods included patients admitted between November 21st, 2022 to January 21st, 2023 and November 21st, 2023 to January 21st, 2024, respectively. The primary outcome was to compare broad-spectrum antibiotic administrations and durations after the initiation of pharmacist-driven interventions for inpatients who have been on broad spectrum therapy >48 hours. Secondary outcomes include whether pharmacist interventions were accepted or rejected by providers, if pharmacists gave appropriate de-escalation recommendations based on the de-escalation screening tool, and comparisons of indication of use for infection. **Results:** Data collection is ongoing; results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify potential complications with long durations and over usage of broad-spectrum antibiotics.

Recognize the impact of pharmacist-driven interventions for broad-spectrum antibiotic de-escalation.

Self Assessment Questions:

What is a concern from overuse of broad-spectrum antibiotics?

- A. Increased antibiotic resistance
- B. Increased C. Diff infections
- C. Longer hospital stays
- D. All of the above

What should a pharmacist review for possible de-escalation on a patient that is placed on a broad-spectrum antibiotic?

- A. Allergies
- B. Preliminary cultures
- C. Temperature
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-568-L01-P

Comparison of Twice Daily Hydralazine with Isosorbide mononitrate daily or dinitrate Twice Daily Compared to Thrice Daily Hydralazine with Isosorbide dinitrate in Congestive Heart Failure

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Purpose: While the efficacy has not been formally examined, preliminary observations suggest improved compliance with simpler dosing strategies such as twice daily hydralazine with Isosorbide Mononitrate ER or Isosorbide dinitrate compared to thrice daily hydralazine and Isosorbide Dinitrate in patients with congestive heart failure. We hypothesize this shift may lead to either improved or equivalent clinical outcomes and increased medication adherence. The primary objective was to assess the rate of 30-day rehospitalization of congestive heart failure patients on twice daily Hydralazine with Isosorbide Mononitrate ER or Isosorbide dinitrate twice daily compared to thrice daily hydralazine and Isosorbide dinitrate.

Methods: Retrospective, non-inferiority study, assessing the 30-day rehospitalization rates and average time to rehospitalization among congestive heart failure patients on twice daily Hydralazine with Isosorbide Mononitrate ER daily or Isosorbide dinitrate twice daily compared to thrice daily hydralazine and Isosorbide dinitrate. Congestive heart failure 30-day readmission is a core hospital measure for the Centers for Medicare and Medicaid Services. Secondary objectives included the number of hospitalizations for congestive heart failure exacerbations, an evaluation of medication adherence cross the two regimens, an assessment of 30-day mortality attributed to congestive heart failure as well as 1 year mortality attributed to congestive heart failure. This assessment will provide valuable insight to the impact twice daily Hydralazine with Isosorbide Mononitrate ER or Isosorbide dinitrate twice daily regimen may have on patients' medication adherence, quality of life and mortality compared to thrice daily hydralazine and Isosorbide dinitrate.

Results/ Conclusions: Data analysis is in progress and will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the monumental trial that evaluated the effects of vasodilator therapy on mortality among patients with chronic congestive heart failure

Recognize the barriers to hydralazine-nitrate therapy for patients.

Self Assessment Questions:

Which of the following trials evaluated the effects of vasodilator therapy on mortality among patients with chronic congestive heart failure

- A. Z-Heart II
- B. V-HeFT I
- C. J-HeFT
- D. C-Heart II

Which of the following is not a barrier to hydralazine-nitrate therapy for patients

- A. Complexity
- B. Cost
- C. Delirium
- D. Hypertension

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-741-L01-P

Evaluation of Optimal Timing of Cefazolin Intravenous Push Surgical Prophylaxis for Reduction of Surgical Site Infection Risk

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Purpose: Appreciable morbidity, mortality, and economic burden are attributed to preventable healthcare-associated infection such as surgical site infection (SSI). Surgical antibiotic prophylaxis (SAP) has historically been used to reduce infection risk after operative procedures. General consensus of national and international guideline recommendations on preoperative SAP are to administer antimicrobials within two hours of incision, but some discourse exists surrounding the optimal timing range which most greatly reduces the risk of post-operative infection. Research on the influence of administering common prophylactic antibiotics, such as cefazolin, via intravenous (IV) push is scarce in the United States. Guideline-recommended SAP timing does not consider the variable of administration method, which influences time-to-peak tissue concentration. This study aims to investigate the timing interval for completion of cefazolin antibiotic prophylaxis via intravenous push for reduction of surgical site infection risk.

Methods: This study will be conducted as a retrospective chart review of surgical patients at Bronson Healthcare Group (BHG) who have previously been treated with cefazolin IV push surgical prophylaxis at different preoperative times. Patients will be categorized by time of SAP completion. The information obtained through chart review will be used to compare patient cohorts to evaluate differences in SSI risk. Additional infection classification and SSI surveillance criteria are defined by and followed according to the Centers for Disease Control (CDC) and Prevention and National Healthcare Safety Network (NHSN) recommendations. The primary endpoint will compare between-group differences in SSI in patients stratified by time of SAP completion in patients who have received only cefazolin. A secondary endpoint will evaluate differences in SSI in patients given either cefazolin, vancomycin, or clindamycin, stratified by time range of SAP completion.

Results and Conclusions: Data analysis is ongoing. Findings are to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Define the Surgical Site Infection (SSI) surveillance criteria according to the Centers for Disease Control (CDC) National Healthcare Safety Network (NHSN).

Describe the influence of Surgical Antibiotic Prophylaxis (SAP) administration timing on incidence of Surgical Site Infection (SSI).

Self Assessment Questions:

Which of the following National Healthcare Safety Network (NHSN) operative procedure categories accurately correspond with their listed Surgical Site Infection (SSI) surveillance period?

- A. Coronary artery bypass graft (CABG) procedure; 30-day SSI surveillance
- B. Cardiac surgery; 30-day SSI surveillance
- C. Hip or knee prosthesis procedure; 90-day SSI surveillance
- D. Vaginal hysterectomy; 90-day SSI surveillance

Which of the following Surgical Antibiotic Prophylaxis (SAP) scenarios is expected to have the lowest risk of Surgical Site Infection (SSI)?

- A. Patient to undergo colorectal surgery is given oral vancomycin 125mg four times daily for two days before procedure
- B. Patient to undergo orthopedic surgery is given weight-based cefazolin via intravenous-push 30 minutes before first incision
- C. Patient to undergo an emergent cesarean section is started on a two-hour vancomycin infusion at the time of first incision
- D. Patient having undergone a pacemaker surgery without the use of pre-surgical antibiotics is prescribed cephalexin 500mg to be taken every eight hours for five days outpatient

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-864-L01-P

Comparison of the incidence of surgical site infections in patients who receive clindamycin vs. beta-lactam antibiotics for pediatric gastrointestinal surgery

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Purpose: Surgical Site infections (SSIs) are one of the most common types of hospital-acquired infections and pose a substantial risk of morbidity and mortality. The impact on the healthcare system has been estimated to be approximately \$25,000 per case. According to the Infectious Disease Society of America (IDSA) guidelines for antimicrobial prophylaxis in surgery, antibiotics plays an essential role in reducing the rate of potential surgical site infection. The objective of this study is to compare the incidence of postoperative surgical site infections in patients who receive clindamycin vs. a beta-lactam antibiotic for perioperative prophylaxis in pediatric patients undergoing gastrointestinal surgery. This study will aim to assess the comparative efficacy between beta-lactam and clindamycin use in pediatric patients as perioperative prophylaxis. A notable strength of this study will be addressing the efficacy and effectiveness of beta-lactam antibiotics to clindamycin, an area where there is limited literature data within the pediatric population.

Methods: A retrospective chart review of patients who received either a beta-lactam or clindamycin prior to surgery as perioperative infection prophylaxis from 2014 to 2022 was conducted. Inclusion criteria for this study were patients 1-18yrs who underwent a gastrointestinal procedure and had clinic follow-up within 30 days.

Patients who were less than 1 year and greater than 18 years old or being treated for an active infection were excluded. Data collected included age, race, gender, weight, body mass, allergies, type of surgical procedure, antibiotics given, whether the antibiotic was administered within 60 minutes of the start of the procedure, length of surgery, length of hospital stay, and surgical site infection according to the CDC (Centers for Disease Control) guidelines.

Results/Conclusion: Data collection and analysis are currently in progress and will be presented at the Great Lake Pharmacy Resident Conference.

Learning Objectives:

Discuss the role of antibiotic prophylaxis in the prevention of surgical site infections in pediatric patients undergoing elective gastrointestinal surgery

Restate reasons why clindamycin may not be the optimal antimicrobial for surgical antimicrobial prophylaxis

Self Assessment Questions:

What is the recommended antibiotic for perioperative gastrointestinal surgery as the first-line therapy per IDSA guideline?

- A. Cefezolin
- B. Vancomycin
- C. Clindamycin
- D. Zosyn

Should you continue prophylaxis antimicrobials more than 24 hours postoperatively?

- A. Yes, it needs to be more than 36 hours post-op
- B. Yes, it needs to be more than 48 hours post-op

C. Yes, it needs to be more than 72 hours post-op
D. No, there is no benefit of having antimicrobials more than 24 hours
Q1 Answer: A Q2 Answer: D
ACPE Universal Activity Number 0121-9999-607-L01-P

Analysis of oral transition to cefdinir versus moderately and highly bioavailable agents for gram-negative bacteremia

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Historically, gram negative blood stream infections (GN-BSI) have been treated with intravenous (IV) antibiotics. Evidence has shown that transition to appropriate oral antibiotics has no difference in outcomes compared with IV antibiotics. Despite this, a concern is that the oral dosage form of some antimicrobial agents may not yield as high of bioavailability as an IV agent. In previous trials that have compared the use of various oral agents, the representation of cefdinir has been low. This study aims to examine the efficacy of oral cefdinir, as compared to antibiotics with moderate to high bioavailability, in treating GN-BSI's.

This is a retrospective cohort study that will include a descriptive review of patients within the TriHealth system between August 31, 2021 through July 1, 2023. This study will include patients 18 years of age and older, admitted to a TriHealth facility, had at least 1 set of blood cultures positive for gram negative Enterobacteriaceae, received IV antibiotics that cover gram-negative organisms, and completed the course with oral antibiotics. Patients will be excluded if they have a chronic infection with the need for prolonged antibiotics or an uncontrolled source of infection, have polymicrobial bacteremia, an identified organism resistant to first generation cephalosporins, or if they are discharged to hospice care. The primary outcome of this study is a 30-day composite of all-cause mortality, relapse of bacteremia, and transition back from oral to IV antibiotics within the same treatment course. Secondary outcomes include hospital length of stay, hospital readmission within 90 days, development of either clinically or microbiologically documented infection (other than the original gram-negative bacteremia) within 90 days, time to oral transition of antibiotics, and Clostridioides difficile associated diarrhea. A convenience sample of 300 patients will be utilized. This study approved by the TriHealth Institutional Review Board.

Learning Objectives:

Recall the oral bioavailability of common antibiotics used for gram negative blood stream infections
Review the evidence for current use of oral antibiotics in gram negative blood stream infections

Self Assessment Questions:

Which of the following agents has low oral bioavailability?

- A. Sulfamethoxazole-trimethoprim
- B. Levofloxacin
- C. Cefdinir
- D. Amoxicillin-clavulanic acid

What was the conclusion in the study by Rieger et al. in regard to treatment failure with oral antibiotics?

- A. No difference in treatment outcomes
- B. IV antibiotics had an increased risk of treatment failure
- C. Oral antibiotics have an increased risk of treatment failure
- D. Oral antibiotics had a decreased risk of treatment failure

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-729-L01-P

Impact of New ASHP Standards on PGY1 Pharmacy Residency Experience

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American Society of Health-System Pharmacists (ASHP) recently updated its accreditation standard for postgraduate pharmacy residency programs. Beginning July 1, 2023, residents are limited to 37 days away from the program per 52-week training period. If residents exceed this limit, they will not be eligible to receive residency completion certificates, unless the program is extended by the number of days in excess of 37 days. The revised accreditation standards were presented at the ASHP 2022 Midyear Clinical Meeting & Exhibition. Concerns were raised regarding this change including questions about the impact on residents' structure and residents' well-being. There are no studies evaluating the potential impact of the revised standard on pharmacy residency training. The objective of this study is to assess the perceptions of RPDs and pharmacy residents on how the new standard will impact their residency experience. A cross-sectional survey utilizing Qualtrics was conducted. Participants include postgraduate year one (PGY1) pharmacy residency program directors (RPDs) and PGY1 residents who completed their residency training in June 2023 across the United States. Two separate surveys were sent to RPDs via email; one completed by the RPD, the other by 2022-23 residents forwarded to them by their RPD. The primary outcome is to measure the number of RPDs who perceive a need to change their program structure and the number of residents who perceive they would have changed how their time away from the program was used based on the 37-day limit. Secondary outcomes include the number of RPDs/residents who agree with the 37-day limit, perceived challenges created by this limit, and potential impact on residents' well-being. Descriptive statistics and thematic analysis will be used to analyze survey responses. Two surveys were emailed to RPDs on 1/12/2024. Data collection and analysis are currently in progress and will be presented at the conference.

Learning Objectives:

Describe current ASHP standard regarding time away from the program.
Recognize perceived benefits and challenges of the revised standard.

Self Assessment Questions:

Which of the following type of days is counted toward the new ASHP 37-day limit of time away from the program?

- A. Staffing days
- B. Conference days
- C. Compensatory days
- D. Research days

Which of the following is a potential challenge of the 37-day limit?

- A. Helps residents manage their expectations regarding days off throughout program
- B. Ensures consistency among residents across programs regarding minimum training days
- C. Supports RPDs in making a decision to extend the program
- D. Curtails or devalues professional experience (e.g., conference attendance)

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-783-L04-P

Buprenorphine reinitiation rates in hospitalized patients diagnosed with opioid use disorder

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Purpose:

Opioid use disorder (OUD) diagnoses have increased over the past few years and have been a detriment to public health. Providers often hesitate to continue OUD treatments such as buprenorphine upon hospital admission due to lack of communication with OUD providers and lack of guidance on the reinitiation of buprenorphine in the perioperative period. Abrupt discontinuation of buprenorphine can lead to multiple complications including withdrawal symptoms, greater risk of relapse and overdose after hospital discharge, and uncontrolled pain during hospital admission. Current guidelines recommend continuing buprenorphine and supplementing with non-opioid pharmacologic options for pain when possible.

Methods:

This study will be a retrospective, single center, cohort study assessing inpatient reinitiation rates of buprenorphine agents in individuals receiving buprenorphine prior to admission for OUD. The pharmacy team will implement a flag on the patient scoring list to prompt them to assess if a patient's buprenorphine is resumed during admission. The pharmacist will create an intervention to contact the physician to get the medication resumed if there are no contraindications. Data will be collected 3 months in the pre-intervention period and 3 months post-intervention period. Electronic medical records will be utilized to collect buprenorphine administration data. The inclusion criteria will include patients that are ≥18 years of age and have documented buprenorphine usage outpatient. Pain scores, sedation scores, vital signs, and naloxone usage will be collected to assess pain control and safety.

Results: N/A

Conclusion: N/A

Learning Objectives:

Identify reasons why buprenorphine should be resumed inpatient for individuals with opioid use disorder.

Recognize buprenorphine's place in perioperative management in patients prescribed this medication prior to admission.

Self Assessment Questions:

Which of the following are true?

- A. Buprenorphine can be held for a few weeks without any negative effects.
- B. Buprenorphine should be continued throughout the perioperative.
- C. Increasing the dose of opioids can control pain in patients if buprenorphine is withheld.
- D. Buprenorphine should be held 5 days before surgical procedures so full agonist opioids can be used for pain control.

Withholding buprenorphine can:

- A. force patients into withdraw
- B. decrease pain control
- C. increase the effectiveness of full agonist opioids
- D. A&B

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-858-L08-P

Evaluating Impact of High vs Low Kidney Donor Profile Index (KDPI) Kidneys on Clinical Outcomes

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The purpose of this study is to investigate differences in transplant outcomes after receiving high versus low Kidney Donor Profile Index (KDPI) kidneys. This single center, retrospective chart review consists of adult deceased donor isolated kidney transplant (KT) recipients at the University of Illinois Hospital from 9/1/2021 to 9/1/2022. Re-transplant recipients, multiorgan recipients, and those with an unknown KDPI value will be excluded. Recipients lost to follow-up for reasons other than death were also excluded. The low KDPI cohort consists of KT recipients with a donor KDPI less than 85% compared to the high KDPI cohort with a donor KDPI greater than or equal to 85%. Clinical outcomes data will be collected for all eligible KT recipients until their routine one-year follow-up. The primary outcome is kidney graft failure at one year post-KT (defined as death or definitive return to hemodialysis). Secondary outcomes include delayed graft function (defined as need for dialysis within 7 days post-KT), length of index hospital stay, acute rejection, readmission rates, eGFR at 3, 6, and 12 months post-KT, time to first acute rejection event, and time to graft failure. Statistical analyses of study endpoints will be assessed using descriptive, comparative, and regression statistics with a significance level of 0.05. Data analysis is currently in progress. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe the Kidney Donor Profile Index (KDPI) score

Recognize immunologic and acute tubular necrosis (ATN) risk factors for transplant recipients

Self Assessment Questions:

Which of the following statements is true about a KDPI score?

- A. It is used to describe a kidney obtained from a live donor
- B. The score is calculated using recipient rejection risk factors
- C. Higher scores mean a greater expected allograft functionality
- D. KDPI scores are used to match organs to appropriate recipients

Which of the following is an immunologic risk factor for transplant recipients?

- A. Male

- B. Presence of donor specific antibodies
- C. High body mass index
- D. History of diabetes

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-889-L01-P

Distribution of Naloxone with or without Buprenorphine at Emergency Department Discharge: Does it MATter?

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Purpose: Medication-assisted treatment (MAT) provides patients with access to methadone or buprenorphine for a safe detoxification from opioid use. Due to the removal of the DEA X-waiver prescribing requirements, expansion of buprenorphine prescribing in the emergency department (ED) provides the potential to initiate therapy in a wider array of patients.

There is minimal data comparing the impact of MAT initiation in the ED to that of dispensing only a naloxone kit at discharge. Reporting on the comparison between these differences in the effectiveness of these two preventative methods for overdose is currently lacking in published literature. The primary purpose of this study is to review effectiveness of initiating MAT in an ED setting on subsequent admissions for opioid overdose while also analyzing patient-specific characteristics that may predispose patients to experience subsequent overdose events.

Methods: This is a retrospective study of MAT order set utilization across Indiana University Health emergency departments from September 1, 2022 to September 30, 2023. Patients were selected based on the implementation of an ED MAT order set that allowed providers to select options for outpatient consults, intranasal naloxone, and/or buprenorphine-containing products at discharge. Exclusion criteria included patients admitted to an inpatient level of care and protected patient populations. The primary outcome is the incidence of return ED visits for opioid overdose in the subsequent three months from initial visit. Secondary outcomes include incidence of ED return for addiction-related events, documented follow-up with outpatient providers after ED discharge and admission to a rehabilitation program or addiction management program.

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

Learning Objectives:

Describe initiation of opioid dependence therapies within the emergency department based on current American Society of Addiction Medicine recommendations

Identify benefits of medication-assisted treatment initiated within the emergency department for patients with a documented opioid use disorder

Self Assessment Questions:

Which of the following recommendations would be most appropriate to initiate in a patient presenting after an opioid overdose who received one dose of naloxone in the emergency department and reports a 2-year history of daily fentanyl use?

- A. Naloxegol 25 mg daily monotherapy
- B. No therapy is required. Recommend patient follow up with primary care outpatient
- C. Administer dose of buprenorphine-naloxone then discharge with buprenorphine-naloxone 8/2 mg sublingual tablet daily and naloxone intranasal kit
- D. Recommend patient receive naloxone intranasal kit after discharge from outpatient clinic

Which of the following would be considered a potential reason to initiate a patient with a 7-year history of heroin use on buprenorphine-naloxone therapy?

- A. There is no reduction in potential rates of overdose and mortality
- B. Reduces engagement in addiction treatment
- C. Reduces potential costs associated with opioid use compared to brief intervention or referral
- D. Increases rates of HIV and hepatitis C virus transmission

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-881-L08-P

Impact of MRSA Nares Screening on De-escalation of Empiric Vancomycin Therapy in Patients with Proven or Suspected Pneumonia

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Purpose: Vancomycin is an intravenous antibiotic often used as part of an empiric treatment plan to cover methicillin-resistant *Staphylococcus aureus* (MRSA) in patients with confirmed or suspected pneumonia. There is concern about the overuse of vancomycin for pneumonia treatment despite guideline recommendations to de-escalate antibiotic therapy based on culture results. The MRSA nasal screening has approximately a 98% negative predictive value and can help guide the de-escalation of antibiotic therapy in patients with pneumonia. This retrospective study aims to evaluate the de-escalation patterns of empiric vancomycin based on the results of MRSA nares screening.

Methods: The electronic medical record system was used to identify patients who were initiated on vancomycin for confirmed or suspected pneumonia. The following data will be collected: diagnosis, blood culture data, MRSA nares culture results, evidence of imaging indicating pneumonia, number of vancomycin doses administered, duration of therapy, and duration of hospital stay. A chart review will determine if patients initiated on empiric vancomycin had risk factors for MRSA and if there were any reasons for continuing therapy if the screening was negative. Eligible patients must be 18 years of age and diagnosed with proven or suspected pneumonia. Exclusion criteria include patients under 18 years old, pregnancy, positive MRSA nares screening, and other indications for MRSA treatment. The primary outcome is vancomycin duration following the results of the MRSA nares screening. Secondary outcomes include appropriate ordering of MRSA nares screening, the re-initiation rate of vancomycin within seven days of de-escalation, and the ordering rate for MRSA nasal screens.

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

Learning Objectives:

Describe the appropriate use of the MRSA nares screening tool.

Identify the benefits of utilizing the MRSA nares screening tool.

Self Assessment Questions:

The MRSA nares screening can be used to guide antibiotic de-escalation in which disease state?

- A. Skin and soft tissue infection
- B. Pneumonia
- C. Urinary tract infection

D. Intra-abdominal infection

Which of the following describes a benefit of using the MRSA nares screening tool in patients with pneumonia?

- A. The test results quicker than blood or respiratory cultures
- B. A positive result can prove that a patient has an active MRSA infection
- C. A negative result may allow for earlier discontinuation of vancomycin
- D. A & C

Q1 Answer: B Q2 Answer: D

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

Workflow Development for Bulk Medication Dispensing with Patient at Discharge

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Proper dispensing and labeling of bulk medications at the time of discharge has been identified as a current gap in workflow at Froedtert and the Medical College of Wisconsin. Per FDA regulation, medications sent home with a patient that were not brought into the facility by the patient is considered dispensing and the prescription, label and counseling must be in compliance with Wisconsin Phar 7. One organization who implemented a process for dispensing at discharge found that there was a significant reduction in 30-day and 60-day readmission rates, respectively (21.4% pre-intervention vs. 8.7% post-intervention, $p = 0.0016$). Currently, bulk medications are discarded or inappropriately sent home with patients without a prescription or proper labeling and counseling. The projects objective is to develop and implement a workflow for properly dispensing and labeling bulk medications from the patients stay at the time of discharge. The purpose of the bulk medication workflow is to reduce medication waste, medication cost, readmission rates and increase patient adherence and satisfaction.

We plan to develop and implement a workflow for sending patients home at the time of discharge with properly labeled bulk medications dispensed during the patient's stay. The primary outcome is the change in number of properly labeled bulk medications sent home with the patient at the time of discharge. Secondary outcomes include average change in nursing and patient satisfaction with the new discharge workflow and readmission rate percentage at 30-days.

The results will be demonstrated as a percent change from pre- and post-implementation of the new workflow. The results are pending.

Conclusions are pending.

Learning Objectives:

Describe Wisconsin and federal requirements for sending patient's home with bulk medications utilized during their hospital admission.

Review the Froedtert Hospital workflow for sending patient's home with bulk medication utilized during their hospital admission.

Self Assessment Questions:

Per Froedtert Hospital's bulk medication workflow policy, which medication(s) would qualify?

- A. Albuterol Inhaler
- B. Amoxicillin
- C. Tylenol
- D. All of the above

What is required for dispensing bulk medications home with patient's that were utilized during their hospital admission:

- A. Outpatient compliant label
- B. Pharmacist Education
- C. Outpatient prescription/order
- D. All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-770-L04-P

Bleeding Rates with a Recently Decreased aPTT Goal in Patients on VV-ECMO (extracorporeal membrane oxygenation)

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Statement of Purpose:

Anticoagulation during extracorporeal membrane oxygenation (ECMO) is necessary to prevent thrombosis. The ECMO team at Indiana University Health observed bleeding events in ECMO patients anticoagulated with bivalirudin using an activated partial thromboplastin time (aPTT) goal of 60-80 seconds. With support from previously published literature advocating lower aPTT goals to minimize bleeding risks, the decision was made to change the aPTT goal from 60-80 seconds to 45-60 seconds. This study aims to investigate the impact of this recently lowered aPTT protocol, utilizing a reduced aPTT goal from 60-80 seconds to 45-60 seconds for venovenous (VV) ECMO patients anticoagulated with bivalirudin.

Statement of Methods:

This retrospective, single-center, cohort study from March 2019 to March 2023 compared bleeding rate before and after an aPTT goal protocol change. Adult patients requiring VV-ECMO and receiving bivalirudin for anticoagulation at Indiana University Health Methodist Hospital were included. Patients in the pre-group had goal aPTTs of 60-80 seconds and patients in the post-group had a goal aPTT of 45-60 seconds. Patients were excluded if they received VA or VP-ECMO or any cardiac assist device (i.e. Impella or ventricular assist devices), were positive for COVID-19, or required VV-ECMO post-cardiac or transplant surgery. The primary endpoint was incidence of bleeding. Secondary endpoints included rate of aPTT goal reduction due to bleeding, rate of bivalirudin interruption or discontinuation due to bleeding, rate of clotting during ECMO support, rate of deep-vein thromboses post-ECMO decannulation, rate of aPTT goal increase due to clotting, and percentage of aPTTs in target range.

Results and Conclusions:

Data collection is in progress. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Describe why there is an increased risk of clotting in VA ECMO patients when compared to VV ECMO patients.

Review the reasons why bivalirudin for anticoagulation in VV ECMO patients can be more beneficial compared to heparin.

Self Assessment Questions:

Why is there an increased risk of thrombus formation in VA-ECMO patients when compared to VV-ECMO patients?

- A. VA cannulation supports pulmonary circulation
- B. VA cannulation can lead to intracardiac stasis of blood
- C. VA-ECMO needs a slower circuit rate compared to VV-ECMO
- D. There is no increased risk between VV and VA-ECMO

Why can bivalirudin be more beneficial for anticoagulation in VV ECMO patients over the alternative heparin?

- A. ECMO circuits can reduce levels of antithrombin, which heparin needs to have an anticoagulant effect
- B. Heparin can bind to the walls of the cannulation tubing, reducing overall anticoagulation effect
- C. Heparin's effect on systemic anticoagulation is much quicker than that of bivalirudin's, something that can be detrimental during the early stages after ECMO cannulation
- D. There is no difference between the anticoagulants, it was simply what was cheaper from the medication supplier

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-710-L01-P

Impact of a Pharmacist-Led Initiative on Antibiotic Use for Asymptomatic Urinary Tract Infection in the Emergency Department

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Statement of Purpose: This quality improvement project aims to reduce the amount of antibiotics prescribed for asymptomatic urinary tract infection (UTI) in the emergency department (ED) at Lutheran Hospital by providing pharmacist-led education to providers within the ED. The primary objective is to compare rates of antibiotic prescribing for asymptomatic UTI from the ED both before and after completion of a pharmacist-led education. The secondary objective compared 30-day readmission rates. Statement of Methods: Pharmacist-led education was a reinforcement of the current Infectious Diseases Society of America (IDSA) recommendations for management of asymptomatic UTI. Education focused on the rate of antibiotic prescribing for UTI, as well as the appropriate management and adverse consequences of treatment. Patient charts were retrospectively reviewed to compare the rate of antibiotic prescriptions. Inclusion criteria included male and non-pregnant female patients who are asymptomatic for UTI and discharged from the ED. Exclusion criteria included patients less than 18 years of age, pregnant females, those undergoing imminent urological procedures, and patients receiving an antibiotic for a non-urinary related infection. Summary of Results: A total of 109 patients (pre-intervention, n = 62; post-intervention, n = 47) met inclusion criteria. 23 patients received antibiotics during the pre-intervention phase (37%). Only 8 patients received antibiotics in the post-intervention phase (17%). Pharmacist-led education provided a 20% decrease in the total number of antibiotics prescribed for asymptomatic UTI (p = 0.007). The 30 day readmission rate showed no statistical difference with both groups only having one patient readmitted. Conclusion Reached: At our single center, prescribing rates decreased for asymptomatic UTI following pharmacist-led education to providers. After education a 20% decrease was observed in the total number of antibiotics prescribed for this indication.

Learning Objectives:

Describe an appropriate patient, based on IDSA guidelines, for the treatment of asymptomatic UTI in the setting of discharge from the emergency department.

Identify the percentage change in treatment rate for asymptomatic UTI before and after pharmacist-led education at our single facility.

Self Assessment Questions:

Based on IDSA guidelines, which of the following patient types would require treatment for asymptomatic UTI?

- A. Acute mental status changes with or without fall (no fever or hemodynamic instability)
- B. Pregnancy
- C. Indwelling catheter
- D. Solid organ transplant

At our single center, what percentage change for treatment of asymptomatic UTI was demonstrated before and after pharmacist-led education to providers in the ED?

- A. 0.05
- B. 0.1
- C. 0.2
- D. 0.5

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-642-L01-P

Exploration of Medication Related Readmissions

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Purpose: The estimated national hospital readmission rate stands at 14% of hospital discharges. Among these readmissions, 21% can be attributed to medication-related issues such as medication errors, adverse drug events, drug interactions, and instances where treatment failed to achieve the intended therapeutic outcome.

The impact of medication-related issues leading to hospital readmissions is underscored by this statistic.

This study aims to conduct a comprehensive assessment of selected members within value-based care (VBC) contract plans who have had readmissions within 90 days of an index hospitalization to determine the correlation between medication-related events and readmissions.

Methods: The study will be conducted through a chart review of VBC contract Medicare members who are 18 years or older with re-admissions within 90 days of an index hospitalization occurring between 1/1/2022 and 6/30/2023. Patients were excluded from the study population if they were terminally ill or hospice patients, discharged with no need for follow-up, only emergency room visits without hospital admission, those who left "against medical advice" discharged to Inpatient Rehabilitation care, and non-surgical cancer patients (including admissions solely for chemotherapy treatment).

The study's primary objective is to determine the rate of medication-related hospital readmissions within 90 days of an index admission for included patients.

Secondary outcomes are the numbers and rates of patients with the same diagnosis for both index admission and readmission, the number of completed admission and discharge medication reconciliations, and the demographics of readmitted patients.

Results: To be presented at the conference

Conclusion: To be presented at the conference

Learning Objectives:

Identify the correlation between hospital readmissions within 90 days and medication-related events, such as errors, adverse drug events, drug interactions, and instances of treatment failure.

Outline a pharmacist-led comprehensive transition-of-care intervention to help limit hospital readmissions within 90 days of discharge.

Self Assessment Questions:

Which medication-related factor is the most common contributor to hospital readmissions within 90 days of discharge among Medicare patients?

- A. Medication non-adherence after discharge
- B. Adverse drug reactions and side effects
- C. Subtherapeutic dosing of medications
- D. Drug-drug interactions

The LACE Index tool uses a scoring system that accounts for all the following risk factors EXCEPT:

- A. Length of stay
- B. Age
- C. Comorbidities
- D. ED visits

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-804-L05-P

NEP SCORE: A Tool for Targeting Peripheral Norepinephrine Utilization

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Background: Vasopressors, particularly norepinephrine (NE), are crucial in managing hypotension and shock. Recent studies suggest that peripherally infused NE (PNE) may be a safe alternative to traditional central line administration. Avoidance of central line insertion may help mitigate costs, alleviate physician time constraints, and decrease risk of related infections.

Purpose: While initial research on PNE provides valuable insights, additional studies are essential to understand its safety and efficacy across diverse healthcare settings. The development and validation of a predictive scoring tool will facilitate providers in optimizing the use of PNE to improve patient outcomes and resource utilization using factors specific to the population at our institution. With this scoring tool, we also aim to balance unnecessary central line exposure with potentially detrimental delay in central line placement.

Methods: This, retrospective, multicenter study, included a subset of 1000 adults (18 years or older) receiving NE between January 2021 and December 2022, specifically within 6 hours of admission to the Emergency Department across Henry Ford Health (HFH). With a patient population derived from five hospital locations within HFH, our research's potential external validity is a valuable aspect of the study. Data collection was conducted using Structured Query Language on the Epic Clarity database. Machine learning techniques were applied to analyze 80% of the cohort, identifying factors correlated with PNE eligibility for scoring tool development. The scoring tool was validated on the remaining 20%, with Receiver Operator Characteristic curve analysis to evaluate accuracy.

Results and Conclusion: To be presented at Great Lakes Pharmacy Residency Conference 2024.

Learning Objectives:

Identify the prevalent characteristics in the patient population that would benefit the most from the use of peripheral norepinephrine.

Recognize the characteristics exhibited by patients who require a central line upon admission to the hospital.

Self Assessment Questions:

Which patient may have vasopressor requirements requiring placement of a central line?

- A. 45 YO mother with 4 children
- B. A otherwise healthy 28 YOM
- C. 71 YOF with PAD, CAD, and CHF
- D. 39 YOF with COPD

What patient characteristic below may indicate a central line requirement?

- A. Need for multiple vasopressors
- B. Recovered alcoholic
- C. Previous smoker
- D. 30 years old

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-533-L01-P

Nephrotoxicity Evaluation of Short Course Post-Operative Antibiotic Prophylaxis in Lung Transplant Recipients

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Infection is a common complication in lung transplant recipients, occurring in up to 42% of patients after surgery. Surgical prophylaxis with vancomycin plus an antipseudomonal beta-lactam can be common to mitigate infection risk, but an optimal post-operative duration has not been defined. The lack of data poses a potential threat to cause patient harm from unnecessarily prolonged prophylaxis without benefit of infection prevention, including acute kidney injury (AKI), Clostridium difficile infection, and development of resistant pathogens. In June 2020, Henry Ford Hospital implemented a guideline change to shorten the duration of post-operative surgical prophylaxis. Previously, cefepime duration was 5 days and vancomycin duration was until chest tube removal. After the guideline change, both antibiotics were administered for 72 hours. This study evaluates the impact of this intervention on the proportion of post-operative AKI in lung transplant patients. This was an IRB approved, single pre-test, post-test quasi-experiment that included adult patients who received a lung transplant between August 2016-December 2023 with a baseline estimated glomerular filtration rate (eGFR) of >30 mL/min/1.73. The primary outcome was the proportion of patients who developed AKI before and after the guideline change. AKI was defined by the Kidney Disease Improving Global Outcomes (KDIGO) AKI definition while receiving vancomycin and up to 72 hours after discontinuation of vancomycin through 14 days. Time to AKI, 28-day AKI, and AKI as defined by the vancomycin consensus definition were assessed. A nonequivalent dependent variable of appropriate use of deep vein thrombosis prophylaxis was evaluated. Based on literature assessing antibiotic-induced AKI, we estimated that approximately 62 patients each from pre- and post- implementation of the policy change with a detection of differences in rates of AKI of 20% will provide 80% power with an alpha of 0.05.

Conclusions to be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Select an appropriate post-operative antibiotic prophylaxis regimen for a lung transplant patient.

Discuss the risks associated with post-operative antibiotic use.

Self Assessment Questions:

PT is a 36 YOF who is receiving a bilateral lung transplant today. PT has no known allergies or intolerances to antibiotics and CrCl is 80 mL/min. Which of the following would be commonly used antibacterial post-operative prophylaxis agents for PT?

- A. No prophylaxis is indicated
- B. Cefepime plus vancomycin
- C. Piperacillin-tazobactam
- D. Metronidazole plus vancomycin

Which of the following is not a risk associated with post-operative antibiotic use?

- A. AKI
- B. Clostridium difficile infection
- C. Development of resistant pathogens
- D. Stroke

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-714-L01-P

Linezolid-Associated Thrombocytopenia in Patients with Hematologic Malignancy

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Thrombocytopenia is a common adverse effect associated with linezolid, with the estimated risk ranging from 5% to 15%. A study by Kaya, et al. found that baseline platelet levels <200x10⁹/L were associated with the development of thrombocytopenia. Several studies on the incidence of linezolid-associated thrombocytopenia have excluded patients with malignancies. Consequently, there is a scarcity of data regarding this adverse effect specifically in patients with hematologic malignancies. This study aims to determine the incidence and magnitude of linezolid-associated thrombocytopenia in patients with hematologic malignancies.

This was a single-center, retrospective review of patients admitted to The James Cancer Hospital between January 1st, 2020, to July 30th, 2023. The study population included 100 patients diagnosed with hematologic malignancies who received linezolid and remained admitted for a minimum of 7 days after linezolid initiation. Thrombocytopenia was defined as platelets <150x10⁹/L or ≥50% reduction in platelet levels. The Naranjo Probability Scale was employed to objectively determine the probability of a causal relationship between linezolid and thrombocytopenia. Patients identified as probable association to linezolid underwent further evaluation, including descriptive information on alternative causes of thrombocytopenia and the status of their underlying disease.

The study cohort had a median baseline platelet of 37 x 10⁹/uL, consistent with their hematologic malignancy background. Despite a 20% incidence of thrombocytopenia, only 5% were deemed to have a "probable association" with linezolid, aligning with clinical trial rates. Thorough investigation using the Naranjo Scale revealed multifactorial causes in most cases, including chemotherapy, and linezolid was continued until the end of the planned treatment course. Safety analysis indicated that only one patient discontinued linezolid due to adverse effects, highlighting overall drug tolerance.

Linezolid appears to be a viable antibiotic option in patients with hematologic malignancies, irrespective of thrombocytopenia and concurrent chemotherapy treatment.

Learning Objectives:

Discuss the existing concerns and available data related to the administration of linezolid therapy

Describe key findings on the safety of linezolid therapy in patients with hematologic malignancies

Self Assessment Questions:

Which of the following is an adverse effect of linezolid that would be a cause for concern in a patient with a hematologic malignancy?

- A. Serotonin syndrome
- B. Peripheral neuropathy
- C. Clostridioides difficile infection
- D. Thrombocytopenia

Which of the following summarizes key findings regarding the safety of linezolid therapy in patients with hematologic malignancies?

- A. Linezolid therapy demonstrated increased incidence of thrombocytopenia in patients with hematologic malignancies
- B. Linezolid appears to be a viable option in patients with hematologic malignancies, irrespective of thrombocytopenia and concurrent chemotherapy treatment
- C. Linezolid therapy was associated with a higher risk of gastrointestinal complications in patients with hematologic malignancies
- D. Linezolid therapy exhibited efficacy but posed concerns regarding peripheral neuropathy in patients with hematologic malignancies

Q1 Answer: D Q2 Answer: B

Impact of Change in Regulations on Buprenorphine Prescribing

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Purpose: Opioid use disorder (OUD) affects over 2.3 million people in the United States, however only 20 - 40% of people with OUD receive evidence-based treatment. One of the many barriers to OUD treatment has been burdensome regulatory procedures. In December 2022, federal regulations changed to increase access to buprenorphine for patients who need OUD treatment. The requirement for prescribers to obtain a DATA or X waiver was removed, and, currently, buprenorphine only requires a standard DEA registered license to be prescribed. The purpose of this study is to evaluate the impact of change in regulations on buprenorphine prescribing at a community teaching hospital.

Methods: This single-center, retrospective cohort study investigates buprenorphine prescribing habits for adult patients with OUD before and after changes in federal regulations. The before group includes patients who presented to Trinity Health Oakland from March to December 2022, and the after group includes patients who presented March to December 2023. Patients are included if they are at least 18 years old, have documented OUD, and have either an ICD-10 diagnosis for OUD or buprenorphine ordered for OUD. Patients are excluded if they receive other evidence-based medication-assisted treatment for OUD, including methadone or naltrexone; have a history of OUD that no longer requires treatment; were receiving buprenorphine with or without naloxone for indications other than OUD; or have no documented indication for buprenorphine. The primary outcome is the percentage of patients with OUD who received buprenorphine with or without naloxone before and after the changes in regulations. Secondary outcomes include reported adverse events to buprenorphine, percentage of patients who received discharge prescriptions for buprenorphine, and patient disposition or discharge location.

The results and conclusions of this study will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review current evidence-based management of OUD.

Discuss the impact of regulation changes on buprenorphine prescribing habits at a community teaching hospital.

Self Assessment Questions:

Which of the following is NOT FDA-indicated for opioid use disorder?

- A. Sublocade (buprenorphine extended-release injection)
- B. Probuphine (buprenorphine subcutaneous implant)
- C. Suboxone (buprenorphine and naloxone film)
- D. Belbuca (buprenorphine buccal film)

Which of the following are physicians currently required to obtain to prescribe buprenorphine for opioid use disorder?

- A. REMS enrollment
- B. DATA or X waiver
- C. DEA registered controlled substance license
- D. 8 hours of Substance Abuse and Mental Health Services Administration (SAMHSA) approved training

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-600-L01-P

Effect of Prophylactic Fluconazole on the Incidence of Candidemia in Patients Receiving Total Parenteral Nutrition

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Purpose: Patients receiving total parenteral nutrition (TPN) are at an increased risk of candidemia. This risk has led some providers to initiate candidemia prophylaxis with an antifungal agent, such as fluconazole, despite a lack of data supporting this practice. Studies utilizing fluconazole prophylaxis in similarly high-risk patient populations (e.g., surgical intensive care unit patients) found a decreased incidence of candidemia in patients who received prophylaxis. The purpose of this study is to determine whether the prophylactic use of fluconazole in hospitalized patients receiving TPN reduces the incidence of candidemia.

Methods: This is a retrospective cohort study of patients admitted to UofL Health who received TPN from March 1, 2021, through July 31, 2023. Patients were divided into two study arms: those who received fluconazole prophylaxis and those who did not receive fluconazole prophylaxis. Adult patients with no evidence of active invasive fungal infection prior to initiation of TPN and who have been receiving TPN for at least three days during admission were included. Patients were excluded if they received antifungal prophylaxis with an agent besides fluconazole, received antifungal prophylaxis for another indication, received an antifungal for the treatment of an invasive fungal infection unrelated to TPN administration, were pregnant, or incarcerated. The primary endpoint is incidence of candidemia, as measured by time-to-infection. Secondary endpoints include hospital mortality and incidence of fluconazole-resistant Candida species. This study was approved by the University of Louisville Institutional Review Board.

Results/Conclusions: Final results and conclusions to be shared at the 2023 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Identify risk factors that place hospitalized patients at high risk of candidemia

Discuss the impact of providing candidemia prophylaxis with fluconazole for patients receiving total parenteral nutrition

Self Assessment Questions:

Which species of Candida may either be susceptible dose-dependent or entirely resistant to fluconazole?

- A. C. krusei
- B. C. tropicalis
- C. C. glabrata
- D. C. parapsilosis

Which patient would be the most appropriate candidate to consider for candidemia prophylaxis with fluconazole?

- A. 65-year-old male with necrotizing pancreatitis secondary to newly diagnosed stage III pancreatic adenocarcinoma receiving TPN and empiric antibiotic coverage with meropenem

B. 27-year-old female presenting following a motor vehicle accident receiving tube feedings and empiric antibiotic coverage with vancomycin and cefepime for new fevers

C. 72-year-old female with breast cancer presenting with neutropenic fever receiving empiric antibiotic coverage with cefepime

D. 45-year-old male with chronic HIV infection (adequately treated with cabotegravir-rilpivirine) presenting with multiple abdominal gunshot wounds receiving TPN

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-693-L01-P

Evaluation of Buprenorphine Use for the Treatment of Opioid Use Disorder at Norton Healthcare Facilities

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Purpose: On December 29, 2022 Congress eliminated the DATA-Waiver Program, also known as the X-Waiver Program, with the signing of the Consolidated Appropriations Act of 2023. Initiation of buprenorphine for the treatment of opioid use disorder (OUD) in the emergency department (ED) along with appropriate outpatient referral has been shown to increase patient engagement in addiction treatment, improve follow-up, and decrease the need for inpatient addiction services. In response to the positive outcomes associated with buprenorphine treatment, the American College of Emergency Physicians have urged clinicians to improve ED access for initiation of buprenorphine for the treatment of OUD. The ED and inpatient settings represent a critical point of opportunity for both patients seeking OUD treatment and clinicians to initiate appropriate treatment while simultaneously providing the necessary foundation to begin the path to recovery. The purpose of this study is to assess the utilization of buprenorphine therapy for the treatment of OUD at Norton Healthcare facilities and evaluate if there is an opportunity for pharmacist involvement to improve the prescribing and referral process. Methods: This retrospective medical chart review was conducted from March 1, 2023 to November 1, 2023 at four community hospitals located in Louisville, KY. The study included patients in the ED or inpatient setting with a primary diagnosis of opioid use disorder. Exclusion criteria included age less than 18 years, incarceration, prescribed buprenorphine, methadone, or naltrexone prior to admission, treated with methadone or naltrexone while admitted, and prescribed buprenorphine, methadone, or naltrexone for an indication that is not an opioid use disorder. The primary outcome was incidence of buprenorphine utilization. Secondary outcomes included use of buprenorphine order sets, criteria met for initiation, alignment with Kentucky law, outpatient referrals, outpatient prescriptions, and readmission rates. Results and Conclusions: To be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the benefits of hospital-initiated buprenorphine with outpatient referral

Recognize the impact of the X-Waiver removal on the prescribing of buprenorphine

Self Assessment Questions:

Hospital initiated buprenorphine for the treatment of opioid use disorder along with outpatient referral is associated with which of the following outcomes?

A. Increased likelihood of patient follow-up

B. Increased readmission rate for treatment of opioid use disorder

C. Decreased use of inpatient addiction treatment services

D. Both A and C

Which of the following changes are a result of the 2023 Consolidation Appropriations Act?

A. Limits the types of providers eligible to prescribe buprenorphine

B. Eliminates the requirement for substance use disorder education for providers

C. Creates an opportunity for states to leverage pharmacists to prescribe buprenorphine

D. Removes provider requirements for the prescribing of methadone for OUD

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-713-L01-P

Cephalexin Discharge Prescriptions and Treatment Failure for Urinary Tract Infections in the Emergency Department

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Purpose: Urinary tract infections (UTIs) are among the most common bacterial infections seen in the emergency department, accounting for 2-3 million emergency department visits each year in the United States. The Infectious Diseases Society of America has published guidelines with recommendations for the treatment of UTIs. Oral beta-lactams are not first-line recommended therapy for UTIs and are considered an alternative and less effective option. The guideline states cephalexin may be an appropriate option in some cases of uncomplicated cystitis. The usual recommended dose of cephalexin according to the FDA package insert is 250-500mg every six hours. It also states that in patients over 15 years of age with uncomplicated cystitis, 500mg every 12 hours may be used. Existing literature has supported the use of either twice daily or four times daily cephalexin in uncomplicated UTIs, but limited data exists for optimal dosing in broader populations often seen in the emergency department, including patients with complicated UTIs or pyelonephritis. The purpose of this study is to examine the heterogeneous prescribing patterns of cephalexin for UTIs at discharge from the emergency department and to compare clinical outcomes.

Methods: This will be a single-center, observational, retrospective, cohort study including 100 patients who were treated for a UTI with cephalexin at discharge from the Loyola University Medical Center Emergency Department. The study will compare outcomes of patients who received standard therapy with those who received non-standard therapy. Standard therapy includes cephalexin 500 mg every 6 hours for 5-7 days for uncomplicated cystitis and 10-14 days for complicated cystitis or pyelonephritis. Non-standard treatment includes regimens where the dose, frequency, or duration deviates from standard treatment. The primary outcome will be incidence of treatment failure. Time to treatment failure and retreatment antibiotic choice, if prescribed, will also be examined.

Results/Conclusions: In progress

Learning Objectives:

Discuss the pathophysiology of urinary tract infections and identify the most frequent causative organisms.

Review the Infectious Diseases Society of America (IDSA) recommendations for the treatment of urinary tract infections.

Self Assessment Questions:

Which organism is most likely to be isolated in a patient with a urinary tract infection?

- A. *Staphylococcus aureus*
- B. *Escherichia coli*
- C. *Proteus mirabilis*
- D. *Enterococcus faecalis*

Which of the following is a first-line therapy for complicated urinary tract infections recommended by the IDSA Guidelines?

- A. Amoxicillin-clavulanate
- B. Cefpodoxime
- C. Amoxicillin
- D. Sulfamethoxazole-trimethoprim

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-518-L01-P

Assessment of Oncology Health Care Professional Well-Being at a Community Cancer Center

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Well-being in health care professionals (HCPs) has become an increasingly emphasized and studied topic in recent years. Certain health care specialties, such as oncology, may carry an especially high risk of poor well-being due to the burdens of caring for a vulnerable patient population with poor prognoses and challenging treatment-related adverse effects. Existing literature on HCP well-being focuses primarily on single-profession studies and is weighted towards large, academic medical centers or entire associations of HCPs across the country. We sought to assess well-being in a multidisciplinary health care team at a community cancer center serving a largely rural population to investigate possible relationships between well-being and such a practice setting. Additionally, we sought to evaluate whether or not there was a need for increased awareness and offering of wellness resources. To accomplish this, we developed a voluntary, anonymous, cross-sectional survey distributed to physicians, advanced practice providers (APPs), nurses, and pharmacists within the center. Data from the survey will be compared to normative data from the Well-Being Index to evaluate if oncology HCPs in this setting exhibit better or worse well-being than the national average. Further exploratory analyses will be performed to assess awareness and utilization of wellness resources and overall interest in potential future wellness opportunities. The results from such a study may help drive future decision-making to support well-being in HCPs at the study cancer center.

Learning Objectives:

Recall key outcomes related to health care professional well-being

Outline strategies to assess health care professional well-being within an institution

Self Assessment Questions:

Which of the following is true regarding existing literature focused on well-being in oncology health care professionals?

- A. Most existing literature assesses multiple health care professional types within individual studies
- B. Most existing literature suggests that oncology health care professionals exhibit better well-being than other specialties
- C. Most existing literature is based on studies from community cancer centers
- D. Most existing literature measures burnout as the primary indicator of well-being

Poor well-being in health care professionals correlates with increased risk of which outcomes?

- A. Reduced job satisfaction and increased turnover
- B. Reduced job satisfaction and reduced salary/wage
- C. Increased turnover and reduced salary/wage
- D. Reduced job performance and reduced turnover

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-874-L99-P

Evaluation of medication reconciliation during transition from the ICU

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A growing collection of evidence links transitions of care (TOC) throughout hospitalization with an increased risk of medication related problems (MRP). Similar rates of MRP occur during transition from an intensive care unit (ICU) to a lower acuity unit compared to admission and discharge. The most common MRP for critically ill patients involve discontinuation of maintenance medications and continuation of medications with ICU-specific indications. The purpose of this research project is to develop a targeted, pharmacist-led intervention that will improve medication reconciliation efforts during TOC in critically ill patients and prevent avoidable medication errors. Pre-intervention data was collected through retrospective chart review to evaluate the appropriate discontinuation of ICU-specific medications and resumption of home medications at ICU stepdown for adult patients admitted to the medical/surgical ICU at UW Health University Hospital between June-August 2023. Patients who were intubated and on stress ulcer prophylaxis (SUP) with no proton pump inhibitor (PPI) or H2-receptor antagonist (H2RA) prior to admission (PTA), on aspirin (ASA) and/or a beta-blocker (BB) PTA, or on a selective serotonin reuptake inhibitor (SSRI) and/or a serotonin-norepinephrine reuptake inhibitor (SNRI) PTA were included. Post-intervention data will be collected to assess efficacy. Approximately 20% of patients continue to receive SUP at ICU stepdown despite having no indication. Between 20-25% of patients continue to have PTA ASA, BB, and/or SSRI/SNRI held at ICU stepdown. Although this may not lead to immediate patient harm, it places patients at an increased risk for long-term adverse effects. Pharmacists hold a critical role in preventing MRP. At UW Health, pharmacists currently perform medication reconciliation at admission and discharge. A formalized process for performing medication reconciliation at ICU stepdown is warranted.

Learning Objectives:

Review the appropriateness of initiating and continuing stress ulcer prophylaxis in critically ill patients.

Discuss the importance of resuming chronic disease medications in the ICU setting when patients are no longer unstable.

Self Assessment Questions:

A patient receiving mechanical ventilation in the ICU was started on stress ulcer prophylaxis. The patient has no other indication for a proton pump inhibitor and was just extubated. What should we do with the patient's stress ulcer prophylaxis?

- A. Decrease the dose since the patient is extubated
- B. Wait to discontinue it until stepdown from the ICU
- C. Discontinue it now since the patient is extubated

D. Continue it even after the patient discharges

What outcome may precipitate if maintenance medications are not resumed?

A. Hospital readmission due to further exacerbation of chronic disease management

B. Increased adherence given fewer medications at discharge

C. No significant outcomes associated with inappropriate medication discontinuation

D. Decreased risk for adverse events following hospital discharge

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-803-L05-P

Pharmacodynamic-optimized dosing of cefepime at 1 gram every 6 hours versus traditional dosing: a comparison of clinical outcomes

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Background: Cefepime exhibits bactericidal activity based on the percent of time the free drug concentration is maintained above the minimum inhibitory concentration (T>MIC). Prevalence of resistant organisms has led to evaluation of optimal cefepime dosing regimens. Based on Monte Carlo Simulation studies, cefepime pharmacodynamics can be optimized by increasing the dose, increasing the dosing interval, or extending the time of administration. There is a lack of literature evaluating which optimization strategy is best. Trinity Health Oakland (THO), Livonia (THL), and Ann Arbor (THAA) recently updated renal dosing guidelines for cefepime in May 2023. Previously, cefepime standard dosing was 2 grams every 12 hours, and now patients with similar renal function instead receive 1 gram every 6 hours to better optimize pharmacodynamics and improve T>MIC. Although the total daily dose received in both groups is the same, there is limited evidence to evaluate the difference in dosing frequencies between 2g q12h vs 1g q6h.

Objective: Evaluate if patients will have similar outcomes when comparing cefepime 2g q12h to 1g q6h.

Methods: Multi-center, retrospective cohort study conducted at THO, THAA, and THL. Critically ill adults admitted 11/1/2022-11/1/2023 receiving cefepime either at 1g q6h or 2g q12h with significant exposure will be included. Patients will be excluded if they are a vulnerable population, have ESRD/dialysis, documented first positive culture result with cefepime resistance, or if cefepime was initiated on a general medical unit before ICU admission. The primary composite endpoint is clinical efficacy, defined as no escalation of treatment needed, no in-hospital mortality, and no readmission to ICU for recurrent infection. Secondary outcomes include: 30-day all-cause mortality and hospital readmission, duration of therapy, ICU and in-hospital length of stay, time on mechanical ventilation and vasopressors, rate of C. difficile infection, and incidence of documented cefepime-related encephalopathy.

Results/Conclusions: To be presented at the conference.

Learning Objectives:

Discuss the pharmacodynamics of cefepime

Describe the available evidence evaluating alternative methods to optimize cefepime pharmacodynamics

Self Assessment Questions:

All the following are strategies to optimize cefepime pharmacodynamics, except:

A. Increasing the dose

B. Increasing the dosing interval frequency

C. Switching to IV push

D. Extending the interval the medication is administered over

In patients with febrile neutropenia, a previous study compared cefepime 1g every 6 hours vs which dosing regimen?

A. 1g every 12 hours

B. 2g every 12 hours

C. 1g every 8 hours

D. 2g every 8 hours

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-617-L01-P

Urine Trouble: Taking Aim at Urinary Bacteremia with Oral Step-down Cephalosporins

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Purpose: Although initial management of gram-negative bloodstream infections (GNBSI) commonly involves intravenous antibiotics, data for utilizing oral agents once a patient is clinically stable is growing. Trimethoprim/sulfamethoxazole and fluoroquinolones have been considered the preferred oral agents for GNBSI with a urinary source due to excellent bioavailability and high concentrations in the urine. Studies comparing oral beta-lactams to fluoroquinolones or trimethoprim/sulfamethoxazole have had mixed results and major limitations, such as being underpowered, lacking qualitative analyses of which beta-lactams were used, and combining all oral beta-lactams together in one group, regardless of their pharmacokinetics, such as bioavailability and urinary excretion. There is little evidence demonstrating definitive efficacy for one oral antibiotic over another. The purpose of this investigation is to compare the efficacy of different oral cephalosporins with varying renal excretion for the treatment of GNBSI from a urinary source.

Methods: This study was a retrospective chart review of adult patients who had GNBSI with a urinary source and transitioned to oral cephalosporin therapy at Indiana University Health Hospital from September 2011 to September 2021. An electronic health record review was conducted to identify patients' baseline demographics and clinical characteristics. Patients meeting the study criteria were compared based on the cephalosporin selected for oral stepdown therapy. Oral cephalosporins were grouped based on urinary excretion, as an unchanged drug, in the following manner: high urinary concentrations (>60%), cephalexin, and cefuroxime; moderate urinary concentrations (30-60%), cefixime and cefpodoxime, and low urinary concentration (<30%), cefdinir. The primary outcome will be all-cause hospital readmission at 30 days. Secondary outcomes are the following: Readmission with positive cultures with the same organism within 30 days or 90 days, all-cause re-admission within 90 days, and all-cause mortality within 90 days.

Summary of results: Data collection is ongoing.

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

Learning Objectives:

Review current literature on oral step-down therapy for bloodstream infections from gram-negative bacteremia from urinary sources.

Recall the renal excretion of commonly used cephalosporins.

Self Assessment Questions:

1. Which, if any, oral antibiotic has consistently shown to be superior in decreasing hospital readmissions when used to treat gram-negative bacteremia from a urinary source?

- A. Ciprofloxacin
- B. Sulfamethoxazole/Trimethoprim
- C. Cephalexin
- D. No oral antibiotic has consistently shown superiority in reducing hospital readmission

What percent of cefdinir is renally excreted?

- A. 0.18
- B. 0.33
- C. 0.5
- D. 0.83

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-606-L01-P

Development of an Oncology Patient Management Program at a Health System Specialty Pharmacy

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Background/Purpose

Accreditation status provides a pathway for specialty pharmacies to demonstrate the ability to provide high-quality patient care. Standards that signify accreditation status establish a foundation for pharmacies to build services upon, and ensure that quality improvement is at the forefront of administrative and clinical services. Patients, providers, and payors can be more confident in the capabilities of accredited specialty pharmacies secondary to rigorous standards ensuring wholistic patient management that encompasses disease activity, quality of life, and financial burden on the patient, to name a few. The purpose of this project is to develop a specialty pharmacy patient management program within oncology that meets the standards established by URAC and ACHC.

Methods

Initially, the accreditation standards for URAC, ACHC, and the ACHC path to distinction in oncology will be reviewed. Then, a baseline assessment of clinical management and documentation for oncology patients within both the specialty pharmacy and the clinical setting will be completed. This assessment will enable the identification of current areas within clinical practice that are noncompliant with accreditation standards or services that overlap between specialty pharmacy and clinic. Finally, collaboration will occur within the leaders of specialty pharmacy and oncology pharmacy services to develop a clinical management practice guideline to define scope and level of services for oncology patients filling at our health system specialty pharmacy.

Anticipated Results

This project will provide a gap analysis identifying areas at risk of noncompliance with accreditation standards as well as a plan for how to correct these gaps to ensure compliance upon accreditation review. Data regarding pharmacist workload, including number of patient management interactions completed each day, will be collected to assess if current resources are sufficient to sustain a specialty pharmacy patient management program within oncology. Lastly, patient adherence will be collected to assess the program's impact on patient outcomes.

Learning Objectives:

Identify programs that provide accreditation certifications to specialty pharmacies.

Recognize focus areas of accreditation standards.

Self Assessment Questions:

Which of the following has an accreditation certification for specialty pharmacy?

- A. Utilization Review Accreditation Commission (URAC)
- B. Accreditation Commission for Health Care (ACHC)
- C. The Joint Commission
- D. All of the above

Which of the following are focus areas of URAC accreditation standards?

- A. Risk Management
- B. Operations and Infrastructure
- C. Patient Service and Communication
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-756-L04-P

The Effect of Pharmacist Driven Empiric Vancomycin De-escalation in Methicillin Resistant Staphylococcus aureus (MRSA) Pneumonia with the Utilization of MRSA Nasal Swabs

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The purpose of this study is to evaluate the effect of the pharmacist driven empiric vancomycin de-escalation protocol on days of vancomycin therapy in pneumonia with the utilization of MRSA nasal swabs. In November 2019, Memorial Hospital of South Bend (MHSB) implemented a pharmacist driven vancomycin de-escalation protocol that allows pharmacists to order MRSA nasal swabs in patients with pneumonia. Per this protocol, with a negative MRSA nasal swab, pharmacists may recommend discontinuing the empiric vancomycin. Vancomycin de-escalation could result in decreased pharmacist workload, cost avoidance, increased patient safety, and the improvement of medication use and stewardship.

Methods: This study was a retrospective analysis to identify patients who were admitted to Memorial Hospital of South Bend from January 1, 2019 through June 30, 2019 and January 1, 2023 through June 30, 2023 who received vancomycin with an indication of pneumonia. The primary outcome was the difference in duration of vancomycin therapy before and after the implementation of pharmacist driven vancomycin de-escalation protocol. Secondary outcomes were the difference in length of stay and difference in rate of adverse drug events. Participants were patients admitted to MHSB and who were at least 18 years of age being treated with empiric vancomycin for a diagnosis of pneumonia from January 1, 2019 through June 30, 2019 and January 1, 2023 through June 30, 2023. Patient characteristics that were collected include demographics, pneumonia diagnosis, signs of infection, receipt of nephrotoxic medications, use and result of MRSA swab, culture results, and more. **Results:** In the pre-protocol group, 93 patients met criteria. In the post-protocol group, 100 patients met criteria. Data collection and analysis is ongoing. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

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

Learning Objectives:

Identify the positive impacts of de-escalating empiric vancomycin.

Explain the role of MRSA nasal swabs in empiric antibiotic de-escalation.

Self Assessment Questions:

Which of the following is NOT a positive outcome of de-escalating vancomycin?

- A. Decreased pharmacist workload
- B. Improved antibiotic stewardship
- C. Increased patient safety
- D. Increased monitoring

MRSA nasal swabs can be useful in which of the following infections?

- A. Osteomyelitis
- B. Ventilator-associated pneumonia
- C. Bacteremia
- D. Endocarditis

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-661-L01-P

Evaluation of Empiric Coverage of Previously Cultured Multidrug Resistant Organisms in Critically Ill Patients Admitted for Sepsis

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Purpose: Multidrug-resistant organisms (MDROs), defined as acquired non-susceptibility to at least one agent in 3 or more antimicrobial categories, have been associated with an increased length of stay and a higher risk of mortality in hospitalized patients. The Infectious Disease Society of America (IDSA) provides guidance on the management of gram-negative MDROs, but states that decisions on empiric treatment in patients with a history of MDROs are outside the scope of their guidelines. Previous MDRO growth can lead to increased use of broad-spectrum empiric antibiotics in subsequent admissions. A lack of evidence exists on the appropriateness of this practice.

Methods: A retrospective, single-center, cohort study will be conducted to evaluate the impact of empiric MDRO antibiotic coverage in patients with a history of resistant organisms on hospital length of stay. Patients will be included in this study if they are 18 years or older, have a history of MDROs, and are admitted to the ICU with sepsis. Those with previous MDRO isolates admitted for a non-infectious diagnosis and those who did not require ICU level care will be excluded. Differences in length of stay will be assessed between two groups of patients: those empirically treated for their historic MDRO and those who were not. Secondary outcomes will include in-hospital mortality, ICU length of stay, need for antibiotic escalation, need for antibiotic de-escalation, and vasopressor duration. Cerner electronic health records will be used for data collection. Results will be evaluated for normality of distribution and appropriate statistical methods will be utilized to compare continuous and categorical variables. All data will use a 95% confidence interval and an alpha of 0.05 for significance.

Results: Data collection is in progress. Results will be presented at the meeting.

Conclusions: Conclusions will be made based on results of this study.

Learning Objectives:

Review the IDSA Guidelines on the Management of Gram-Negative MDROs and their stance on empiric treatment of such organisms.

Identify negative outcomes associated with inappropriate empiric therapy in a patient with a MDRO.

Self Assessment Questions:

The IDSA Guidelines on the Management of Gram-Negative MDROs state that a patient's relevant culture and susceptibility data should be reviewed for the past ____ months.

- A. 12 months
- B. 24 months
- C. 6 months
- D. 2 months

Patients that isolate a MDRO have a higher risk of ____ with inappropriate empiric therapy.

- A. Longer duration of mechanical ventilation
- B. Additional MDROs
- C. Mortality
- D. Ventilator-associated pneumonia (VAP)

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-662-L01-P

Evaluation of Benzodiazepine Dosing Strategies in the Management of Status Epilepticus

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Purpose: Status epilepticus (SE) is a medical emergency associated with significant morbidity and mortality. All available guidelines recommend benzodiazepines as first-line therapy due to their rapid efficacy in aborting seizure activity. Though guidelines provide recommended benzodiazepine dosing strategies, these drugs are often underdosed in clinical practice, possibly contributing to treatment failure. The purpose of this study is to evaluate the impact of initial benzodiazepine dosing strategies in SE on seizure cessation.

Methods: A retrospective chart review of electronic medical record (EMR) data will be conducted for patients presenting to the emergency department of Carle Foundation Hospital with a diagnosis of SE from January 2018 to September 2023. Adults and children at least 2 years of age or older who received at least one dose of parenteral benzodiazepine (either lorazepam or midazolam) will be included. Parenteral diazepam is also an appropriate first-line agent, but will not be evaluated as it is not available institutionally. The primary outcome will be to analyze the rate of treatment failure with initial benzodiazepine dosing in SE. Treatment failure will be defined as the receipt of greater than 2 doses of benzodiazepine and/or the initiation of an injectable second-line antiepileptic drug (AED). Secondary outcomes will include ICU admission, hospital length of stay, incidence of endotracheal intubation, and incidence of mortality at 28 and 90 days.

Results: In progress

Conclusion: In progress

Learning Objectives:

Review guideline-recommended first-line therapies for the treatment of status epilepticus

Discuss optimal dosing of benzodiazepines and its impact on patient outcomes in status epilepticus

Self Assessment Questions:

Which of the following is a benzodiazepine regimen endorsed by societal guidelines for initial treatment of status epilepticus?

- A. IV midazolam 5 mg for a patient < 40 kg
- B. IV midazolam 10 mg for a patient > or equal to 40 kg
- C. IV lorazepam 0.1 mg/kg (maximum 4 mg)
- D. IM lorazepam 0.1 mg/kg (maximum 4 mg)

Why is it postulated that benzodiazepines are often underdosed in clinical practice by providers?

- A. Lack of availability of benzodiazepines
- B. Concern for respiratory depression
- C. Difficulty to establish intravenous access
- D. Availability of other antiepileptic drugs

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-695-L01-P

Provider Satisfaction of a Pharmacist Transition of Care Service

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Transitions of care (TOC) remain a focus with the goal of improving outcomes and reducing patient readmissions. The University of Michigan Healthcare System uses LACE (Length of Stay, Acuity of Visit, Comorbidities, Emergency Department visit in past 6 months) scoring to identify patients at risk for readmission. Upon discharge, patients receive a phone call from a care navigator within 2 business days, a pharmacist within 3-6 days and follow-up with a medical provider for a TOC appointment within 2 weeks. The pharmacist visit is documented in a pharmacist TOC note which is then sent to the medical provider managing the TOC visit. During the pharmacist call, a medication history and reconciliation is completed, symptom and drug interactions are reviewed and recommendations to optimize patients' therapy are provided. Our objectives are to assess provider satisfaction with the TOC notes; to determine what part of TOC documentation providers find most useful; to determine if improvements in the TOC documentation are warranted; and to determine provider satisfaction with pharmacist TOC services as a whole.

This is a descriptive cross-sectional study that will assess provider satisfaction through a REDcap® survey. The eligible survey population will be all providers who work in general medicine discharge clinics, including attendings, residents, and advanced practice providers. Survey questions will include demographic data (provider type, area of practice, years in practice), provider satisfaction with various parts of the pharmacist TOC note documentation, and perceived usefulness of the TOC documentation using a mix of Likert scale and open-ended questions. The primary outcome measured will be overall provider satisfaction. Secondary measured outcomes will include satisfaction by provider type, area of practice of provider, and years in practice of provider. Descriptive and bivariate analyses will be conducted. Data collection is ongoing, but results will be available at time of presentation.

Learning Objectives:

Recognize the importance of pharmacists in the transition of care process

Describe the ways in which pharmacists can assist in the transition of care process

Self Assessment Questions:

Which of the following was NOT evaluated in pharmacist transition of care notes?

- A. Medication Reconciliation
- B. Blood Pressure Testing
- C. Cost of Medications
- D. PHQ-9

Ideally, when should recently discharged patients be seeing a pharmacist?

- A. Within 1-3 days of discharge
- B. Within 3-7 days of discharge

C. 7+ days after discharge
D. Anytime after they see the physician for follow-up
Q1 Answer: D Q2 Answer: B
ACPE Universal Activity Number 0121-9999-763-L04-P

Impact of Pharmacist-driven Patient Education on All-cause Readmissions in Patients with Heart Failure

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Purpose: In the past decade there has been an increased focus on decreasing heart failure (HF) readmission rates in hospitals, though few interventions have been proven to be effective. One proposed method to combat high HF readmission rates is the implementation of transitions-of-care (TOC) programs, which often focus on patient education, medication reconciliation, and care coordination among healthcare providers. Pharmacists are uniquely equipped to assist with these services. The purpose of this study was to evaluate the impact of a newly implemented pharmacist-driven patient education service on 30-day all-cause readmission rates in patients with heart failure.

Methods: A single center, pre-post study was conducted at a 433-bed community hospital located in Lexington, Kentucky. Adult patients admitted with an active hospital problem of heart failure were included in the study. Patients in hospice/palliative care, incarcerated patients, patients with an admission of ≤ 24 hours, patients requiring transfer to another acute care facility, and patients who expired during index admission, and patients who left the hospital against medical advice were excluded. Electronic medical records were used to collect information on patients during their admission. Patients were stratified into two groups, pre-intervention (those admitted between December 1, 2022 and February 28, 2023) and post-intervention (those admitted between August 1, 2023 and January 31, 2024) to assess for differences in 30-day all-cause readmission rates. Secondary outcomes included 30-day heart failure-related readmissions, number and type of pharmacy interventions completed, and utilization of bedside medication delivery service. Data was evaluated for normality of distribution and appropriate statistical methods were utilized to compare continuous and categorical variables. All data used a 95% confidence interval and an alpha of 0.05 for significance.

Learning Objectives:

Discuss strategies that have been implemented to address the problem of high heart failure readmission rates
Describe the role that pharmacists play in heart failure transitions of care

Self Assessment Questions:

What is the Hospital Readmissions Reduction Program (HRRP)?

- A. A program implemented by an individual hospital to identify areas for improvement in transitions of care, with the goal of reducing readmission rates
- B. A program implemented by the Joint Commission which sets forth core standardized performance measures for hospitals
- C. A program implemented by the Centers for Medicare and Medicaid Services (CMS) designed to incentivize hospitals to improve care coordination and, in turn, reduce avoidable readmissions
- D. A program implemented by the American Heart Association (AHA) that promotes consistent adherence to the latest research-driven guidelines in a effort to prevent avoidable readmissions

Which pharmacist-led intervention has been most frequently evaluated in the literature with regard to readmission rates in the population of heart failure patients?

- A. Medication reconciliation
- B. Patient education/counseling
- C. Bedside medication delivery
- D. A combination of multiple transitions-of-care interventions

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-829-L01-P

Enhancing Heart Failure Care: Implementation of Clinical Pharmacy Services Within an Existing Heart Failure Clinic

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Warfarin and INR monitoring services provided by anticoagulant clinics may decline as the affordability of Direct Oral Anticoagulants (DOAC) increases. As a result, anticoagulation clinics will need to diversify services. One opportunity is to expand services to heart failure management.

Heart Failure guidelines recommend the use of Guideline-Directed Medical Therapy (GDMT) to aid in management of reduced ejection fraction heart failure (HFrEF). Guidelines emphasize the need and utilization of clinical pharmacy services in this patient population by counseling, monitoring, and optimizing medications based on patient factors. The purpose of this pilot study is to assess the viability and effectiveness of incorporating heart failure management services into an established anticoagulation clinic by describing challenges and alternative strategies used when integrating these services.

This is a single center, prospective pilot study conducted within an anticoagulation clinic. Patients were referred from Indiana University Health Bloomington Hospital cardiology providers. Patients that were included are 18 years and older, have been seen by a cardiologist at the Indiana University Health Cardiology Clinic, referred to pharmacy services from January 2024 to May 2024, and have a diagnosis of heart failure with an ejection fraction of less than 40%. Patients will be excluded if they were referred by a non-Indiana University Health cardiologist, are in hospice, nursing home, long-term care or palliative care, diagnosis of dementia, or a diagnosis of stage D/advanced heart failure on intravenous inotropic therapy. The primary outcome of this study is the number of patients on optimized GDMT. Secondary outcomes include patients on each GDMT medication class (RAAS inhibitors, Beta Blockers, mineralocorticoid receptor antagonist (MRA), SGLT2 inhibitors) and number of interventions. Outcomes will be compared to pre-study medication use evaluation (MUE) data.

Final results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the American Heart Association (AHA) and American College of Cardiology (ACC) ACC/AHA recommendations for appropriate heart failure management
Recognize operational considerations required in the development of a heart failure clinic

Self Assessment Questions:

According to 2022 ACC/AHA Guidelines, which medication has been shown to decrease morbidity and mortality in heart failure patients?

- A. Lisinopril

- B. Metoprolol Tartrate
- C. Furosemide
- D. Amlodipine

Which of the following is an example of an operational consideration required in the development of a heart failure clinic?

- A. Confirmation of heart failure diagnosis
- B. Ensuring all patients are optimized/initiated on GDMT
- C. Appointing appropriate clinic leadership
- D. Providing resources and educational materials to patients and caregivers

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-684-L01-P

Impact of Using Actual Body Weight for Obese Compared to Non-Obese Breast Cancer Patients Receiving Carboplatin Dosed Using the Cockcroft-Gault Equation

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Purpose: Carboplatin has a higher risk of causing myelosuppression when given at higher doses. Because carboplatin is dosed based on renal function, typically using the Cockcroft-Gault equation, obese patients are at a higher risk of myelosuppressive effects due to the higher doses used. The purpose of this study is to determine if obese patients receiving carboplatin-based therapy for breast cancer have higher incidences of myelosuppression when actual body weight is used.

Methods: A retrospective, multicenter, cohort study will be conducted to assess the outcomes in obese compared to non-obese breast cancer patients receiving carboplatin dosed from using their actual body weight at multiple outpatient chemotherapy centers in Kentucky. Patients will be included in this study if they were 18 years or older and were receiving carboplatin, docetaxel, trastuzumab, pertuzumab regimens for breast cancer. Other breast cancer regimens were excluded due to potential confounding from cytotoxic effects of other chemotherapy agents. Patients who received concurrent radiation therapy, died during Cycle 1, and vulnerable patients were excluded. Electronic health records will be used to collect information on patients during their chemotherapy regimens. Patients will be stratified into two groups, including those who were considered obese based on body mass index versus those who were not considered obese with an appropriate body mass index. Data will be evaluated for normality of distribution and appropriate statistical methods will be used to compare continuous and categorical variables. All data will use a 95 percent confidence interval and an alpha of 0.05.

Results: Data collection is in progress. Results will be presented at the meeting.

Learning Objectives:

Discuss the consequences of carboplatin-induced myelosuppression.

Describe the utility in using different body weights when calculating a dose of carboplatin when using the Calvert Formula.

Self Assessment Questions:

The NCCN guidelines recommend which of the following weights to be used when calculating a carboplatin dose using the Calvert Formula?

- A. Adjusted body weight
- B. Ideal body weight
- C. Actual body weight
- D. None of the above

Which of the following has the highest incidence when in relation to carboplatin dosing?

- A. Thrombocytopenia
- B. Anemia
- C. Leukopenia
- D. Neutropenia

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-683-L01-P

Evaluation of Bevacizumab-Related Hypertension and Proteinuria and Treatment Response in Gynecologic Cancer

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Bevacizumab is a medication used to treat many solid tumors including gynecologic malignancies. It binds to vascular endothelial growth factor (VEGF) and prevents binding to the VEGF receptors, which inhibits endothelial cell proliferation and angiogenesis. Bevacizumab has a high incidence of adverse events, including hypertension (HTN) and proteinuria (PTU). It is hypothesized that the mechanism of these adverse events is related to the mechanism of action, and some previous trials have demonstrated a correlation between HTN and PTU with bevacizumab efficacy in other cancers, such as metastatic colorectal cancer and glioblastoma. Available data regarding PTU or HTN as a biomarker of response in gynecologic malignancies treated with bevacizumab is limited. This study aims to compare disease outcomes in patients receiving bevacizumab for gynecologic malignancies who experience PTU and/or HTN versus patients who receive bevacizumab but do not experience these toxicities.

This single-health system, retrospective, observational study will be conducted at UC Health, including patients at the University of Cincinnati Medical Center (UCMC) and West Chester (WCH) hospitals. Participants to be included must be at least 18 years of age with a confirmed gynecologic malignancy who received at least two cycles of bevacizumab at UCMC or WCH. Exclusion criteria include pregnancy, hemodialysis during bevacizumab treatment, uncontrolled HTN at baseline, or significant PTU at baseline. Eligible patient records will be included between August 2014 and August 2023.

The primary outcome will be comparing progression free survival between patients who develop bevacizumab related HTN and/or PTU and those who do not develop these toxicities. Secondary outcomes include but are not limited to objective response rate, overall survival, and disease control rate compared between groups.

Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Residents Conference in April 2024.

A conclusion will be forthcoming based on results.

Learning Objectives:

Review the available literature surrounding bevacizumab related adverse effects as markers of treatment efficacy.

Describe the clinical impact the results will have treatment outcomes in gynecologic malignancies.

Self Assessment Questions:

Which of the following statements is true regarding the data for bevacizumab related HTN/PTU as a marker of treatment response?

- A. Data in metastatic colorectal cancer has demonstrated a correlation between development of bevacizumab related HTN/PTU and improved treatment outcomes.
- B. Data in glioblastoma has demonstrated a correlation between development of bevacizumab related HTN/PTU and improved treatment outcomes.
- C. Data in gynecologic malignancies is limited.
- D. All of the above are true.

Which of the following is a primary objective of this research project?

- A. Compare overall survival between patients who do vs do not develop bevacizumab related HTN/PTU.
- B. Compare objective response rate between patients who do vs do not develop bevacizumab related HTN/PTU.
- C. Compare progression-free survival between patients who do vs do not develop bevacizumab related HTN/PTU.
- D. Compare disease control rate between patients who do vs do not develop bevacizumab related HTN/PTU.

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-649-L01-P

Evaluation of Continuous Infusion Ketamine Monotherapy versus Standard of Care for Sedation in Mechanically Ventilated Patient

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Ketamine is an N-Methyl-D-Aspartate receptor antagonist with activity at the mu, kappa, and delta opioid receptors and nicotinic, muscarinic, and cholinergic receptors. Multiple physiologic targets are responsible for ketamine's multitude of off-label indications including depression, post-traumatic stress disorder, analgesia, and sedation. Ketamine continuous intravenous infusion (CIVI) for sedation provides an alternative mechanism of action with potential fewer side effects (e.g., respiratory depression and hypotension) than guideline recommended sedatives. Current literature describes adjunctive CIVI ketamine's effect on reducing concurrent CIVI analgesic and sedative requirements. However, no comparator trials assess efficacy and safety of CIVI ketamine for sedation monotherapy. This study aims to evaluate the effect of CIVI ketamine versus standard of care (propofol or dexmedetomidine) in mechanically ventilated patients.

This two-center, retrospective study includes adult, mechanically ventilated patients who received ≥ 12 hours of CIVI sedative monotherapy (ketamine, propofol, or dexmedetomidine) and were admitted to an academic, quaternary referral center between January 1, 2013, and October 31, 2023. Exclusion criteria included CIVI ketamine for non-sedation indications; CIVI neuromuscular blockade for ≥ 4 hours; CIVI benzodiazepines during sedation monotherapy, pregnancy, and incarceration. The primary outcome was the proportion of Richmond Agitation Sedation Scale (RASS) scores within goal at 24 hours. Secondary outcomes included proportion of RASS scores undersedated, oversedated, proportion of CPOT scores at goal, and ventilator- and delirium-free days. Safety outcomes including hypotension, hypertension, bradycardia, and tachycardia were also reported. Outcomes were compared using Chi-square or Fisher's exact test for categorical data and Student's t-test or Wilcoxon Rank Sum for continuous data, as appropriate. Outcomes will be described in a matched and non-matched cohort. Case match criteria includes baseline RASS score, traumatic brain injury status, receipt of concomitant CIVI opioids, and age.

Data collection and analysis is ongoing. Final results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the mechanism of action of ketamine for sedation.

Describe risks associated with administration of guidelines recommended continuous infusion sedatives (propofol and dexmedetomidine).

Self Assessment Questions:

Which of the following is a mechanism of action of ketamine?

- A. Mu, kappa, and delta receptor antagonism
- B. NMDA receptor antagonism
- C. GABA agonism
- D. Alpha-2 receptor agonism

Which of the following is a risk associated with continuous infusions of guideline recommended sedatives such as propofol or dexmedetomidine?

- A. Respiratory depression
- B. Hypertension
- C. Tachycardia

D. Hyperthermia
Q1 Answer: B Q2 Answer: A
ACPE Universal Activity Number 0121-9999-668-L01-P

Evaluation of Same-Day vs Next-Day Administration of Prophylactic Pegfilgrastim in Fluoropyrimidine-Based GI Cancer Treatment

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Background: Despite the increase in prevalence of immunotherapy, the standard of care in the treatment of many gastrointestinal (GI) cancers remains to be fluoropyrimidine-based regimens. These regimens, while effective, carry a noteworthy risk for development of neutropenia, brought on by bone marrow suppression. Pegfilgrastim is a granulocyte-colony stimulating factor (GCSF) used to prevent chemotherapy-induced neutropenia. Historically, all GCSFs including pegfilgrastim are administered 24 hours following the administration of the last chemotherapeutic agent. Despite the widely practiced policy of delayed GCSF administration by 24 hours from chemotherapy, there is little literature to support the necessity of a practice in the setting of GI cancers. The mechanism of the aforementioned toxicity is theoretical and has never been fully supported or identified in literature nor in clinical trials.

Purpose: The primary purpose of this study is to compare same-day administration of pegfilgrastim based GCSF to next day administration in terms of safety, efficacy, and cost to institution. Pegfilgrastim biosimilar pegfilgrastim-cbqv and pegfilgrastim on-body applicator are the two most commonly used GCSFs used for the prevention of chemotherapy-induced neutropenia at all NCI facilities and will be the focus of this study.

Methods: A multicenter, retrospective chart review of patients who received pegfilgrastim-based GCSF for an associated GI cancer treated with FOLFOX, FOLFIRI, FLOT, or FOLFIRINOX chemotherapy from December 11, 2021 to December 11, 2023 at NCI. The primary outcome for the study is the development of febrile neutropenia while receiving GCSF; secondary outcomes are grade 3-4 neutropenia and institutional cost for each GCSF modality. The exclusion criteria were patients < 18 years old, pregnant women, patients enrolled in clinical trials during GCSF administration, and patients who did not receive either pegfilgrastim-cbqv or pegfilgrastim on-body applicator as their form of GCSF.

Results: Results pending

Conclusions: Pending results

Learning Objectives:

Describe the practical concerns associated with next-day growth factor administration
Explain the rationale for investigating same-day administration of growth factor in GI cancers

Self Assessment Questions:

Which of the following is a potential concern regarding use of on-body growth factor applicators?

- A. Increased drug interactions
- B. Device failure
- C. Decreased drug clearance
- D. Increased spontaneous bleeding

Why is there minimal concern for same day admin of GF in GI cancer treatment?

- A. GI Cancer regimens contain no myelosuppressive agents
- B. GI cancer treatment is always given with steroids
- C. Circulating 5FU is considered minimally myelosuppressive during pump unhook
- D. Neutropenia induced by GI cancer treatments is transient and self-limiting

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-748-L01-P

Reducing 30-day Readmission Rates for Admitted Patients on Inhalers Through the Use of Education and Improved Medication Accessibility

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Purpose:

The purpose of this study was to decrease 30-day readmission rates at a local community hospital through pharmacy-provided education on proper inhaler use, procurement of a 30-day supply of respiratory medication prior to discharge, and phone-based patient follow-up within 15 days of discharge.

Methods:

This retrospective study was conducted at a single center, 156-bed community hospital from August 2023 to November 2023. Patients on inhalers were identified upon admission by medication history technicians and inhaler education was performed by a pharmacy student, a pharmacy resident, or a pharmacist. If pharmacy identified accessibility concerns, the pulmonology providers were consulted to determine alternative regimens. The outpatient pharmacy verified co-pays. The primary outcome was percent of all-cause readmissions after 30 days.

Results:

The proportion of subjects readmitted in the pre- versus post-intervention groups was 7.7% vs 4.7% ($p = 0.0242$). Subjects in the pre-intervention group were nearly twice as likely to be readmitted within 30 days (OR= 1.7, 95% CI = 1.07 to 2.66). Of the patients who met inclusion criteria ($n = 191$), 72.7% received education prior to hospital discharge. Sixty percent of patients were contacted via phone call within 15 days of discharge. Inhaler therapy was adjusted for eight patients prior to discharge. Of the 13 readmissions in August 2023, three were included in this study and one was a pulmonary diagnosis. Of the 14 readmissions in September 2023, five patients were included in this study, and one was a pulmonary diagnosis.

Conclusion:

This study confirms that 30-day readmission rate reduction was statistically significant following pharmacy-led intervention through increased education and inhaler accessibility. Additionally, the inhaler education and post-discharge follow-up with patients were proven to be clinically significant. Further comparison of pre- and post-intervention readmission rates is warranted to fully assess the impact of these initiatives on 30-day readmission rates.

Learning Objectives:

Discuss updated GOLD guidelines for choosing the appropriate inhaler device.

Recognize the impact of pharmacist-led inhaler education and accessibility on 30-day hospital readmission rates.

Self Assessment Questions:

1. According to the GOLD 2023 Report, select all that apply of which are best principles when choosing appropriate inhalation device choice for patients. a. Patient's cognition, dexterity, and strength b. Shared decision making c. Availability of the drug in the device d. Cost of the drug in the device e. Prescribing devices unfamiliar to the care team

- A. A and B
- B. C, D, and E
- C. A, B, C, and D
- D. B only

2. What positive outcomes are associated with achieving good adherence (>80%) to inhaled therapy for patients with Chronic Obstructive Pulmonary Disease (COPD)?

- A. Increased frequency of exacerbations and hospitalization
- B. Worsening lung function and reduced quality of life
- C. Higher economic and societal burdens from COPD
- D. Less frequent exacerbations, hospitalization, and emergency room (ER) visits, along with improvements in lung function and quality of life

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-623-L01-P

LAMA, LAMA, COPD Patients Need a LAMA: Evaluation of Optimization of Respiratory Therapy in COPD Patients Using a Comprehensive Scoring System in the Electronic Health Record

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Purpose: Henry Ford Hospital (HFH) has created a comprehensive scoring system within the electronic health record to prioritize workload and identify interventions. The scoring system consists of variables with a tiered point system and is the standard of care for clinical pharmacists' workflow. One of the variables identifies patients with chronic obstructive pulmonary disease (COPD) exacerbation so that a pharmacist can intervene in their management. This study evaluates the use of the scoring system on optimization of inhaled therapy for patients with COPD.

Methods: This is a retrospective quasi experiment evaluating the effectiveness of a pharmacist directed scoring system at HFH in Detroit, MI. We will be comparing outcomes on general practice units (GPU) floors that have the COPD variable of the scoring system active compared to inactive. Patients included will be ≥18 years old, discharged between 11/1/23 - 4/1/24, admitted > 48 hours in the GPU, have an encounter diagnosis of COPD exacerbation, and received any intravenous or oral steroid equivalent to oral prednisone > 40 mg. The primary outcome will be proportion of patients discharged on long-acting muscarinic antagonist (LAMA) therapy. Secondary outcomes will be amount of discharge medication cost inquiries sent for LAMA therapies by a pharmacist, referrals sent to the pharmacist lead pulmonary ambulatory care clinic, amount of patients readmitted to or presenting to any facility within 30 days for COPD exacerbation, and to correlate patient's average total daily score to length of stay. This study aims to include 194 patients to detect a difference of 20% in primary outcome with a power of 0.80. Comparisons of continuous data will utilize a student's T-test for parametric data and Mann-Whitney U-test for non-parametric data. Comparison of single variable outcomes will utilize a simple linear regression.

Results: Results and conclusions will be presented at GLPRC.

Learning Objectives:

Define the pharmacist's role in optimizing COPD management

Relate the use of a system-wide electronic scoring system to improved patient outcomes

Self Assessment Questions:

What is one intervention a pharmacist can make to assure appropriate COPD therapy is prescribed and to prevent COPD exacerbation readmission?

- A. Assess inhaler technique and provide education as needed
- B. Assume that because the patient has insurance that their inhalers have an affordable copay
- C. Recommend separate inhalers for each inhaled therapy drug class
- D. Let the medical team review correct inhaler technique with the patient

What is one of the requirements for a patient to be identified as having a COPD exacerbation within the scoring system?

- A. Received one dose of doxycycline 100 mg
- B. Prescribed LAMA therapy prior to admission
- C. Received one dose of prednisone 40 mg
- D. Past medical history diagnosis of COPD

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-625-L01-P

Intravenous Acetaminophen Medication Use Evaluation in a Large Community Health System

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Purpose

Intravenous acetaminophen is priced higher than comparable agents, with limited evidence to justify use. To that end, health systems have adopted formulary criteria indicating certain circumstances where intravenous acetaminophen may be used due to high costs associated with use. This study's overall purpose is to evaluate adherence to criteria for intravenous acetaminophen and appropriateness of alternative uses in a large health system.

Methods

A multi-center, retrospective cross-sectional chart review was conducted at a large health system. Patients were included if intravenous acetaminophen was ordered and administered between April 1, 2023, and March 31, 2023. Patients were excluded if they were neonatal intensive care patients receiving intravenous acetaminophen for patent ductus arteriosus or oncology patients undergoing cytoreductive therapy with hyperthermic intraperitoneal chemotherapy. A total of 16,253 orders were identified as an initial population. A sample population of 300 patients was calculated, assuming 30% of orders deviated from formulary criteria. The primary outcome measured overall compliance, individually and in aggregate, with health system policy. This was assessed by comparing patient-specific uses to P&T-approved criteria. P&T approved criteria included for assessment consists of (1) single doses for all surgical patients, (2) intensive care unit (ICU) patients at high risk for elevated intracranial pressure requiring rapid temperature reduction, (3) an alternative to intravenous ketorolac in patients receiving intrathecal narcotics for colorectal surgeries for up to 24 hours, (4) as needed for post-operative orthopedic patients for up to 24 hours, and (5) up to 4 doses for patients 65 years of age or older with hip fracture.

Summary of Results/Conclusions

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

Learning Objectives:

Outline formulary restrictions that guide use of intravenous acetaminophen in a community health system.

Identify uses of intravenous acetaminophen that deviate from a large health system's formulary restrictions.

Self Assessment Questions:

Which of the following is NOT an approved criteria for intravenous acetaminophen?

- A. One peri-operative dose for all surgical patients
- B. ICU patients at risk of increased intracranial pressures requiring rapid reduction of temperature
- C. Intubated patients without enteral or rectal access requiring rapid reduction of temperature
- D. Hip fracture patients that are 65 years of age or older

Which of the following orders does NOT qualify for use of intravenous acetaminophen per P&T criteria?

- A. An order allowing PRN peri-operative doses for a surgical patient
- B. An active order for 24 hours allowing PRN administration to post-operative orthopedic patients
- C. Ordered as an alternative to intravenous ketorolac in patients receiving intrathecal narcotics for colorectal surgery
- D. A PRN order allowing up to 4 doses for hip fracture patients 65 years of age and older

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-769-L04-P

Justification of a Pharmacist Managed Intranasal Esketamine Clinic

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Purpose: Suicide is the fourth leading cause of death in 15-29-year-olds. Intranasal esketamine received fast track and breakthrough therapy designation from the FDA for major depressive disorder with suicidal ideation in conjunction with an oral antidepressant. As of 2023, there are no other medications approved for emergent treatment of patients with active suicidal ideation. Current first line therapies take weeks for full effect. However, esketamine results can be seen as quickly as two hours. The objective of this study is to assess whether implementing an intranasal esketamine clinic would be beneficial at UW Health SwedishAmerican Hospital.

Methods: This study is a single-system, retrospective chart review assessing the number of patients eligible to receive intranasal esketamine at UW Health SwedishAmerican Hospital. Calculation of potential cost-savings with esketamine administration will also be completed. Electronic health records will be used to identify patients who presented to the emergency department who were then admitted to the Center for Mental Health for suicidal ideation from July 1, 2022 to June 30, 2023. Patients will be excluded if they are pregnant or breastfeeding, admitted from jail, or if they met any of the criteria that would disqualify them from receiving esketamine. The data collected will include age, gender, allergies to esketamine, ketamine, or its excipients, length of hospital stay, number of readmissions for suicidal ideation within the time frame, previous and current medication use, comprehensive metabolic panel, urine drug screen, blood pressure, and past medical history.

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

Learning Objectives:

Describe the appropriate administration and monitoring process of esketamine

Identify the appropriate eligibility criteria for a patient to receive esketamine

Self Assessment Questions:

What is the proper dose administration of esketamine?

- A. Healthcare-administered, Intranasal esketamine without post-administration monitoring
- B. Healthcare-administered, Intranasal esketamine with 2 hours post-administration monitoring
- C. Self-administered, Intranasal esketamine without post-administration monitoring
- D. Self-administered, Intranasal esketamine with 2 hours post-administration monitoring

A 28 y/o male with no known drug allergies and a history of substance abuse (cocaine, last used 5 years ago) and major depressive disorder (MDD) and bipolar who presents to the ED for suicidal ideation. His vital signs and lab work was all within normal limits. Is this patient eligible to receive esketamine?

- A. Yes, he is eligible.
- B. No, he is ineligible due to history of substance abuse
- C. No, he is ineligible due to his bipolar diagnosis
- D. No, he is ineligible since esketamine is only indicated for treatment resistant MDD

Q1 Answer: D Q2 Answer: C

Assessing impact of initiating MRSA nasal PCR in the emergency department on days of vancomycin therapy at a tertiary care facility.

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Purpose: Vancomycin is a commonly used antibiotic for empiric methicillin resistant Staphylococcus aureus (MRSA) coverage. Vancomycin has a dose-dependent risk of acute kidney injury and requires close pharmacokinetic monitoring with trough levels. MRSA nasal PCR is an effective way to de-escalate anti-MRSA therapy in pneumonia patients due to its high negative predictive value for pneumonia. The 2019 IDSA guidelines for community-acquired pneumonia (CAP) recommend addition of MRSA coverage for patients that have had prior respiratory isolation of MRSA, locally validated risk factors or hospitalization in the last 90 days with administration of IV antibiotics. 50% of Staphylococcus aureus isolates at Aultman Hospital are MRSA. Aultman Hospital does not initiate the MRSA nasal PCR orders until the patient is admitted and started on vancomycin therapy. There is some recently published data to support use of MRSA nasal PCR for deescalating of therapy for skin and soft tissue infections (SSTI). Methods: This study is a single center, retrospective, case control study of adults started on vancomycin therapy in the ED. The primary objective of this study was to determine the impact of performing early MRSA nasal PCRs upon initiation of vancomycin therapy in the ED on days of therapy for pneumonia (56 patients). Data gathered included number of doses administered, days of therapy, interval between PCR result and discontinuation of vancomycin and number of duplicate PCR performed. The secondary objective of this study was to determine the positive and negative predictive value of the MRSA nasal PCR for SSTIs (145 patients). Data gathered included results of MRSA PCR, results of wound cultures, sensitivities of cultures positive for Staphylococcus aureus and layer of wound cultures were obtained from (deep/surface/operative). Data and statistical analysis are in progress. Results and conclusion will be reported at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review the IDSA Guidelines for MRSA coverage in community-acquired pneumonia.

Recall monitoring parameters for vancomycin.

Self Assessment Questions:

Which of the following would warrant covering for MRSA in community acquired pneumonia?

- A. Admitted to the hospital 30 days prior
- B. Admitted to the hospital 30 days prior and administered IV antibiotics
- C. Prior respiratory isolation of Staphylococcus aureus that was oxacillin susceptible
- D. None of the above

True/False: vancomycin requires regular monitoring with trough levels due to risk of acute kidney injury.

- A. TRUE
- B. FALSE
- C. All of the above
- D. None of the above

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-667-L01-P

Retrospective Evaluation of Topical Tranexamic Acid Irrigations in Decreasing Blood Loss During Spinal Fusion Surgeries

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Spinal fusion surgeries are associated with an increased risk of perioperative blood loss. The current literature supports the safety and efficacy of intravenous tranexamic acid use during spinal surgeries when expecting a significant amount of blood loss. However, there is limited literature available regarding the use of topical tranexamic acid diluted with normal saline as an irrigation during the spinal fusion procedure. The purpose of this study is to determine if the application of topical tranexamic acid for surgical field irrigation decreases perioperative blood loss in patients undergoing spinal fusion surgery. A report was used to identify all adult patients who underwent spinal fusion surgery at McLaren Greater Lansing between January 2021 and December of 2023. A retrospective review of surgeries was limited to a surgeon who utilizes normal saline for surgical wound irrigation and another surgeon who uses topical tranexamic acid diluted in normal saline. Of this group, 100 surgeries were randomly selected for evaluation, 50 where normal saline was used for irrigation and 50 where 1000 mg of tranexamic acid was diluted in 1100 mL of normal saline. Patients were excluded if they were under 18 years old, pregnant, or incarcerated. The primary objective was to evaluate blood loss which was evaluated by decreased hemoglobin (Hgb) levels, transfusion incidence, and surgical drain output. The secondary objective was the length of the hospital stay. Preliminary results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference as the data collection and analysis are still ongoing.

Learning Objectives:

Identify the mechanism of action by which tranexamic acid decreases bleeding in patients undergoing orthopedic surgery.

List parameters that can be used to evaluate blood loss in patients post spinal fusion surgery.

Self Assessment Questions:

The following parameters are utilized to evaluate perioperative blood loss in spinal surgeries:

- A. Hemoglobin levels
- B. Transfusion incidence
- C. Surgical drain output
- D. All of the above

Which of the following is the correct mechanism of action for tranexamic acid?

- A. Prothrombin complex which provides coagulation factors II, VII, IX, X, protein C and S
- B. Inhibits fibrinolysis by displacing plasminogen from fibrin
- C. Binds to factor Xa inhibitors
- D. It is a monoclonal antibody fragment which binds to dabigatran at a higher affinity than thrombin

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-664-L01-P

DOACs and drug-drug interactions: Are we missing anything?

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Purpose and Background: Direct oral anticoagulants (DOACs) are becoming the most prescribed drugs for preventing ischemic stroke in patients with atrial fibrillation (AF) and for the treatment and prevention of venous thromboembolism (VTE). The safety profile of DOACs is compromised due to drug-drug interactions. Strong inhibitors of permeability glycoprotein (P-gp) and Cytochrome P450 3A4 (CYP3A4) increase bleeding risk whereas inducers increase the risk of treatment failure. This study's purpose is to identify missed drug-drug interactions of DOACs and their effects to improve patient care.

Methods: This is an IRB-approved retrospective cohort analysis of patients discharged on DOACs with concomitant P-gp and CYP3A4 inducers or inhibitors starting October 1st, 2022, until March 30th, 2023. This study examined patients taking apixaban or rivaroxaban in combination with one or more of the inhibitors or inducers listed in the inclusion criteria. Patients were included if they were 18 or older, if the anticoagulant indication was either acute treatment of VTE or pulmonary embolism (PE), primary or secondary prophylaxis for VTE, AF, or peripheral artery disease (PAD). The primary outcome is to quantify the proportion of patients on these interacting drug combinations inpatient and on discharge. The secondary outcome is to evaluate if any adverse events were associated with the drug-drug interactions during admission and up to 180 days after discharge. Descriptive statistics will be used to describe the patient population. Categorical variables will be compared via Chi-square or Fisher's exact test. Continuous variables will be compared with the Student's t-test.

Results and conclusion: Will be reported at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify common P-gp and CYP3A4 drug-drug interactions with direct oral anticoagulants.

Review current evidence on the risks of DOAC use in combination with (P-gp) and CYP3A4 inhibitors and inducers.

Self Assessment Questions:

Which of the following drugs increase the risk of bleeding when used in combination with DOACs?

- A. Phenobarbital
- B. Phenytoin
- C. Posaconazole
- D. Rifampin

Based on previous studies, which P-gp/CYP3A4 inhibitor has shown the greatest rivaroxaban area under the curve (AUC) elevation?

- A. Amiodarone
- B. Dronedarone
- C. Ketoconazole
- D. Ritonavir

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-808-L05-P

Safety of neurostimulant use in ICU patients with neurologic emergencies

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Neurologic emergencies are prevalent worldwide and significantly contribute to both morbidity and mortality. Neurostimulant medications are often prescribed for prolonged disorders of consciousness following a neurologic emergency, such as traumatic brain injury (TBI) or stroke. Data supports the use of neurostimulants for improving functional recovery when started in the rehabilitation setting weeks after injury. There is limited data describing the safety of these agents when started earlier during the intensive care unit (ICU) admission. The purpose of this study is to evaluate the safety of neurostimulants when initiated during ICU admission for patients who suffered a TBI or stroke.

This single-center, retrospective, observational study will include patients admitted to the University of Cincinnati Medical Center located in Cincinnati, Ohio between 2017 and 2023. Adult patients admitted to the ICU due to an acute ischemic stroke, intracerebral hemorrhage, or TBI, who received scheduled amantadine, modafinil, and/or methylphenidate will be included. Primary and secondary outcomes will be evaluated for each patient before and after starting a neurostimulant, as well as between the different neurostimulant cohorts: amantadine, modafinil, and methylphenidate.

The primary outcome is the composite of cardiovascular or neurologic adverse events associated with each neurostimulant. Secondary outcomes include the incidence of cardiovascular adverse events (hypertension, tachycardia, and electrocardiogram changes), incidence of neurologic adverse events (agitation and seizures), and incidence of new start medications for hypertension, sleep aid, and/or agitation. In-hospital mortality, ICU length of stay, hospital length of stay, and the efficacy of selected neurostimulant (changes in Glasgow Coma Scale (GCS), Richmond Agitation Sedation Scale (RASS) scores, and physical/occupational therapy engagement) will be compared among cohorts.

Data collection and analysis are ongoing. Results will be presented at Great Lakes Pharmacy Residents Conference in April 2024.

A conclusion will be forthcoming based on results.

Learning Objectives:

Discuss the current recommendations for the use of neurostimulants after neurologic emergencies.

Describe the differences in safety outcomes associated with the use of amantadine, modafinil, and methylphenidate when initiated during ICU admission.

Self Assessment Questions:

What is an appropriate indication for neurostimulant use after a neurologic emergency?

- A. To modulate blood perfusion to the brain
- B. To repair damaged blood vessels
- C. To promote wakefulness
- D. To treat uncontrollable bodily movements

Which of the following describes the knowledge gap this study hopes to address?

- A. No clinical experience describing modafinil and methylphenidate, but only amantadine
- B. Neurostimulant initiation in the rehabilitation setting weeks after injury, but not during index ICU admission
- C. Lack of efficacy data, but some data available regarding safety of neurostimulant use in this population

D. Neurostimulants only used in acute ischemic strokes, but lack of data in traumatic brain injuries

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-507-L01-P

The Social Determinants of Stroke: A Transitions of Care Investigation

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Despite advances in its acute management, stroke remains the leading cause of long-term disability nationwide. Hypertension is not only the most common comorbidity accompanying stroke but also the most important modifiable risk factor for primary prevention and secondary recurrence. Current guidelines recommend starting or reinitiating antihypertensive therapy in stable patients prior to discharge and advocate for an outpatient blood pressure (BP) goal below 130/80 mmHg in most patients. Most retrospective studies examining post-stroke hypertension management focus on clinical presentations and interventions without examining the upstream factors, such as the social determinants of health (SDOH), that ultimately impact health outcomes. Effective care transitions require clinical interventions, while proactively addressing barriers to access and resource planning prior to discharge. The objective of this study was to examine the factors that influence patient adherence to follow-up visits post-stroke and identify opportunities for stroke care coordination that target SDOH.

This was a retrospective, cohort study including adult patients admitted for acute ischemic stroke (AIS) or transient ischemic attack (TIA) at a safety-net, academic medical center. Patients were included if they were admitted between June 1, 2022, and June 1, 2023, with a primary ICD-10 code of AIS or TIA. Patients were excluded if they were admitted for hemorrhagic stroke or expired prior to discharge. The primary outcome was patient adherence to stroke follow-up provider visits in either neurology or primary care within 6 months of discharge. Secondary outcomes included readmission/emergency department visits for hypertension, AIS, or TIA, BP control at 3 and 6 months, and social vulnerability index (SVI) percentiles broken into the SDOH domains. BP control was defined as office BP <130/80 mmHg or <140/90 mmHg in accordance with guideline recommendations and similarly designed retrospective studies. Results and conclusions will be presented at the Great Lakes Pharmacy Residents Conference in April 2024.

Learning Objectives:

Describe the social determinants of health (SDOH) and their impact on health outcomes.

Identify gaps in recent literature regarding post-stroke transitions of care (TOC) and the SDOH

Self Assessment Questions:

Which of the following is not an example of upstream factors that influence health outcomes?

- A. Environment with sidewalks, benches, easily accessible parks
- B. Emergency department visits
- C. Food Insecurity
- D. Affordable housing

Which of the following social determinants of health domains is least represented in current literature on post-stroke transitions of care?

- A. Economic stability
- B. Community and social context
- C. Neighborhood and built environment
- D. Education access and quality

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-701-L01-P

Standardized versus Anti-Xa Adjusted Enoxaparin Dosing Strategies for Patients with Acute Burn Injury

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Statement of purpose:

Venous thromboembolism (VTE) continues to be one of the prevailing complications for patients admitted with acute burn injury. Burn injured patients have unique risk factors for VTE which include major surgical procedures, prolonged immobilization, multiple blood transfusions, and indwelling central catheters. The risk of medication (e.g. enoxaparin and heparin) failure is especially evident in this patient population due to pharmacokinetic changes (e.g. increased volume of distribution and enhanced elimination) during acute resuscitation and healing phases after burn injury. Also, current guidelines do not adequately describe pharmacologic agents or dosing for use in the burn injured population. The purpose of this study was to compare the efficacy and safety of standard prophylactic enoxaparin doses with anti-Xa adjusted enoxaparin doses for patients admitted to a hospital with acute burn injury .

Statement of methods used:

This multi-center, retrospective, observational cohort study is being conducted at 5 centers. Patients were included if they are 18 years of age or older and admitted to a hospital with an acute burn injury. Patients were excluded are if they have a previous burn admission, received anticoagulation within 30 days of admission, received therapeutic dosing of anticoagulation during hospital admission, past medical history of known bleeding or clotting disorders, pregnant, or incarcerated at time of admission.

The primary objective is to compare the incidence of VTE in patients that received anti-xa adjusted enoxaparin dosing for VTE prophylaxis vs standard enoxaparin dosing (e.g. 40mg daily or 30mg twice daily). Secondary objectives include incidence of major bleeding, blood transfusion requirements during hospitalization, and number of enoxaparin dose changes required to obtain goal anti-Xa concentrations.

Summary of preliminary results:

Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Conference in April 2024.

Conclusions reached:

A conclusion will be forthcoming based on results.

Learning Objectives:

Recognize the pharmacokinetic changes associated with patients with acute thermal injury.

Identify the utility of anti-factor Xa concentration monitoring in patients with thermal injury

Self Assessment Questions:

What effect does a severe thermal injury have on hydrophilic drugs?

- A. Increased Concentrations by Increasing Vd

- B. Decreased Concentrations by Increasing Vd
- C. Decreased concentrations by increasing metabolism
- D. It has no effect

2. What is the purpose of using Anti-Xa monitoring in patients with acute thermal injury who are receiving enoxaparin for VTE prophylaxis?

- A. Patients with thermal injury have shown to have supratherapeutic anti-Xa levels on standard doses of enoxaparin
- B. Patients with thermal injury have shown to have subtherapeutic anti-Xa levels on standard doses of enoxaparin
- C. Monitoring Anti-Xa levels in patients with thermal injury has been shown to reduce mortality
- D. Patients with thermal injury have better outcomes when anti-Xa monitoring is utilized in VTE prophylaxis

Q1 Answer: B Q2 Answer: B

ACPE Universal Activity Number 0121-9999-732-L01-P

Review of the Effects Patient Financial Assistance has on Glycemic Control in Patients with Type I and Type II Diabetes Mellitus

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This study examined the effects of patient financial assistance via manufacturer programs and the Marshall Pharmacy 340B program on glycemic control in patients with type I and type II diabetes mellitus (DM). Records for patients in the Marshall Health Endocrinology Clinic who were enrolled in patient financial assistance were reviewed retrospectively. Patients were included if they were 18 years or older, diagnosed with type I or II DM, enrolled in patient assistance through either manufacturer programs or Marshall Pharmacy 340B program, and had at least 6 months of glycemic data (i.e., A1c) prior to patient assistance enrollment and 6 months after, excluding 6 months of washout immediately after enrollment. A1c measurements had to be taken at least 90 days apart. Patients were excluded if they were enrolled in patient assistance for medications not indicated for the treatment of DM or if they became deceased within the 12-month period after patient assistance enrollment. The following data were recorded: hemoglobin A1c; age; gender; ethnicity; BMI at time of enrollment; weight; eGFR; serum lipids; insurance (commercial, Medicaid, Medicare, or uninsured); if the patient was enrolled in assistance prior to, at time of, or after DM diagnosis; type of assistance program used; duration of time following with endocrinology; and if the medication being covered under patient assistance was started before, at the time of, or after patient assistance enrollment. The primary outcome of this study was the change in A1c trend (rate of change) before and after enrollment in patient assistance. Final results and conclusions pending. This data will be presented at the Great Lakes Pharmacy Resident conference. The speaker has no actual or potential conflict of interest in relation to this presentation.

Learning Objectives:

Recall A1c goals for patients with diabetes mellitus

Discuss potential barriers to medication adherence

Self Assessment Questions:

Which of the following values is the American Diabetes Association (ADA) guideline directed A1c goal for diabetes management?

- A. < 6.5
- B. < 6
- C. < 7
- D. < 7.5

Which class of medications has the greatest A1c-lowering effect?

- A. Glucagon-like peptide-1 (GLP-1) receptor agonists
- B. Sulfonylureas
- C. Sodium-glucose cotransporter 2 (SGLT-2) inhibitors
- D. Insulin

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-627-L01-P

Cost and Efficacy of Rocuronium Dosing in Rapid Sequence Intubation: A Single Health System, Retrospective, Observational Study

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Rapid Sequence Intubation (RSI) is the process of administering a sedative and a neuromuscular blocking agent (NMBA) in rapid succession to facilitate endotracheal intubation. Typical doses of rocuronium for RSI are between 0.9-1.2 mg/kg based on ideal body weight. Higher rocuronium doses (≥1.4 mg/kg) are being used more widely in practice. Higher doses of rocuronium have an increased duration of action and can lead to prolonged paralysis that can outlast sedation during RSI. The purpose of this study is to determine the costs associated with higher doses (>1.2 mg/kg) of rocuronium compared with standard doses (≤1.2 mg/kg) and to evaluate whether higher doses are more efficacious than standard doses of rocuronium.

This is a single-health system, retrospective, observational study that will include adult patients, undergoing RSI with rocuronium, and have a procedure note documenting an+ intubation at University of Cincinnati Medical Center and West Chester Hospital, from 2012 to 2023. Exclusion criteria include pregnancy, prisoners, and those undergoing RSI in peri-operative areas of the hospital. Patients will be separated into 2 cohorts based on the dose of rocuronium received divided by their ideal body weight.

The primary outcome is costs associated with higher doses of rocuronium versus standard doses, including the cost of rocuronium, reversal agents, and rescue paralytics based on their actual wholesale price at the time of data collection. Secondary outcomes include first attempt intubation success, number of airway attempts, rate of reversal agent use, rate of additional IV push paralytic use, rate of aspiration, time until initiation of continuous analgesedation, and ICU and total hospital length of stay.

Data collection and analysis are on-going. Final results will be presented at Great Lakes Pharmacy Residents Conference in April 2024.

Learning Objectives:

Review current dosing recommendations for rocuronium during rapid sequence intubation.

Discuss the risk versus benefit of higher doses of rocuronium during rapid sequence intubation.

Self Assessment Questions:

Which of the following doses falls into standard dosing of rocuronium during rapid sequence intubation?

- A. 1.5 mg/kg based on actual body weight
- B. 1 mg/kg based on ideal body weight
- C. 0.6 mg/kg based on actual body weight
- D. 1.5 mg/kg based on ideal body weight

Which of the following is a risk of an increased dose of rocuronium during rapid sequence intubation?

- A. There is not enough paralytic, and the patient aspirates from incomplete paralysis
- B. Due to the increased duration of action, the paralytic lasts longer than the induction sedative causing awareness while paralyzed
- C. Psychological distress from awareness while paralyzed
- D. Both B and C

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-638-L01-P

After-hours Pharmacist-Driven Rapid Pathogen Identification Alerts on Bloodstream Infections Outcomes

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Purpose: At Henry Ford Macomb Hospital, antimicrobial stewardship pharmacists review blood culture rapid pathogen identification (RPID) results as part of antimicrobial stewardship best practice alerts (AMS BPA) built into the electronic health record. After hours, the gram stain result was reported to nursing but the subsequent rapid blood culture result was not reported to pharmacy. There may exist a gap in after-hours care where without pharmacist intervention blood cultures may not be appropriately responded to, although this has not been evaluated. The purpose of this study is to evaluate improvement in patient care outcomes and inform future decisions regarding use of after-hours alerts through evaluating after-hours pharmacist-driven blood culture rapid pathogen identification best practice alerts compared to no after-hours pharmacist response.

Methods: This study is a quasi-experimental, retrospective study with pre-post intervention cohorts conducted in 2022 and then in 2023 once AMS BPA were expanded to after-hours. The proposed study focuses on the first alert of AMS BPA on index blood cultures during after-hours (defined as 4pm-7am on weekdays, and throughout weekends). The primary endpoint is the amount of patients changed to acceptable therapy within 3 hours from RPID result. Secondary endpoints include all-cause 30-day mortality, 30-day re-admission rate, hospital and intensive care unit lengths of stay, amount of patients changed to targeted therapy within 3 hours from RPID result, median time to culture identification, median time to acceptable and targeted antimicrobial therapy from culture collection and identification. Pharmacists' expectation is to evaluate all AMS BPAs, review culture results and current antibiotic orders, and ensure appropriate antimicrobial coverage per a modified system-wide policy. A Student t-test or Mann-Whitney U were used for continuous variables and Chi-square test or Fisher's exact test were used for categorical variables.

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

Learning Objectives:

Outline the process for successfully establishing a pharmacist-initiated response to blood culture rapid pathogen identification alerts during after-hours

Discuss the impact that after-hours pharmacist response to blood culture rapid pathogen identification alerts for bloodstream infections may have on patient care

Self Assessment Questions:

Which of the following is a recommended therapy after a blood culture rapid pathogen identification result of Escherichia coli with CTX-M detected by PCR?

- A. Ceftriaxone
- B. Cefepime
- C. Ertapenem
- D. Piperacillin/tazobactam

When implementing an after-hours pharmacist-driven blood culture rapid pathogen identification alerts workflow in a community hospital setting, which statement is most correct?

- A. Focusing only on escalation of therapy in response to blood culture rapid pathogen identification results may be the most effective use of pharmacist time during after-hours
- B. If no change is made in response to a blood culture rapid pathogen identification result, a progress note should still be written to document time spent
- C. Initial pharmacy department education is not integral towards successful implementation of blood culture rapid pathogen identification workflow
- D. Pharmacists should always spend time empirically de-escalating therapy as to prevent unnecessary adverse drug reactions

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-846-L99-P

Evaluation of Neuromuscular Blocking Agents' Dosage in Obese Patients for Rapid Sequence Intubation

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Purpose: Obesity is a very large issue in the US and has been for many years. Neuromuscular blocking agents (NMBA) used for rapid sequence intubation in obesity have different recommendations for rocuronium versus succinylcholine dosing which may lead to the underdosing or overdosing of paralytic agents. This retrospective cohort study compared succinylcholine and rocuronium weight-based dosing for patients with a BMI ≥ 30 kg/m² and how it impacts initial intubation rates.

Methods: Patients were included if they were older than 18 years old, on a general medicine floor, in the emergency room, in the critical care unit, required intubation, had a BMI ≥ 30 kg/m², and received succinylcholine or rocuronium. The patients were categorized based on their dose divided by their ideal body weight if rocuronium was given, or total body weight if succinylcholine was given, resulting in a number greater than 0.95 as above their target dose and if less than 0.95 received below their target dose. Patients meeting the above criteria were randomly chosen for chart review. Results: A total of 46 patients needed to be included to meet power; 14 of these patients were underdosed (30.4%) with increasing percentage of underdosed patients with escalating obesity class (Class 1: 25% 4/16, Class 2: 29.4% 5/17, and Class 3: 38.5% 5/13). Conclusion: A limitation of this study was having to rely on charting for the evaluation of first pass rate intubation. The results of this study were inconclusive on determining if underdosing patients with NMBAs impacted first pass intubation success rates. There was, however, a trend identified that the higher a patient's BMI, the higher the likelihood they were underdosed.

Learning Objectives:

Review the recommended dosing of neuromuscular blocking agents for obese patients

Discuss dosing strategies used in different patient care settings based on patient demographics that are available

Self Assessment Questions:

1. While in the medical intensive care unit, a medical resident asks you what the succinylcholine dose should be for a 125 kg male patient (height is 5'8") that needs to be intubated. You tell the medical resident:

- A. 125 mg
- B. 60 mg
- C. 200 mg
- D. 70 mg

2. While in the emergency department attending a trauma alert for a patient that was in a car accident and needs intubated, the anesthesiologist asks you for rocuronium. What dose would you recommend? (Hint: the EMTs that brought the patient in estimate the patient is around 400 pounds, is at least 6' tall, and in his late 40s)

- A. 100 mg
- B. 180 mg
- C. 80 mg
- D. Ask for more information on patient's height and weight

Q1 Answer: A Q2 Answer: C

ACPE Universal Activity Number 0121-9999-522-L01-P

Evaluation of Adverse Effects Observed After Peripheral Administration of Hypertonic Saline

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Purpose: Hypertonic saline's high osmolarity poses theoretical risks of infiltration and extravasation during IV administration. Manufacturers suggest administering hypertonic saline via a central IV line to avoid such adverse effects. However, availability of central IV access may be limited in emergent situations, leading to peripheral administration of hypertonic saline. The purpose of this study is to review current practices and documented adverse effects at John H Stroger Jr Hospital of Cook County. The findings of this review will facilitate development of guidelines for safe administration of hypertonic saline at our institution.

Methods: Retrospective chart review of adult patients who received hypertonic saline (3% - 24.3%) between Jan 1, 2020 and August 31, 2023. Adult patients that have received an infusion of hypertonic saline via either a central or peripheral line will be screened for inclusion in this study. Exclusion criteria include individuals under the age of 18, pregnant women, and detainees. The primary outcomes include documented incidents of extravasation, soft tissue injury, and necrosis after 1 hour of peripheral or central line administration of hypertonic saline. The secondary outcomes include incidence of hypotension (defined as systolic BP less than 90 mmHg or MAP less than 60 mmHg within 1 hour of hypertonic saline administration), incidence of hypernatremia (defined in these patients as serum sodium >155 mmol/L) and Peripheral IV Infiltration Score. The study has been approved by the institutional review board. Data will be collected from computerized medical records and data analysis will be performed using descriptive statistics. Data collection currently in progress.

Preliminary Results: Based on preliminary data, there have been no documented incidents of infiltration associated with either the peripheral or central IV administration of 3% hypertonic saline.

Conclusions: Peripheral administration of 3% hypertonic saline is associated with minimal adverse events and is safe to use.

Learning Objectives:

Recall the potential safety concerns with administering 3% NaCl through a peripheral IV catheter

Review whether 3% NaCl can be administered safely through a peripheral IV catheter

Self Assessment Questions:

Which of the following is/are the main safety concern(s) with administering 3% NaCl through a peripheral IV catheter?

- A. Cerebral herniation
- B. Phlebitis and Extravasation
- C. Hypernatremia
- D. Encephalopathy

56, M is brought in by EMS after a motorcycle accident. As the patient has suffered a traumatic brain injury, the Trauma ICU team wants to start a 3% NaCl infusion.

The patient does not have central access yet. How should this medication be administered?

- A. 3% NaCl must be administered via a central IV line. The safety concerns outweigh the benefits and administration of 3% NaCl should wait for central IV access.
- B. 3% NaCl must be administered via a peripheral IV line. There are no safety concerns associated with peripheral IV administration of this medication.
- C. 3% NaCl may be administered via a central IV line, but should be switched to peripheral IV line for extended-duration infusions.
- D. 3% NaCl may be administered via a peripheral IV line, but should be switched to a central IV line for extended-duration infusions

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-811-L05-P

Evaluation of Empiric Vancomycin Guideline in the Neonatal Intensive Care Unit for Late Onset Sepsis and Necrotizing Enterocolitis

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The American Academy of Pediatrics recommends avoiding vancomycin empirically for neonatal intensive care (NICU) patients unless there are specific risks for pathogens resistant to narrower-spectrum agents. Overuse of vancomycin can lead to increased toxicity and resistance development. Studies have demonstrated that guideline implementation and anti-staphylococcal penicillin initiation for empiric therapy of late-onset sepsis (LOS) reduces the use of vancomycin without increasing morbidity and mortality. The purpose of this study is to evaluate the difference in judicious vancomycin courses and outcomes before and after guideline implementation with the goal of further reducing non-judicious use in the NICU. This is a retrospective cohort study evaluating the number of judicious vancomycin courses before and after implementation of an empiric antibiotic therapy guideline for LOS and necrotizing enterocolitis (NEC) in the NICU at University of Illinois Hospital & Health Sciences System. We are conducting a retrospective chart review on patients who received antibiotics for LOS or NEC in the NICU from December 1, 2017, to September 30, 2023. The primary outcome is the difference in judicious vancomycin courses before and after guideline implementation. Secondary outcomes include the difference in infection recurrence, survival at discharge, and vancomycin levels drawn along with an evaluation of risk factors that could predict vancomycin necessity. Pre-guideline data was collected previously and showed that 134/263 (51%) of vancomycin courses were justified. Preliminary results show that after guideline implementation, 92/119 (77%) of vancomycin courses were justified. Non-judicious use includes continuation of vancomycin past 24 hours of no growth or for organisms not requiring vancomycin therapy. Data will be analyzed using descriptive and comparative analyses and is ongoing. A regression analysis is planned to identify associations between patient characteristics and infection necessitating vancomycin therapy. The preliminary results support the conclusion that guideline implementation reduces non-judicious use of vancomycin in the NICU.

Learning Objectives:

Review late onset sepsis (LOS) and necrotizing enterocolitis (NEC), the most common pathogens, and appropriate treatment according to UI Health guidelines. Define judicious vancomycin use according to the CDC and in respect to this study.

Self Assessment Questions:

Why are the recommended empiric antibiotics different between early-onset sepsis and late-onset sepsis?

- A. Early-onset sepsis is not as severe as late-onset sepsis and does not need broad spectrum antibiotics.
- B. Vancomycin is contraindicated in neonates less than 72 hours old.
- C. The most common pathogens differ between early and late-onset sepsis.
- D. All of the above.

Baby J spiked a fever and has an elevated C-reactive protein (CRP) and was started on vancomycin and gentamicin for empiric treatment of late-onset sepsis. Blood and urine cultures were collected. At 24 hours, there is no growth on either of the cultures. Which of the following would result in the most judicious use of vancomycin?

- A. Continue vancomycin and gentamicin until 48 hours of no growth on the cultures.
- B. Discontinue vancomycin and gentamicin since there has been no growth at 24 hours
- C. Switch to ampicillin and gentamicin for necrotizing enterocolitis treatment.
- D. Switch vancomycin to oxacillin and continue gentamicin treatment.

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-610-L01-P

The New Low Carb Diet: Utilization Of A Carbapenem Request Form

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Background

Antibiotic resistance is an ongoing threat impacting millions globally. Carbapenems are commonly used due to their effectiveness against numerous organisms and their stability against multiple resistance mechanisms. Often these agents are reserved for resistant organisms. However, use of carbapenems has given rise to carbapenem resistant organisms that require more expensive agents for treatment. Antimicrobial stewardship interventions such as prospective audit and feedback are key in promoting appropriate antibiotic use. However, this may not be feasible at institutions with resource scarce antimicrobial stewardships programs. We implemented a carbapenem request form in hopes of preserving our carbapenem use.

Methods

The carbapenem request form was implemented in September of 2023. This is a pre and post implementation study comparing the effects of the carbapenem request form on carbapenem prescribing. Patients were included if they received meropenem or ertapenem. Patients were excluded if they received meropenem or ertapenem for perioperative use, ordered by infectious diseases physicians. The primary outcome is to evaluate the appropriateness of carbapenem use pre and post implementation of the carbapenem request form. Appropriateness is defined as adherence to ASP criteria for use. Secondary outcomes include time from carbapenem order placed to time of pharmacist verification, time from order placed to time patient received medication.

Results

A retrospective chart review was conducted for all patients who received meropenem or ertapenem between the months of January 2022- December 2023. Seventy-two patients were included in the analysis. In the post implementation group, 80.55% of patients were considered appropriate versus 55.55% of patients in the pre-implementation group with an overall effect difference of 25%. On average, the time from ordering to pharmacist verification increased by 12.5 minutes. Additionally, average time to patients receiving medication by 36 minutes.

Conclusion

Implementation of a carbapenem request form increased the appropriateness of carbapenem usage.

Learning Objectives:

Identify to identify the advantages and disadvantages of different antimicrobial stewardship interventions

Recognize to recognize the challenges surrounding the development and utilization of newer antimicrobial agents

Self Assessment Questions:

LS is a 64 year old female with chief complaints of dysuria and right flank pain. Allergies: Sulfa. Labs: Na 137, K 3.7, Cl 107, BUN 34, CrCl 54 ml/min. Patient was started on ceftriaxone empirically. Urine culture is now growing ESBL E Coli, blood cultures are negative. Provider wants to switch the antibiotic to ertapenem. Which of the following is an acceptable carbapenem sparing treatment option?

- A. Sulfamethoxazole/Trimethoprim
- B. Levofloxacin
- C. Nitrofurantoin
- D. Cefepime

Which of the following is false regarding newer antimicrobial agents?

- A. Newer antimicrobials are often reserved as last line agents
- B. There is no financial incentives to produce newer antimicrobial agents

C. Newer agents are more expensive and cost prohibitive to health institutions
D. There is an abundance of new agents being FDA approved each year

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-536-L01-P

Retrospective Review of Opioid Prescribing Practices in Patients with Substance Use Disorder and Cancer-Related Pain

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Pain is a common symptom for patients diagnosed with cancer that often requires opioid therapy management. However, opioids are associated with serious risks for harm, including misuse, overdose, and death. Patients with an active and/or history of substance use disorder and a cancer diagnosis may be at greater risk of these harmful effects with the continuous use of opioids. There is an increased recognition of the need to safely manage patients within this population. The objective of this study was to review opioid prescribing practices in patients with substance use disorder and cancer-related pain in an outpatient clinic at a large academic medical center. This study was a retrospective, descriptive chart review of palliative care patients with diagnosis of cancer and a substance use disorder from September 1, 2020, to October 1, 2023. Patients were included if they were between the age of 18 to 89 years old, referred to the outpatient clinic, had a diagnosis of cancer and diagnosis of active or history of opioid use disorder, concerns for opioid misuse, alcohol use disorder, cocaine use disorder, or methamphetamine use disorder and were receiving prescription opioids for cancer-related pain. The primary endpoint was to describe the rate of patients who had an opioid regimen change at a subsequent clinic visit. Secondary endpoints included rate of adherence defined as presence of prescribed opioid in urine drug test, rate of oral morphine equivalents change, symptom management utilizing the Edmonton Symptom Assessment Scale, comparison of Suboxone (buprenorphine/naloxone) versus Subutex (buprenorphine), healthcare utilization, and presence of illicit substances in urine drug test results. There were no applicable exclusion criteria. This study received Institutional Review Board approval. Data collection and analysis are ongoing. Results and conclusion to be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Review opioid management therapy strategies currently utilized in patients with active and/or history of substance use disorder and cancer-related pain.
Describe the current gaps in literature regarding treatment modalities within this patient population.

Self Assessment Questions:

Which two opioid agonist medications are FDA-approved for managing opioid use disorder and also approved for pain?

- A. Methadone and naltrexone
- B. Buprenorphine and methadone
- C. Buprenorphine and naltrexone
- D. Methadone and hydromorphone

What is the primary purpose of Medication-Assisted Treatment (MAT) in the context of cancer-related pain management?

- A. To promote euphoria and alleviate emotional and physical distress.
- B. To replace conventional cancer treatments.
- C. To provide a comprehensive approach that combines medication with other therapies for effective pain relief.
- D. To discourage patients from pursuing medical intervention for cancer-related pain.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-821-L08-P

Evaluation of Cefepime IV Push Medication Administration: An Assessment of Safety and Efficacy in a Mixed Model Health System

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Purpose: In recent years, there has been an increase in intravenous push (IVP) antimicrobial administration due to national fluid shortages. This practice has been maintained without strong support from published literature with standardized preparation techniques. In January 2022, UofL Health downtown campuses transitioned IVP cefepime preparation. Syringes made by pharmacy in an ISO class 5 sterile environment transitioned to immediate use preparation by nursing. The objective of this study was to assess if preparation environment for IVP cefepime impacted clinical patient outcomes related to safety and efficacy in a mixed model health system.

Methods: This was a multi-center, retrospective, observational cohort study of patients admitted to UofL Hospital and Jewish Hospital who received IVP cefepime prepared in an ISO class 5 sterile environment versus immediate use preparation by nursing between December 1, 2020, through February 28, 2023. January 2022 was the month of transition for IVP cefepime preparation practices and was excluded to avoid overlap between groups. Adult patients were eligible for inclusion if they received at least 72 hours of IVP cefepime therapy. Patients were excluded if they had a history of severe allergic reaction to a beta-lactam, pathogen intermediate or resistant to cefepime, were pregnant, incarcerated, or received doses of IVP cefepime prepared in both environments. Primary endpoints were rates of adverse drug events and medication errors. Secondary endpoints included need for antibiotic escalation (change to carbapenem, novel beta lactam/beta lactamase inhibitor, or cefiderocol), all-cause mortality while on cefepime therapy, and time to first dose administration from order entry.

Results/Conclusion: Final results and conclusions to be shared at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss the potential benefits of utilizing intravenous push cefepime compared to traditional intravenous piggyback
Identify the differences between United States Pharmacopeia (USP) preparation standards for intravenous push cefepime

Self Assessment Questions:

A shorter time to first dose and time to empiric broad spectrum antimicrobial coverage are potential benefits of which of the following approved administration techniques for cefepime?

- A. Intramuscular
- B. Intravenous piggyback
- C. Sublingual
- D. Intravenous push

All of the following medication errors, except _____, are a potential risk with an intravenous push cefepime syringe prepared using USP immediate use standards on the floor by nursing.

- A. Incorrect aseptic technique

- B. Incorrect diluent
- C. Incorrect infusion rate input
- D. Incorrect dosage

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-817-L07-P

Improving Communication and Therapy Management Following Acute Hypersensitivity Reactions

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PURPOSE

At Froedtert & MCW outpatient infusion sites, there does not currently exist a protocol which outlines best practices following the completion of an infusion-related reaction (IRR). The purpose of this project is to develop a workflow for the treatment team to follow after a patient experiences a reaction. This workflow will close the loop between the nursing team, pharmacy, providers, and the patient prior to subsequent infusions.

METHODS

This is a single site, quality improvement project, conducted at Froedtert & MCW outpatient oncology infusion sites. Chart review of patients who experience IRRs before and after the implemented workflow was conducted using safety event reports. Data was reviewed for 2 months prior to workflow implementation. Education was provided to the infusion nursing, pharmacist, and provider groups. The workflow includes a nursing IRR note sent to the provider team, allergy documentation, safety event report documentation, and a provider follow-up note outlining the next steps for subsequent infusions. Safety event reports for 2 months following implementation were reviewed to compare the results. The primary outcome is the percentage of oncology patients with an IRR who have a postreaction provider follow-up note after workflow implementation. Secondary outcomes include oncology infusion nurse and pharmacist workflow satisfaction, the number of times the infusion nurse or pharmacist has to clarify the treatment regimen for 2 months before and 2 months after workflow implementation, and the percentage of patients with IRRs with documentation they were contacted to discuss treatment changes.

RESULTS

In progress.

CONCLUSIONS

Conclusions are pending. The results of this study will evaluate if the implementation of our workflow increased the number of patients with IRRs who had treatment changes documented. This study will evaluate the satisfaction of infusion nurses and pharmacists with the post-IRR workflow.

Learning Objectives:

Outline essential workflows following an infusion related reaction and the changes to the Froedtert & MCW post-IRR workflow

Recognize key features in Electronic Health Record that can be utilized to enhance documentations surrounding IRR

Self Assessment Questions:

1. Per the Quality Oncology Practice Initiative (QOPI standards), review of documentation regarding patients previous treatment related reactions is required:

- A. On each day of treatment
- B. Only after an infusion related reaction has occurred
- C. It is not required
- D. At the provider's discretion

Infusion related reactions should be documented in:

- A. Patient's allergy list
- B. Safety event report
- C. Note section with follow-up plan
- D. All of the above

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-626-L04-P

Comparison of Clinical Outcomes of Prophylactic Enoxaparin Dosing in Patients with Low Body Weight

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Purpose: Enoxaparin is commonly used in the acute care setting for venous thromboembolism (VTE) prophylaxis. The CHEST guidelines provide standard enoxaparin dosing for VTE prophylaxis in patients with normal weight and renal function; however, there is currently little guidance on dosing adjustments for patients with low body weight. When utilizing enoxaparin flat rate dosing regimens, patients with low body weight receive higher doses per kilogram of body weight, which may put them at higher risk of bleeding. The purpose of this study is to evaluate the safety and efficacy of reduced enoxaparin prophylactic dosing compared to standard prophylaxis dosing in patients with low body weight. Methods: This multicenter, retrospective, cohort study includes adult patients weighing less than 55 kilograms who received either reduced or standard enoxaparin prophylaxis dosing while admitted to an IU Health hospital. Pregnant or incarcerated patients as well as patients admitted for suspected bleed or VTE, patients on anticoagulation prior to admission, patients with creatine clearance less than 30 mL/min or on hemodialysis, patients admitted to surgical or ICU services, and patients who received enoxaparin for an indication besides VTE prophylaxis will be excluded. The primary outcome will be total incidence of major and minor bleeding in patients with low body weight receiving enoxaparin 40 mg daily or 30 mg twice daily compared to those receiving enoxaparin 30 mg daily. Secondary outcomes will include incidence of new VTE diagnoses while inpatient, incidence of major bleeding, incidence of minor bleeding, length of hospital stay, in-hospital mortality, and subgroup analyses of bleeding and VTE rates for different weight ranges. Results: Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify risk factors for development of venous thromboembolism.

Discuss current gaps in literature surrounding prophylactic enoxaparin dosing in patients with low body weight.

Self Assessment Questions:

According to CHEST guidelines, which of the following is considered prophylactic dosing in patients with normal weight and renal function?

- A. Enoxaparin 1 mg/kg BID
- B. Enoxaparin 1.5 mg/kg daily

- C. Enoxaparin 30 mg daily
- D. Enoxaparin 40 mg daily

Which of the following does not meet International Society on Thrombosis and Haemostasis (ISTH) major bleeding criteria?

- A. Intracranial bleed
- B. Drop in hemoglobin by 2 g/dL
- C. Bleeding requiring transfusion of one unit of packed red blood cells
- D. Pericardial bleed

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-609-L01-P

Implementation and Evaluation of Standardized Pharmacist Review of Prior to Admission Medication Lists

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Purpose: It is estimated that one quarter of inpatient prescribing errors are due to incomplete medication histories at the time of admission. One of the 2024 Joint Commission Hospital National Patient Safety Goals is to ensure medication safety by recoding and passing along correct information about a patient's medications. At UW Health SwedishAmerican Hospital, medication histories are completed for some, but not all patients by medication history technicians. Previously, there was no notification to pharmacists or expectation for pharmacists to review the work medication history technicians have completed. Pharmacists completed a competency on the admission navigator as a new documentation method for reviewing prior to admission medication lists in October 2023. The purpose of this study is to evaluate the impact of workflow standardization of pharmacists reviewing prior to admission medication lists which have been updated by medication history technicians.

Methods: This study is a single-hospital retrospective chart review evaluating the new documentation method using the admission navigator for pharmacists reviewing prior to admission medication lists. Patients were included in the study if they were initially admitted to a general medicine floor at UW Health SwedishAmerican Hospital and had a medication history completed by a technician. Patients were excluded from the study if they were less than 18 years old, pregnant during admission, or if the encounter was marked as confidential. The primary objective was to evaluate interventions documented from prior to admission medication list review. The secondary objectives were to evaluate the frequency of categorized interventions and discrepancies documented, and to evaluate the time to document review of prior to admission medication lists.

Results/Conclusions: Of the patient admissions identified with medication histories completed by technicians, 208/296 (70.3%) were marked as reviewed by pharmacists. Complete results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the challenges of the admission navigator implementation.

Identify the most common interventions from prior to admission medication lists.

Self Assessment Questions:

Which of the following challenges were associated with implementation of the admission navigator?

- A. Gaining buy-in from all pharmacists
- B. Differing opinions on what should be included in the navigator
- C. Criteria for marking a medication list as "reviewed"
- D. All of the above

Which of the following was the most frequently identified intervention on prior to admission medication lists?

- A. Add medication
- B. Adjust dose/frequency
- C. Contact provider
- D. Remove medication

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-877-L04-P

Froedtert Community Hospital Division Antimicrobial Stewardship Programs Needs Assessment

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Purpose: Hospital antimicrobial stewardship (AMS) programs to evaluate and optimize antimicrobial therapy are an important tool for improving clinical and patient-related outcomes. The Joint Commission (TJC) and Center for Medicare & Medicaid Services (CMS) have included AMS programs in their hospital accreditation regulatory requirements. The goal of this project is to evaluate current AMS practices across inpatient sites within the Froedtert Community Hospital Division (CHD) to address barriers, improve resource allocation as needed, and target standardization of inpatient AMS program services across the hospital system.

Methods: An interview tool based on TJC and CMS regulatory requirements, Centers for Disease Control and Prevention (CDC) recommendations, Det Norske Veritas (DNV) standards, and other sample questionnaires, was developed to facilitate interviews of at least two providers involved in AMS services at each of the 7 sites included. Interviews were conducted by a minimum of 2 project team members. Interview responses will be used to complete a gap analysis, with subsequent development and presentation of executive summaries. Executive summaries will contain gaps identified and recommendations for addressing gaps. The primary outcome is percentage of sites with 100% compliance with accreditation regulatory requirements. Secondary objectives include assessing current AMS data collection practices for CHD sites, resources needed to conduct a gap analysis with development of executive summaries for CHD AMS programs, where AMS services currently exist across the sites, and opportunities for alignment across the system.

(Preliminary) Results: No preliminary concern for noncompliance with regulatory requirements was identified at any site. Increased Infectious Diseases expertise has been identified for one site. Improved data utilization and sharing was identified at several sites.

Learning Objectives:

Recognize regulatory requirements for inpatient antimicrobial stewardship programs.

Describe components of an antimicrobial stewardship gap analysis and how this method could be adapted for other institutions.

Self Assessment Questions:

What organizations have regulatory requirements in place for accreditation or reimbursement of inpatient hospital antimicrobial stewardship programs? (This does not include organizations with best practice requirements)

- A. The Joint Commission (TJC)
- B. Infectious Diseases Society of America (IDSA)
- C. Centers for Disease Control and Prevention (CDC)
- D. All of the above

Which of the following statements are true?

- A. "Needs assessment" describes the process of assessing practices and gaps via an interview tool
- B. "Gap analysis" describes the analysis of data from the needs assessment to develop optimization recommendations
- C. "Executive summary" describes the site-specific gaps identified and recommendations for addressing gaps
- D. All of the above are true

Q1 Answer: A Q2 Answer: D

ACPE Universal Activity Number 0121-9999-859-L04-P

Role of Professional Continuous Glucose Monitoring (CGM) at a Safety-Net Health-System

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Purpose: Diabetes is a medical condition which affects 38.4 million individuals. Continuous glucose monitoring (CGM) technology has been shown to be beneficial in improving glycemic management and reducing the incidence of hypoglycemia in people living with Type 1 and Type 2 Diabetes. There are two routes in which CGM can be pursued: professional CGM and personal CGM. Professional CGM devices are owned by the clinic, where a sensor is placed at the initial visit and the data is interpreted at a subsequent visit approximately 2 weeks later. The purpose of this study is to identify and define the role of a pharmacist-managed professional CGM service within an endocrinology clinic at a safety-net health-system.

Methods: A single-center, retrospective, observational chart review was conducted on all patients who participated in a two-visit professional CGM series by a pharmacist between April 2022 and September 2023. Patients were excluded if they were less than 18 years of age, incarcerated, or pregnant during the study period. Demographic data and the following data points were collected: gender, age, race, ethnicity, preferred language, and baseline weight, height, and BMI, type of diabetes, type of device used, insurance coverage, medication changes made as a result of professional CGM data review, A1C before and after professional CGM visit series, and if a patient went on to receive a personal CGM device following professional CGM trial. The primary outcome was the amount and type of medication interventions made as a result of the professional CGM visit series. Secondary outcomes included changes in A1C, time in goal glucose range, time below goal glucose range, glucose variability, and billing reimbursement.

Results: Results will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Conclusions: Conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

List the differences between personal and professional CGM devices

Identify current gaps in literature regarding professional CGM devices

Self Assessment Questions:

Which of the following are true regarding professional CGM devices?

- A. Professional CGM systems include FreeStyle Libre Pro and Dexcom G6 Pro
- B. Professional CGM equipment is owned by the patient
- C. Professional CGM billing codes include 95250 and 95251
- D. A and C

Which of the following has not yet been described in the literature regarding professional CGM devices?

- A. Reduced hypoglycemic episodes
- B. Lowered A1C
- C. Increased time in range in low-income patients
- D. Improved awareness of hypoglycemia

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-727-L01-P

Establishing a Process for the Evaluation of Initial and On-going Inpatient Pharmacist Competency

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Purpose

Credentialing and privileging is a process supported by The Joint Commission and Centers for Medicare and Medicaid Services that allows clinical pharmacists to practice at the top of their license. Credentialing refers to the process of verifying a clinician's qualifications to provide patient care. Privileging refers to the process of the healthcare organization allowing credentialed individuals to practice in a scope of different clinical activities including: pharmacokinetics, anticoagulation, and others. The American Society of Health-System Pharmacists (ASHP) 2023 standard 5.1.c.3 for postgraduate residency programs states pharmacy leaders need to ensure the competence of pharmacists is validated through an ongoing formalized process. In the ambulatory practice setting, Froedtert Health has established a process for ongoing review of ambulatory clinical competency via peer review. Similarly, with the aim of ensuring safe and effective patient care within our inpatient setting, the purpose of this study is to implement a standardized peer review process for initial and ongoing review of inpatient pharmacist clinical competency and compliance with established practice protocols and guidelines.

Methods

This study will establish a peer review process that focuses on inpatient pharmacists' competency evaluation at Froedtert Hospital and Froedtert Menomonee Falls Hospital. The peer review process entails the review of vancomycin clinical decision making. The study will utilize clinical notes filed August 1, 2022 - September 30, 2023, by acute care pharmacists across service lines. Evaluated pharmacists will be randomly selected from 3 groups: recently graduated within the past year, on-boarded in the past year, and all other existing pharmacist employees. Pharmacists will have 3 progress notes reviewed by 2 peer reviewers and feedback will be shared with reviewed clinician. The primary outcome of this study is number of peer reviews completed utilizing 2 separate reviewers.

Results/Conclusions

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

Learning Objectives:

Outline the peer review process for evaluation of clinical pharmacokinetic notes of vancomycin filed by inpatient pharmacists at Froedtert Hospital and Froedtert Menomonee Falls Hospital.

Identify whether pharmacists' vancomycin clinical notes follow current practice standards.

Self Assessment Questions:

Our peer review process included all of the following except:

- A. Peer reviewers from across service lines
- B. Randomized selection of pharmacokinetic notes
- C. Review of notes by 2 separate reviewers
- D. Blinded review of notes

Based on our assessment, what percentage of total notes reviewed met criteria ratings for the intervention documented?

- A. >90%
- B. >75%
- C. >50%
- D. >25%

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-712-L04-P

Impact of a Pharmacist-Driven Aminoglycoside Dosing Protocol

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Aminoglycosides are often reserved for infections caused by drug-resistant Gram-negative bacteria. At times they are also used in the setting of severe drug allergies or in combination with a Gram-positive antibiotic for synergy. While effective in the right scenarios, they do come with potentially severe side effects such as nephrotoxicity, ototoxicity, and vestibular toxicity. In the prior state, our community teaching hospital did not have an aminoglycoside dosing protocol for pharmacist use. The purpose of this project was to create an aminoglycoside dosing protocol and determine the impact of the protocol on appropriateness of pharmacist confidence in aminoglycoside dosing. A retrospective chart review was completed to assess appropriateness of aminoglycoside dosing in adult patients who received an IV aminoglycoside from January 2021 through August 2023 prior to protocol implementation. Adult patients were excluded if they received an aminoglycoside for a prophylactic indication only. In addition, an aminoglycoside dosing protocol was created using information gathered from literature review and input from the site's Antimicrobial Stewardship Committee. A survey was created to assess pharmacist confidence in dosing and monitoring aminoglycosides. This was administered before and after education of pharmacists and provision of the protocol to the pharmacy department. Education included the details of dosing methods included in the protocol, aminoglycoside pharmacokinetics and pharmacodynamics, and monitoring requirements. Chart review to assess appropriateness of aminoglycoside dosing post-implementation will also be completed. Results from the pre- and post-implementation surveys and chart review will be compared to determine the impact the protocol has on confidence and clinical appropriateness of aminoglycoside dosing. Results and conclusions from this project will be presented at the Annual Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the pharmacokinetic parameters of aminoglycosides that are associated with safety and efficacy

Review the exclusion criteria for aminoglycoside extended-interval dosing

Self Assessment Questions:

Which of the following pharmacokinetic parameters is representative of SAFETY in aminoglycoside dosing?

- A. Trough Level
- B. Peak/MIC
- C. MIC
- D. Midpoint

MN is a 50 yo female admitted for MDRO pyelonephritis caused by E. coli (S: gentamicin and tobramycin only). The team is wanting to start gentamicin. With the following information, is this patient an appropriate candidate for extended interval dosing? If so, why? Current concomitant medical concerns include: HTN, T2DM (last A1C 9.4%), depression, cirrhosis of liver with ascites, and hypothyroidism. CrCl: 45 mL/min.

- A. No, because hypothyroidism would exclude her from extended interval dosing.
- B. No, ascites would exclude her from extended interval dosing.
- C. Yes, she would qualify for extended interval dosing.
- D. No, her CrCl is too low for extended interval dosing.

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-633-L01-P

Effect of a Pharmacy-Driven Rapid Bacteremia Response Program on Outcomes in Patients with ESBL Bacteremia

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Purpose: Faster time to appropriate antibiotic therapy has been associated with decreased mortality for patients with sepsis. However, patients with extended-spectrum beta-lactamase (ESBL) infections are less likely to have appropriate empiric therapy due to their broad resistance. The antimicrobial stewardship program at Norton Healthcare implemented the Rapid Bacteremia Response Program (RBRP) in quarter 1 of 2017, utilizing the Verigene blood culture nucleic acid test in conjunction with pharmacist evaluation using an evidence-based response algorithm. The purpose of this study was to evaluate the impact of the RBRP on clinical and process outcomes for hospitalized adults with ESBL bacteremia.

Methods: This retrospective, quasi-experimental study was conducted at a large community healthcare system in Louisville, KY. Adult patients with ESBL bacteremia were randomly selected for review until 100 patients were included in a pre-intervention cohort (1/1/2013 to 3/5/2017) and post-intervention cohort (3/6/2017 to 12/31/2021). Patients were excluded if the index blood culture was polymicrobial, if the ESBL producing organism had additional resistance mechanisms identified, if the patient was transferred from an outside facility with ESBL bacteremia, and if patient death occurred prior to a positive Gram stain result of the index blood culture. The primary outcome was the time to appropriate antibiotic therapy. Secondary outcomes included all-cause in-hospital and 30-day mortality, hospital length of stay, intensive care unit (ICU) length of stay, and factors associated with mortality.

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

Learning Objectives:

Identify first-line antimicrobial therapy for the treatment of ESBL bacteremia based on current Infectious Diseases Society of America guidance on resistant gram-negative infections.

Describe the impact of rapid diagnostic testing in combination with antimicrobial stewardship support on outcomes in patients with bacteremia as identified in literature.

Self Assessment Questions:

1. Which of the following is a recommended agent for ESBL E. coli bacteremia according to the IDSA guidance for resistant gram-negative infections?

- A. Piperacillin/tazobactam
- B. Meropenem
- C. Cefepime
- D. Nitrofurantoin

2. Which of the following outcomes are improved with the use of rapid diagnostics in conjunction with active antimicrobial stewardship support in patients with bacteremia as identified in literature?

- A. Time to appropriate antimicrobial therapy
- B. Mortality
- C. Length of stay
- D. All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-540-L01-P

Incidence of Cytomegalovirus Infection in Kidney Transplant Recipients on Belatacept-based Versus Calcineurin Inhibitor-Based Immunosuppression

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Purpose: Cytomegalovirus (CMV) infection is a significant consideration in the post-transplant population given its negative impact on graft survival, mortality, and increased use of resources. Belatacept (Nulojix®) based immunosuppression regimens have been associated with increased incidences of CMV infection in comparison to other regimens. The goal of our study is to determine if the incidence of CMV infection is higher in our kidney transplant recipients treated with belatacept in comparison to calcineurin inhibitor-based regimens with tacrolimus.

Methods: This is a retrospective cohort study following patients who received a kidney transplant between 1/1/22 to 10/31/22 for 1 year post transplant. To determine if there is a correlation between belatacept use and incidence of CMV viremia, we are comparing three cohorts. The first cohort includes patients on an immunosuppressive regimen of belatacept, mycophenolate, and steroids, the second cohort includes tacrolimus, mycophenolate, and steroids, and the third cohort includes patients on tacrolimus and mycophenolate only. Our primary outcomes are incidence of CMV viremia, 12-month post-transplant patient and allograft survival. The secondary outcomes are peak viral load, time to clearance of CMV viremia, incidence of de-novo DSA, incidence of biopsy proven rejection, incidence of empirically treated rejection. Sub-study endpoints include incidence of CMV invasive disease, incidence of resistant CMV, incidence of refractory CMV, belatacept discontinuation during treatment of CMV, antiviral prophylaxis at the time of viremia, drug therapy for CMV treatment. We will be utilizing tests such as Kaplan-Meier, Anova, and Kruskal-Wallis to conduct our statistical analysis.

Results/Conclusions: From our renal transplant database 158 out of 213 patients met the inclusion criteria. Twenty-five patients are placed in cohort 1, 23 in cohort 2, and 110 in cohort 3. Data analysis is in progress and results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the significance of CMV infections in the renal transplant population.

Recognize the impact of belatacept on CMV infection.

Self Assessment Questions:

Which of the following organ is CMV infection most likely to affect?

- A. Eyes
- B. Heart
- C. Lungs
- D. A & C

Based on today's discussion, what conclusions can be made about belatacept?

- A. There is a potential association between belatacept and CMV infection incidence.
- B. There is a potential association between belatacept and CMV infection severity.

C. More research is necessary to draw a conclusion.

D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-643-L01-P

Effect of Vasopressin Dosage on Hemodynamic Response in Patients with Septic Shock

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Purpose: Septic shock is a potentially fatal condition that according to the US Centers for Disease Control and Prevention, affects approximately 1.5 million people annually, resulting in 250,000 deaths, or one of every three hospital deaths. Patients with septic shock can be clinically identified by the fact that they require a vasopressor to maintain a mean arterial pressure (MAP) of 65 mmHg or greater and having a serum lactate level greater than 2 mmol/L. Traditionally, norepinephrine has been the preferred vasopressor, while fixed dose vasopressin (AVP) has been used as an addition to norepinephrine. The Surviving Sepsis guidelines recommend a dosage up to 0.03 units/min, which is based on the VASST trial (Vasopressin and Septic Shock Trial) which demonstrated a mortality benefit to patients with less severe septic shock treated with low dose vasopressin in addition to norepinephrine compared to norepinephrine alone. However, the optimal dosage of vasopressin for patients with septic shock remains controversial. This study purpose is to compare outcomes in survival and response between vasopressin dosages of 0.03 u/min and 0.04 u/min for adult septic shock patients at Henry Ford Health.

Methods: This system-wide retrospective cohort study includes patients from 01/01/2023-12/31/2023. Adult patients (≥18 years old) screened for septic shock who were initiated on vasopressin as an adjunct to catecholamine vasopressor were included. Patients excluded were those transferred from another hospital, patients that died within the first 48-hours of vasopressin initiation, and those whose vasopressin orders were not indicated for sepsis therapy. The primary outcome of this study is vasoactive medication duration, defined as total duration in days of NE-equivalent catecholamine dosage after initiation of AVP. The secondary endpoints are early mortality, ICU length of stay, and total vasoactive dose exposure.

Results: Data analysis in progress. Results and conclusions to be presented at GLPRC.

Learning Objectives:

Describe the potential impact of vasopressin dosages on patient outcomes, including mortality rates and length of stay in the intensive care unit.

Discuss whether the presented evidence supports or challenges existing guidelines related to the dose of vasopressin used in septic shock.

Self Assessment Questions:

Which of the following outcomes was associated with vasopressin doses exceeding 0.05 units/min in prior research?

A. Decreased overall vasoactive medication duration

B. Increased incidence of mortality

C. Decreased ICU length of stay

D. Increased concurrent norepinephrine doses

In the study conducted by Bauer et al. in 2019, which of the following outcomes exhibited a significant difference between patients receiving 0.03 u/min versus 0.04 u/min of vasopressin?

A. 28-day mortality rate

B. ICU length of stay

C. Maximum NE-equivalent catecholamine dosage within 24 hours of AVP initiation

D. Vasoactive medication duration after AVP initiation

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-680-L01-P

Evaluation of high- versus low-dose octreotide for high output states: a single center, retrospective experience

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Statement of Purpose:

High output from abdominal fistulas, small bowel ostomies, and abdominal drains is an uncommon but serious complication of abdominal surgery and trauma, associated with a mortality rate of 5% to 20%. Management typically involves a multifaceted approach, including wound care, nutritional optimization, and pharmacotherapy to reduce output. Octreotide, known to slow bowel transit, increase intraluminal viscosity, and decrease total daily output, is commonly utilized for this purpose. However, data guiding its use are limited to small-scale trials and case series. This retrospective, single-center cohort study, conducted at a quaternary referral, academic level 1 trauma center aims to evaluate treatment response to different octreotide dosing regimens in patients with high output states.

Statement of Methods Used:

Adults who received ≥48 hours of octreotide during hospitalization for high output state, defined as any condition involving abdominal fistula, small bowel ostomy, or intraabdominal drain with ≥500 mL of recorded output per 24-hour period will be included. Exclusion criteria include pregnancy, incarceration, and the use of octreotide for indications other than high output states. Patients will be categorized into two cohorts based on octreotide dosage: high dose (≥600 mcg/day) and low dose (<600 mcg/day). The primary outcome is the proportion of patients achieving treatment response, defined as a ≥20% reduction in 24-hour output within 7 days of octreotide initiation. Secondary outcomes include enteral feed tolerance, incidence of electrolyte abnormalities, treatment failure rates (<20% reduction in 24-hour output), and partial treatment response rates (between 1-20% reduction in 24-hour output).

Summary of (preliminary) results to support conclusion:

Preliminary findings suggest no significant difference in treatment response rates between cohorts. Further data analysis is ongoing and complete results will be presented at the GLPRC conference.

Conclusions reached:

A conclusion will be forthcoming based upon complete results of the study

Learning Objectives:

Discuss the current treatment options for high output states and the role of octreotide.

Recognize the paucity of data in different octreotide dosing regimens and highlight the role of the study in current literature.

Self Assessment Questions:

Which of the following treatments is a part of a multimodal approach for the treatment of high output states?

- A. Anti-secretory medications (i.e. Proton-pump inhibitors)
- B. Appropriate bowel regimen
- C. Encouraging patient to be up and out of bed as much as tolerated
- D. Pro-kinetic agents (i.e. metoclopramide)

What statement is true regarding the current literature supporting the use of octreotide for high output states?

- A. Many high-quality studies demonstrate the efficacy of octreotide for high output states
- B. Several small studies and case series demonstrate the potential efficacy of octreotide but no literature evaluates different dosing regimens
- C. Current literature suggests octreotide is unsafe for high output states due to the risk of cholestasis
- D. Data suggests that octreotide is an effective agent and should be used first line for the treatment of high output states

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-856-L01-P

Comparing In-person vs. Telehealth Kidney/Pancreas Transplant Suitability Evaluation by Pharmacist

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Purpose: Solid Organ Transplantation is the most regulated healthcare specialty in the U.S. The Organ Procurement & Transplantation Network and Centers for Medicare & Medicaid Services mandate the inclusion of a transplant pharmacist or pharmacology expert on the multidisciplinary transplant teams. During transplant suitability evaluation, pharmacists educate patients about transplant medications but also identify and mitigate medication-related issues that could become adherence barriers. Our transplant center at the University of Illinois Hospital (UIH) shifted from in-person to telehealth suitability evaluation for kidney and pancreas transplants in 2020 due to the pandemic. The purpose of this study is to evaluate how the transition impacted pharmacist's ability to identify potential barriers to transplantation. Methods: This was a retrospective study of all transplant candidates who underwent suitability evaluation at UIH. The in-person cohort includes patients assessed for kidney/pancreas transplantation at UIH Transplant Center from September 2018 to August 2019. The telehealth cohort comprises those evaluated via telehealth for kidney/pancreas transplantations from January to December 2022. Exclusions include individuals under 18 years old and individuals assessed for transplantations other than kidney or pancreas. Data collection involves reviewing pre-transplant pharmacist assessment notes in the electronic health record system, with approximately 700 patients in each cohort. Notes will be assessed based on a created list of barriers. Despite some changes in the assessment approach, data collection focuses on consistent core elements. Primary outcome: Average number of questions answered on the suitability evaluation survey. Secondary outcomes: Response rate and answers to each question. Statistical analyses: Chi-square test for categorical data and student's t-test for continuous data. Results and conclusions: In progress.

Learning Objectives:

List a pharmacist's role in transplant suitability evaluation

Recognize medication-related issues that could become adherence issues and lead to potential barriers to organ transplantation.

Self Assessment Questions:

Which of the following is/are a pharmacist's role(s) in transplant suitability evaluation?

- A. Educating patients about the mechanisms and side effects of pre-and post-transplant medications
- B. Identifying and mitigating medication-related issues that could become barriers to organ transplantation
- C. Evaluating patients' knowledge about the indications, dosage, and directions of their medications
- D. All of the above

Which of the following can potentially become an adherence issue and lead to barriers to organ transplantation?

- A. Always taking their medications as directed
- B. Missing at least one dose every day
- C. Discussing with the healthcare providers before stopping taking medications
- D. Never stop taking their meds because it is too expensive or lost insurance

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-839-L01-P

Incidence and Identification of Risk Factors for Multi-Drug Resistant Organisms in Community Acquired Pneumonia

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Purpose: Based on the 2019 ATS/IDSA community-acquired pneumonia (CAP) guidelines, initial inpatient treatment decisions for broad-spectrum antibiotic coverage should be based on locally validated risk factors. This study aims to determine the percentage of CAP caused by multiple drug resistant organisms (MDROs) at Trinity Health Oakland (THO) and identify risk factors that will guide empiric antibiotic selection for those at risk for MDRO CAP. The results of this study will assist providers in the selection of empiric antibiotics if certain risk factors are highly associated with MDROs.

Methods: This study will be a single center, retrospective chart review. MDROs will be defined as the following pathogens: Pseudomonas aeruginosa (PSA), methicillin-resistant Staphylococcus aureus (MRSA), and extended-spectrum beta-lactamase producing gram-negative bacilli (ESBL GNB). Patients were included in the study if they had a diagnosis of CAP, admitted to inpatient stay, and had a positive respiratory culture drawn within 48 hours of admission with susceptibilities reported. Patients younger than 18 years old or diagnosed with hospital/ventilator acquired pneumonia were excluded. The primary endpoint will assess the percentage of CAP caused by MDROs. The secondary endpoint will evaluate the incidence rate of CAP caused by MDROs for each risk factor included in the analysis. Our study power and alpha will be set at 80% and 0.05 with an estimated sample size of 194 subjects to achieve adequate power. Continuous variables will be described as the mean with standard deviation or median with range or interquartile range. Categorical variables will be described as frequency distributions. Univariable analysis of risk factors by group will be assessed using Student's t-test and the chi-squared analysis. Non-parametric tests will be performed for data that are non-normally distributed. Multivariable analysis of risk factors will be done using logistic regression.

Results: Results and conclusion will be presented at GLPRC.

Learning Objectives:

Review current guideline recommendations for the treatment of community acquired pneumonia

Describe data from findings and understand the role of the pharmacists as it pertains to antibiotic selection in community acquired pneumonia

Self Assessment Questions:

Based on the 2019 ATS/IDSA CAP guidelines, what would be an appropriate antibiotic regimen for empiric treatment of community-acquired pneumonia in an inpatient setting, without risk factors for MDROs?

- A. Meropenem + Azithromycin
- B. Ceftriaxone + Vancomycin
- C. Ceftriaxone + Levofloxacin
- D. Ceftriaxone + Azithromycin

Based on the 2019 ATS/IDSA CAP guidelines, what risk factors would indicate a patient is at high risk for MDRO CAP?

- A. Patient had a respiratory culture 5 months ago that grew methicillin-sensitive staphylococcus aureus (MSSA)
- B. A patient with chronic hemodialysis three times weekly, now presenting with new onset altered mental status
- C. Patient had a previous hospitalization 2 months ago and received IV ceftriaxone for a UTI
- D. An immunocompromised patient with no recent hospital exposure now requiring 2 liters of oxygen via nasal canula

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-746-L01-P

Impact of Glucagon-like Peptide-1 Receptor Agonists Prior to Bariatric Surgery

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Background: With the increase in prevalence of obesity with in the United States (42.4%) there has been an increase in both surgeries and medications implemented to manage obesity. The number of bariatric surgeries performed in the U.S. increased from 158,000 in 2011 to 262,893 in 2021, with the sleeve gastrectomy being the most common surgery (58% of bariatric surgeries). Some glucagon -like peptide1 (GLP-1) receptor agonists are FDA-approved for weight loss and recent studies have been performed testing the effect of GLP-1 medications after surgery. There are no studies analyzing the relationship of GLP-1 medication use prior to bariatric surgery. The purpose of this study is to assess the impact on weight loss when GLP-1 medications are used prior to a sleeve gastrectomy.

Methods: This study is a single-site retrospective review of patient receiving a sleeve gastrectomy between the dates of 1/1/2022 and 2/28/2023 . Patients were divided into two groups: those who received GLP-1 medication prior to surgeries and those who did not receive any weight loss medications prior to surgery. Patients were matched based on baseline characteristics including Body Mass Index age, gender, ethnicity, and history of diabetes. The primary endpoint was excess body weight loss at 12 months post-surgery. Additional endpoints include excess body weight loss at 3-month intervals up to 12 months and the need for GLP-1 medication use post-surgery.

Results/Conclusions: Data analysis is currently in progress and results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review the mechanism of action of GLP -1 receptor agonists.

Discuss the roles of GLP-1 receptor agonists and bariatric surgeries in weight management.

Self Assessment Questions:

Which of the following is true in regard to GLP-1?

- A. Increases peripheral sensitivity to insulin
- B. Increases glucagon secretion
- C. Decreases gastric emptying
- D. Decreases beta cell function

Which of the following goals at 9 months would constitute a successful weight loss following a sleeve gastrectomy?

- A. Excess weight loss of 60%
- B. Weight loss of 30 pounds
- C. BMI reduction by 10%
- D. Excess weight loss of 20 pounds

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-635-L01-P

Assessment of Vancomycin Trough Levels Before and After Implementation of an Area Under the Curve (AUC) Dosing Calculator

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Purpose: Prior to December 2019, inpatient vancomycin dosing at Indiana University Health Ball Memorial Hospital was primarily based on weight, estimated renal function, and therapeutic drug monitoring with specified serum trough goals. In December 2019, the hospital transitioned to an AUC-based approach for vancomycin dosing and implemented an AUC dosing calculator to help guide pharmacists when initiating and modifying therapy. The purpose of this research is to assess the impact of the AUC dosing calculator on vancomycin trough levels before and after its implementation.

Methods: This retrospective, quality improvement study has been approved and exempted from comprehensive review by the hospital's Institutional Review Board. The study will include patients admitted to the hospital from January 1, 2018 through December 31, 2021 who received vancomycin. Patients will be identified using the hospital's electronic medical record and will be placed into two study groups: "pre-implementation and post-implementation of the AUC dosing calculator. Exclusion criteria include: patients that were under the age of 18, required any form of renal replacement therapy, received one-time doses or intermittent dosing, or were pregnant. The following information will be collected for each study group: age, weight, gender, ethnicity, indication for treatment, length of treatment, concomitant antimicrobials, length of stay, baseline and subsequent serum creatinine values, estimated creatinine clearance, and vancomycin trough levels. The primary outcome investigated will be the percentage of patients in each study group with vancomycin trough levels below 10 mCg/mL, between 10 and 20 mCg/mL, and above 20 mCg/mL. The secondary outcome investigated will be the percentage of patients in each study group that sustained an acute kidney injury as defined by the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines.

Learning Objectives:

Discuss current literature and recommendations regarding vancomycin dosing and monitoring

Identify the impact of an AUC dosing calculator on therapeutic drug monitoring and incidence of acute kidney injury

Self Assessment Questions:

What is the optimal pharmacokinetic/pharmacodynamic predictor of efficacy for vancomycin?

- A. C_{max}/MIC ratio of 10 to 1
- B. AUC/MIC of 400-600 mg*hour/L
- C. T>MIC at least 70% of the dosing interval
- D. Trough level of 15-20 mCg/mL

Which adverse reaction associated with vancomycin may be mitigated with the use of AUC-based dosing?

- A. Thrombocytopenia
- B. Phlebitis
- C. Nephrotoxicity
- D. C. difficile colitis

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-742-L01-P

Short versus Long Duration of Antibiotic Therapy in Pediatric ICU Patients with Uncomplicated Community Acquired Pneumonia - Impact of an Institutional Guideline Update

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Community acquired pneumonia (CAP) is a significant cause of morbidity and antibiotic overutilization among the pediatric population. The 2011 IDSA guidelines recommend a treatment duration of 10-days for pediatric CAP but recognize that shorter courses may be appropriate in certain settings. In 2022, based on newer literature and extrapolations from the IDSA adult CAP guidelines, Michigan Medicine updated its own institutional guidelines to recommend an antibiotic duration of 5-days to treat uncomplicated CAP in hospitalized pediatric patients. However, there remains limited evidence to support a shorter duration of therapy for patients admitted to the pediatric intensive care unit (PICU).

The objective of this study will be to assess antibiotic utilization for the treatment of CAP among PICU patients before and after the institutional guideline update. This will be a single-center, retrospective cohort study. Children aged 6 months to <18 years who have a confirmed diagnosis of CAP and are admitted to the PICU between November 2016 to December 2023 will be included. Patients with complicated CAP, hospital acquired or ventilator associated pneumonia, confounding comorbidities, or suspicion for alternative diagnoses will be excluded. The primary outcome will be treatment failure: a composite of death (after at least 5 days of antibiotic therapy), hospital readmission, emergency department or outpatient visit, or need for antibiotic retreatment (all attributable to the initial pneumonia) within 30-days after completing therapy. The secondary outcomes will be average duration of treatment and overall guideline compliance. Data collection and analysis is in progress.

This research is significant because patients in the PICU may have underlying medical conditions and present with moderate-severe respiratory distress which could impact optimal treatment duration for CAP. The study results will elucidate whether this patient population should be treated with a shorter course of antibiotics; thus, avoiding harms associated with antibiotic overutilization.

Learning Objectives:

Discuss the morbidity of CAP for pediatric patients and repercussions of excessive antibiotic use in this population

Recognize whether shorter durations of antibiotic therapy affect treatment outcomes among patients in the pediatric ICU with community acquired pneumonia

Self Assessment Questions:

What duration of therapy is recommended by the Pediatric Infectious Diseases Society and Infectious Diseases Society of America for the treatment of uncomplicated community acquired pneumonia in children?

- A. 10 days
- B. 7 days
- C. 5 days
- D. 3 days

What is a benefit of treating patients with shorter courses of antibiotics for simple infections?

- A. Bolster the natural immune response
- B. Decrease incidence of opportunistic infections
- C. Prevent all antibiotic related adverse drug reactions
- D. Further the development of multi-drug resistant organisms

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-604-L01-P

Real World Outcomes of Core Binding Factor Acute Myeloid Leukemia without Gemtuzumab Ozogamicin

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Core binding factor acute myeloid leukemia (CBF-AML) is characterized by distinct cytogenetic abnormalities, t(8;21) and inv(16), that result in impaired myeloid differentiation. CBF-AML is considered favorable risk due to high response rates to induction therapy and higher overall survival (OS) rates relative to other subtypes of AML. Gemtuzumab ozogamicin (GO) is a CD33 targeting antibody-drug conjugate approved for use in AML. A meta-analysis of 5 randomized trials, showed an OS benefit in favorable risk AML. However, the trials had a significant heterogeneity in their regimens, and patient populations. Additionally, it included early results from ALFA-0701 which initially showed an OS benefit with GO that disappeared on longer follow-up. As such, despite its approved place in therapy, GO lacks a consensus on its overall benefit in CBF-AML. In light of the available data, the primary objective of this research is to report real world outcomes of CBF-AML patients treated without GO.

This is a single center, retrospective cohort study of CBF-AML patients treated without GO at University of Michigan Health (U-M Health) from January 1, 2017, to July 1, 2023. Patients will be included if they are ≥ 18 years old, have newly diagnosed CBF-AML, and received induction chemotherapy without GO. Patients will be excluded if they had chemotherapy initiated outside of U-M Health, have incomplete records, or were treated on a pediatric protocol. The primary outcome is median overall survival. Secondary outcomes are response rates after induction chemotherapy, median event free survival (EFS), and identification of predictors for inferior OS. Descriptive statistical analysis will be performed, with Kaplan Meier curves for EFS and OS, and a cox proportional hazards regression for predictors of poor outcomes. The results of the study will be presented at the conference.

Learning Objectives:

Review the currently available data on the use of Gemtuzumab ozogamicin for Core Binding Factor Acute Myeloid Leukemia

Discuss the current treatment approach for Core Binding Factor Acute Myeloid Leukemia patients at University of Michigan Health System

Self Assessment Questions:

What are the distinct cytogenetic abnormalities that characterizes core binding factor acute myeloid leukemia?

- A. t(9;22) and inv(16)
- B. t(8;21) and inv(16)
- C. t(8;21) and inv(13)
- D. t(15;17) and t(6;11)

What risk group is assigned to patients with core binding factor acute myeloid leukemia based on their cytogenetic abnormalities?

- A. Intermediate risk
- B. High risk
- C. Favorable Risk
- D. Adverse Risk

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-665-L01-P

Correlation of PhORCAS Letters of Recommendation and Clinical Aptitude

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Historically, ideal pharmacy residency candidates were identified through excellent letters of recommendation (LOR), strong letters of intent and prior experience.

Since the Pharmacy Online Residency Centralized Application System (PhORCAS) was implemented, the utility of LORs has been called into question due to the standardized formatting and quantitative rankings. Residency programs place a high value on clinical skills; therefore, many programs incorporate clinical assessment as part of the interview. Currently, there is a gap in the literature to provide guidance on what components of candidates' applications are predictive of clinical competence.

At The Ohio State University Wexner Medical Center (OSUWMC), a clinical case is administered as part of the interview process to quantify the clinical aptitude of candidates objectively. This study sought to identify if certain features of LOR correlate with how candidates perform on the clinical case administered during their interview. A standard clinical case was administered to each candidate interviewed for OSUWMC's Post-Graduate Year 1 (PGY1) pharmacy residency program between 2021 to 2024, and an objective score was assigned based on a standardized rubric evaluated by a consistent reviewer. Each interviewed candidate's LORs was assessed for key features, including whether clinical skills were listed as a strength and other similar statements that may convey positive attributes of clinical abilities. The study's primary outcome was to evaluate the correlation between applicants' LOR and their performance on the clinical case. Retrospective data collection is in progress via Redcap® and the results are pending. The results of this study may contribute to programs' ability to more effectively utilize LOR to screen for clinical competency.

Learning Objectives:

Discuss current literature available on the utility of letters of recommendation in pharmacy residency applications

Describe the relationship between key components of residency applications and letters of recommendation to clinical aptitude of PGY1 residency candidates

Self Assessment Questions:

Which of the following was found to be poorly correlated with normalized application scores in the study by Atiyah and colleagues?

- A. Clinical case scores
- B. Reference characteristic ratings
- C. Age
- D. Gender

In the standardized recommendation form, the rating scales went from 4 options in the original form to _ options in the 2023-2024 updated form?

- A. 3
- B. 5
- C. 6
- D. 7

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-870-L99-P

Evaluation of loop diuretic efficacy with or without concomitant albumin administration

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Purpose: Hospitalized patients frequently receive loop diuretics to aid with excess volume removal. However, many patients experience diuretic resistance due to multiple mechanisms. One such mechanism reported in animal models is hypoalbuminemia. As a result, albumin is often co-administered with loop diuretics to enhance drug delivery to the site of action. Despite this theoretical benefit, literature supporting concomitant administration of albumin and loop diuretics is limited. This study aims to assess whether albumin administration with loop diuretics compared to loop diuretics alone results in increased 24-hour urine output.

Methods: The institutional review board approved this single center, observational study including all adult patients admitted to either the telemetry or critical care units at a regional cardiac referral center. Patients who received at least one dose of a loop diuretic during their admission to the aforementioned units were considered eligible for inclusion. Patients who additionally received at least one dose of albumin 25% within 2 hours of loop diuretic administration were included in the albumin-loop diuretic coadministration group. Patients were matched based on unit of admission, age, heart failure subgroups, estimated glomerular filtration rate, and loop diuretic dose. Key exclusion criteria included patients with a documented history of cirrhosis or nephrotic syndrome, and those with two or more unmeasured urine output occurrences. The primary endpoint was total urine output 24 hours post administration of the loop diuretic. Secondary endpoints included change in weight and serum creatinine at 24 hours, hospital length of stay, and intensive care unit length of stay.

Data analysis was performed utilizing the Chi-square or Fisher's exact test, Anderson Darling test, and Student's t-test or Mann-Whitney U test as applicable.

Results: Data collection and analysis is in progress

Conclusion: To be presented at the Great Lakes Pharmacy Regional Conference

Learning Objectives:

Describe the mechanisms contributing to diuretic resistance, focusing specifically on the influence of hypoalbuminemia.

Review the literature evaluating concomitant albumin and loop diuretic administration in aiding diuresis.

Self Assessment Questions:

Which of the following are potential drawbacks with albumin co-administration?

- A. High cost of therapy
- B. Bradycardia
- C. Delays in the use of more effective diuretic strategies
- D. A and C

For which of the following patient groups has the efficacy of albumin and loop diuretic coadministration been well-established through consistent, large-scale studies?

- A. Patients with nephrotic syndrome
- B. Patients with chronic kidney disease
- C. Patients with heart failure with reduced ejection fraction
- D. None of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-618-L01-P

Inhaled Versus Intravenous Tobramycin Therapy for Empiric Antipseudomonal Coverage in Ventilator-Associated Pneumonia: A Single Health System, Retrospective, Cohort Study

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Ventilator-associated pneumonia (VAP) is associated with high morbidity and mortality in critically ill patients. Empiric, broad spectrum antibiotics utilizing double antipseudomonal coverage are often necessary for treatment of VAP to ensure treatment of potential multidrug-resistant organisms. The use of aerosolized antibiotics may theoretically provide higher localized antimicrobial concentrations in lung parenchyma while decreasing systemic exposure and drug toxicities. Despite theorized benefit, there is little evidence describing patient outcomes related to the use of aerosolized aminoglycosides for treatment of VAP. This study aims to compare clinical outcomes between patients receiving empiric inhaled or intravenous tobramycin in combination with intravenous antipseudomonal antibiotics for treatment of VAP.

This single-health system, retrospective, cohort study was conducted at UC Health located in Cincinnati, Ohio. Adult patients admitted to an ICU who received inhaled or intravenous tobramycin for empiric double antipseudomonal VAP coverage were included. Exclusion criteria included a diagnosis of cystic fibrosis, pregnancy, active acute hematologic malignancy or oncologic neutropenic fever, use of who required IV tobramycin for other documented extrapulmonary infections or receipt of inadequate empiric antibiotic coverage based on respiratory microbiologic culture data.

The primary outcome compared the rates of treatment success between patients who received inhaled versus intravenous tobramycin as empiric double antipseudomonal VAP coverage. Secondary outcomes included 72-hour treatment success, incidence of acute kidney injury, changes in modified SOFA from baseline to end of therapy, and a time-dependent analysis of VAP clinical progression. Treatment success was defined as no escalation of antibiotics or worsening of baseline symptoms during or 24 hours after treatment. Morbidity and mortality outcomes, including ICU length of stay, hospital length of stay, and all-cause mortality, were also compared between groups.

Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Residents Conference in April 2024.

A conclusion will be forthcoming based on results.

Learning Objectives:

Discuss guideline-based empiric antimicrobial selection for treatment of VAP.

Describe the differences in treatment success associated with adjunctive inhaled versus intravenous antimicrobial therapy for VAP.

Self Assessment Questions:

Based on IDSA guidelines, which of the following is appropriate empiric therapy in a patient in the ICU with a new concern for VAP after being on a ventilator 7 days? The patient recently had an admission one month ago and received IV antibiotics at that time. To note, this ICU has >20% of S. aureus isolates that are methicillin resistant and >10% of Gram-negative isolates are resistant to standard monotherapy agents.

- A. Piperacillin/tazobactam + tobramycin
- B. Vancomycin + cefepime + tobramycin
- C. Ceftriaxone + vancomycin + ciprofloxacin

D. Linezolid + moxifloxacin + gentamicin

Which of the following is a primary outcome of this research project?

A. 72-hour treatment success

B. Rates of acute kidney injury

C. Ventilator duration

D. Rates of treatment success

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-690-L01-P

Evaluation of a Critical Care Pharmacist's Role in the Discontinuation of Midodrine when Initiated for Intravenous Vasopressor Weaning in Critically Ill Patients.

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Purpose: For some patients intravenous (IV) vasopressor therapy required to sustain normotension may be the only factor keeping them admitted to the Intensive Care Unit (ICU), increasing cost of care and risk of infection, immobility, delirium, and polypharmacy. Midodrine offers the potential to act as a bridge from IV vasopressor dependence, but is not without limitations, including a relatively short duration of action, adverse effects, and the need for dose titration. Close monitoring and individualized dosing are essential to optimize its benefits while minimizing adverse effects. If midodrine is not discontinued prior to ICU discharge, it may be continued inappropriately, increasing patients' risk for adverse effects and polypharmacy. The primary aim of this study was to assess the impact of a critical care pharmacist-driven protocol on the timeliness of midodrine down titration and discontinuation following its use for IV vasopressor weaning.

Methods: All patients included in this retrospective chart review were initiated on scheduled midodrine therapy for IV vasopressor weaning while admitted to an adult ICU at Norton Healthcare. Patients in the pre-implementation group were managed by providers without a protocol, and the post-implementation group was managed by a pharmacist-driven titration protocol. Patients who were less than 18 years old, were prescribed midodrine prior to admission, or were administered midodrine prior to IV vasopressors were excluded. The primary objective was to compare the rate of patients continued on midodrine therapy at discharge before and after the implementation of a pharmacist managed protocol. Secondary outcomes included time on IV vasopressor therapy following midodrine initiation, time to midodrine discontinuation, rate of concomitantly administered antihypertensive, adverse events commonly associated with midodrine, and rate of pharmacist compliance with the protocol, identified by completion of daily documentation.

Results and Conclusion: To be presented at the 2024 Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Identify the clinical impact of midodrine when used for IV vasopressor weaning.

Recognize the risks of midodrine continuation following IV vasopressor weaning.

Self Assessment Questions:

Midodrine therapy for IV vasopressor weaning may be associated with which of the following clinical outcomes?

A. Longer duration of IV vasopressor therapy

B. Increased mortality

C. Increased hospital length of stay

D. Decreased ICU length of stay

Which of the following is a risk of inappropriately continuing midodrine following IV vasopressor weaning?

A. Hypotension

B. Tachycardia

C. Polypharmacy

D. Decreased ICU length of stay

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-645-L01-P

Assessing the impact of a pharmacist-led harm reduction clinic at a rural Veterans Affairs (VA) healthcare system

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Purpose: In 2021 the Centers for Disease Control (CDC) estimated that 106,699 drug overdose deaths occurred in the United States. They also found increased rates of acute hepatitis C and injection drug use. Increasing access to and awareness of harm reduction services may improve the care of people who use drugs. The purpose of this quality improvement project is to assess the impact of the addition of a harm reduction coordinator pharmacist at a rural VA clinic.

Methods: This will be a prospective descriptive study located at the VA Illiana Health Care System in Danville, IL. Data will be collected by the PGY1 resident via the computerized patient record system (CPRS), which will be used to assist in chart reviews and identify patients with notes titled "Harm Reduction" or "Syringe Service Program". Data gathered will include clinic utilization, along with supplies dispensed such as syringes, fentanyl test strips, and services rendered such as pharmacist issued prescriptions for naloxone, buprenorphine, and pre-exposure prophylaxis (PrEP). No patient or provider information will be collected during this process. Throughout the data collection period, the resident will assist in the socialization of the clinic and its services to patients and staff by educating them on the clinic and its services in order to further integrate the use of harm reduction at the facility, and reach more patients that may benefit from harm reduction.

Data is currently being collected, and results will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify patients who may benefit from harm reduction education and potential barriers to seeking care

Recognize potential services offered by harm reduction clinics

Self Assessment Questions:

Which of the following may be barriers to care patients experience?

- A. Stigma
- B. Lack of awareness
- C. Expanding harm reduction services
- D. A & B

Which of the following may be appropriate harm reduction strategies in a patient who comes to the clinic for the first time reporting injectable drug and illicit opioid use?

- A. Naloxone distribution and education
- B. Tell them to come back after they have stopped using
- C. Sterile syringe kit
- D. A & C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-890-L08-P

Ceftriaxone use for low-risk AmpC-producing bacteria

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Purpose:

Ceftriaxone efficacy against Enterobacterales harboring the inducible AmpC gene may be compromised even if initial in vitro susceptibility is demonstrated. The Infectious Diseases Society of America recently categorized Enterobacterales with the inducible AmpC gene based on likelihood of clinically significant AmpC production, recommending that susceptibility results guide treatment of organisms in the low-risk group. Following this change, the study institution revised its susceptibility reporting protocols. The purpose of this study was to assess clinical outcomes among patients treated with ceftriaxone for infections caused by low-risk AmpC-producing bacteria.

Methods:

This was a single-center, retrospective evaluation of patients treated with ceftriaxone for infections caused by *Serratia marcescens*, *Morganella morganii*, or *Providencia* spp. Adult inpatients with non-urinary cultures positive for one or more of these organisms between August 29, 2022 and July 31, 2023 were screened. Patients were excluded if the index culture demonstrated resistance to ceftriaxone, other organisms necessitating broader spectrum antibiotics were present, or ceftriaxone was not administered for at least 3 consecutive days. The primary outcome was escalation of ceftriaxone to another antibiotic due to emergence of resistance or lack of clinical improvement.

Results:

Among 250 screened patients, 24 were included for analysis. The most common pathogen and source were *S. marcescens* (92%) and respiratory (58%), respectively. The primary outcome occurred in 6 (25%) patients and was driven exclusively by lack of clinical improvement. Only one of these patients had no other identifiable infection or disease state to explain their clinical status, and no patients developed ceftriaxone resistance during or within 30 days of ceftriaxone treatment.

Conclusion:

Clinical failure and emergent resistance were uncommon among patients treated with ceftriaxone for infections caused by low-risk AmpC-producing organisms. Given the limited sample size and potential confounding, further research is needed to validate these findings. No changes to institutional protocols are recommended.

Learning Objectives:

Describe the incidence of induced ceftriaxone resistance among low-risk AmpC-producing organisms

Discuss how the reported outcomes impact clinical practice as it relates to antimicrobial selection toward infections caused by low-risk AmpC-producing organisms

Self Assessment Questions:

Which of the following Enterobacterales with the inducible AmpC gene is considered by the Infectious Diseases Society of America to have a low-risk of producing clinically significant AmpC beta-lactamases?

- A. *Klebsiella aerogenes*
- B. *Enterobacter cloacae*
- C. *Serratia marcescens*
- D. *Citrobacter freundii*

The findings of the current study would best support the use of ceftriaxone in which of the following patients?

- A. A 68-year-old male with *Serratia marcescens* pneumonia
- B. A 20-year-old female with *Serratia marcescens* endocarditis
- C. A 45-year-old male with *Morganella morganii* bloodstream infection
- D. A 39-year-old female with *Providencia stuartii* epidural abscess

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-535-L01-P

Evaluating the clinical and financial impacts of integrating a clinical pharmacy team in an ambulatory endocrinology clinic

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Purpose:

Diabetes is a major chronic health condition that can lead to serious health complications. Pharmacists play a significant role in the interdisciplinary approach to managing diabetes and improving patients' quality of life. However, the impacts of adding a clinical pharmacy team (i.e., pharmacist and pharmacy technician or other pharmacist support positions) are not well studied. The purpose of this study is to evaluate the clinical and financial impacts of adding a clinical pharmacy team to the Baptist Health Medical Group (BHM) Endocrinology Clinic in Louisville, KY, in patients with type 2 diabetes mellitus (T2DM).

Methods:

This study is a single-center retrospective chart review comparing patients with T2DM who were enrolled in the pharmacy medication management program at BHM Endocrinology to those who received usual care from the endocrinology provider from November 1, 2021, through October 31, 2022. The primary endpoint is the mean change in hemoglobin A1c in both groups. Secondary endpoints include the mean change in bodyweight in kilograms, adherence expressed as proportion of days covered to pharmacist-managed T2DM medications, incidence of statin use, quality of life scores, and the percentage change in prescription revenue at Baptist Health Louisville Outpatient Pharmacy of pharmacist-managed T2DM medications.

Summary of (preliminary) results to support the conclusion:

Data collection and statistical analysis are currently in progress.

Conclusions:

Results and conclusions will be presented during the Great Lakes Pharmacy Resident Conference 2024.

Learning Objectives:

Discuss the potential clinical benefits of involving a pharmacist in patients' diabetes management.

Identify the potential financial impacts of involving a pharmacist in an ambulatory care clinic.

Self Assessment Questions:

Studies have determined that pharmacist involvement in patients' diabetes management has led to which of the following?

- A. Increased healthcare costs
- B. Reduction in hemoglobin A1c
- C. Decreased patient satisfaction
- D. Increased low-density lipoprotein cholesterol (LDL-C)

Which of the following is a potential financial impact of involving a pharmacist in an ambulatory care clinic?

- A. Decreased economic impact
- B. Increased health system costs
- C. Increased medication costs for patients
- D. Cost avoidance for the health system

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-586-L01-P

Evaluation of valproate for the treatment of acute agitation in critically ill patients

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Background: Agitation and delirium commonly affect patients in the critical care setting, leading to worse outcomes and longer hospital length of stay. Current recommendations for the treatment of these conditions are described in the Prevention and Management of Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU (PADIS) Guidelines. These guidelines recognize that the use of valproate and derivatives have shown efficacy in small studies for reducing agitation and delirium but should continue to be further evaluated.

Purpose: The aim of this study is to assess the efficacy of valproate in comparison to antipsychotic agents (including haloperidol, quetiapine, olanzapine, and ziprasidone) for managing agitation in critically ill patients.

Methods: This retrospective chart review included patients admitted to University Hospitals Cleveland Medical Center (UH CMC) from January 1st, 2021, to August 31st, 2023. Patients aged 18 to 89 were included if admitted to an intensive care unit at UH CMC, received one of the study agents for agitation, and received the study agent for at least 2 consecutive days. Patients were excluded if study agents were initiated before admission, for reasons other than agitation, or as part of hospice care. The primary outcome was the change in agitation level, measured as the mean Richmond Agitation-Sedation Scale (RASS) score 24 hours prior to medication administration compared to the mean RASS score 48 hours after medication administration. Secondary outcomes included the addition or removal of antipsychotic medications, benzodiazepines, and/or dexmedetomidine within 48 hours of study medication initiation, time within the goal RASS score, and prescribing practices of valproate when used for agitation. Safety outcomes include the incidence of oversedation, extrapyramidal side effects, QTc prolongation, and hyperammonemia.

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

Learning Objectives:

Recall the current PADIS guideline recommendations for the management of agitation

Discuss the proposed mechanism of valproate for agitation and its possible safety concerns

Self Assessment Questions:

Which of the following is not an adverse effect of valproate?

- A. Hepatotoxicity
- B. Thrombocytopenia
- C. Insomnia
- D. Hyperammonemia

According to the 2018 PADIS guidelines which of the following is the current recommendation for use of valproate in agitation and delirium treatment

- A. Valproate should be utilized in all patients for treatment based on data from multiple randomized control trials
- B. Valproate should not be recommended for treatment as there is no current literature to support its use
- C. Valproate may be considered for use based on several small studies, though should continue to be evaluated

D. Valproate should be considered for use in patients who have not had resolution of agitation and delirium after failing multiple antipsychotic agents

Q1 Answer: C Q2 Answer: C

ACPE Universal Activity Number 0121-9999-553-L01-P

Short vs. Long Durations of Antibiotic Therapy for Pyelonephritis in Kidney Transplant Recipients

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Purpose: Urinary tract infections are common complications among renal transplant patients. Due to increasing resistance and a lack of new antimicrobial agents in the pipeline, optimizing treatment is paramount. Emerging data (including in transplant patients) suggests shorter durations are effective and safe. The objective of this study is to compare outcomes of short (7-9 days) vs long (10-15 days) durations of antibiotic therapy for acute graft pyelonephritis.

Methods: This is an IRB-approved retrospective cohort study conducted at a large academic health center in southeast Michigan. Adult patients hospitalized from January 1st, 2014 to December 31st, 2023 with a history of kidney transplant, acute pyelonephritis and receipt of at least 7 days of in vitro active antibiotic therapy were included. Pyelonephritis was defined as >104 CFU/mL uropathogen, >10 mm3 WBCs on urinalysis and fever and/or bacteremia. Patients were excluded if they were diagnosed with renal or perinephric abscess or prostatitis or diagnosed with pyelonephritis in the first 2 months post-transplant. Patients receiving short courses of antimicrobials (7-9 days) were compared to patients receiving long courses of antimicrobials (10-15 days). The primary endpoint of this study was clinical success, defined as resolution of infection signs and symptoms and confirmed or presumed microbiologic success at end of therapy. Secondary endpoints included length of stay from UTI onset, continued resolution of signs and symptoms at 30 days, C. diff within 30 days of treatment completion, incidence of biopsy-proven acute rejection, and adverse effects related to drug therapy. The estimated target sample size was 212 patients (106 patients per group), assuming an alpha of 0.05 and beta of 0.2, to detect a 12% difference between groups, with an assumed baseline clinical success rate of 95% in the long duration group.

Conclusions: Will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Describe the potential consequences of pyelonephritis in kidney transplant recipients

Discuss the optimal duration of therapy for pyelonephritis in kidney transplant patients

Self Assessment Questions:

1. By what percent does pyelonephritis increase risk of graft rejection?

A. 2-25%

B. 12-35%

C. 22-45%

D. 32-55%

2. What is the duration of treatment for pyelonephritis recommended by the American Society of Transplantation guidelines?

A. 7 days

B. 7-14 days

C. 14 days

D. 14-21 days

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-547-L01-P

Evaluation of Initial Antibiotic(s) Use in Patient's with Community Acquired Pneumonia at a Community Hospital

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Statement of purpose: Community acquired pneumonia (CAP) is a common and potentially serious pulmonary infection most commonly caused by bacteria. Due to the diverse range of possible etiologies, empiric antibiotics are routinely initiated before the distinct causative agent is identified. The purpose of this study is to evaluate provider adherence at McLaren Oakland Hospital to predefined institutional recommendations regarding proper initial antibiotic use in the treatment of CAP.

Methods: This is a retrospective observational study design. Patient records utilizing the electronic medical record will be queried and adult patients 18 and older admitted with CAP and treated with intravenous antibiotics from January 2023 through May 2023 at McLaren Oakland Hospital will be included. Variables will include, but are not limited to, basic patient demographics (ex. age and sex), history (ex. previous pneumonias), comorbidities (ex. COPD, asthma, or history of immunocompromised state), admission criteria (CAP, severity), antibiotics utilized, dosages, duration, as well as hospital course (complications, length of hospital stay etc.). Exclusion criteria will include human immunodeficiency virus (HIV), pneumocystis pneumonia (PCP), aspiration pneumonia, hospital-acquired pneumonia (HAP), patients involved in clinical trials or those who are incarcerated. The primary outcome measure will be percent adherence to the institution's recommended guidelines for first and second-line antibiotics. The secondary outcome is duration of antibiotic(s) treatment.

Results: The majority of patients (86% vs 14%) were initiated on ceftriaxone + azithromycin, which is the hospital's first preferred regimen, followed by ceftriaxone plus doxycycline (second preferred regimen). Out of 100 patients, 61% completed their antibiotics with an appropriate duration, while 39% did not.

Conclusion: Most providers utilized appropriate antibiotics using the institutional standard set predefined by the hospital. Education will be provided to the medical residents on the importance of utilizing built in order sets and on the appropriate duration of therapy for CAP.

Learning Objectives:

Discuss treatment options for community acquired pneumonia

Recognize the appropriate duration of antibiotic therapy for community acquired pneumonia

Self Assessment Questions:

According to the IDSA guidelines for CAP, which of the following is an appropriate duration of therapy?

A. Azithromycin for 3 days; ceftriaxone for 5 days

- B. Azithromycin for 5 days; ceftriaxone for 5 days
- C. Azithromycin for 7 days; ceftriaxone for 7 days
- D. Azithromycin for 5 days; ceftriaxone for 7 days

Which of the following is a multi-drug resistant risk factor associated with community acquired pneumonia?

- A. COPD
- B. IV antibiotics in the past 90 days
- C. Hospitalized for > 1 day
- D. Substance use disorder

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-576-L01-P

Effect of Time to Initiation of Hyperinsulinemia Euglycemia Therapy

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Statement of Purpose: Calcium channel blocker and beta blocker overdose can cause significant hemodynamic compromise and lead to substantial morbidity and mortality. Hyperinsulinemia euglycemia therapy (HIET) has become a common pharmacologic treatment option for these patients due to its theorized mechanism of action of increasing cardiac output. By improving myocardial utilization of carbohydrates, contractility increases, and its vasodilatory effects lead to a decrease in systemic vascular resistance causing an increase in cardiac output. The optimal timing of initiation of HIET has yet to be fully elucidated. This study aims to evaluate the effect of early versus late initiation of HIET on morbidity and mortality in calcium channel blocker and beta blocker overdose.

Statement of Methods Used: This retrospective, two-center, observational cohort study will include adult patients treated with high dose insulin infusion at doses of 0.5 units/kg/hr of regular insulin for suspected calcium channel blocker or beta blocker overdose at the University of Cincinnati Medical Center and West Chester Hospital from January 2013 through October 2023. Patients will be stratified into the early initiation cohort or late initiation cohort based on the median time from presumed ingestion to time to initiation of HIET of the study population. The primary outcome will be the incidence of all-cause, in-hospital mortality in patients receiving early versus late initiation of HIET for calcium channel blocker or beta blocker overdose. Secondary outcomes include but are not limited to intensive care unit (ICU) mortality, ICU and hospital length of stay, vasopressor-free days, time from initiation of hyperinsulinemia euglycemia therapy to time of death, time on mechanical ventilation, use of additional supportive therapies, and safety endpoints.

Summary of Preliminary Results: Data collection and analysis are on-going. Results will be presented at Great Lakes Pharmacy Resident Conference in April 2024.

Conclusions Reached: Conclusions will be forthcoming based on results.

Learning Objectives:

Describe the mechanisms of action of hyperinsulinemia euglycemia therapy for calcium channel and beta blocker overdose.
Describe the place in therapy of HIET for calcium channel and beta blocker overdose.

Self Assessment Questions:

One of the proposed mechanisms of action of HIET for the treatment of CCB/BB overdoses includes which of the following?

- A. Direct action on the G-protein to convert ATP to cAMP.
- B. Vasoconstrictive effect of insulin leading to increased systemic vascular resistance.
- C. Blockade of L-type calcium channels in pancreatic beta cells.
- D. Restoration of the ability of cardiac myocytes to utilize glucose for energy.

Which of the following is the primary aim of this research project?

- A. Describe additional supportive therapies that can be used in conjunction with HIET.
- B. Prove HIET is a safe therapy by describing rate of incidence of safety events post calcium channel blocker/beta blocker overdose protocol initiation.
- C. Describe the impact of time to initiation of HIET on mortality in CCB/BB overdose.
- D. Prove HIET is superior to the previously described supportive therapies.

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-579-L01-P

Evaluation of a Pilot Competency for Clinical Pharmacists in a Large, Independent Hospital

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There is not one definitive method of assessment known to be most effective in evaluating competency of a clinical pharmacist. The majority of literature surrounding methods of assessing competency involve two populations: physicians and teachers. The difficulty in establishing a competency for clinical pharmacists lies within the variability of clinical pharmacist roles, responsibilities, and fields of expertise. This variability is often wider than that of the fields containing literature on the topic. The purpose of this research project is to evaluate the implementation of a clinical pharmacist competency assessing pharmacist's role in the treatment of patients with sepsis.

This study is an educational, retrospective pretest/posttest study. First, pharmacists were asked to review recent literature on sepsis and completed a case-based reflection of their own treatment of a septic patient. Following this, pharmacists completed a retrospective pretest and posttest reflecting on confidence in their abilities to apply guidelines to treatment, make appropriate recommendations, and safely monitor patient therapy. This included areas such as fluid resuscitation, antibiotic use, and vasopressor therapy. Pharmacists selected choices on a four-point Likert scale to display confidence level of each aspect of care. Results of the identical pretest and posttest are being analyzed for a statistically significant change in pharmacists from beginning to end of the competency.

Results for this study are pending as data is actively being collected. Results from the pretest/posttest Likert scales will be analyzed for a statistically significant increase between the two. The Wilcoxon Signed-Rank test will be used to analyze the data. Medians will be calculated to describe the data collected.

Conclusions made from the study are pending as data remains to be collected and analyzed.

Learning Objectives:

Review the various methods of assessment used for healthcare professionals in order to prove competency.
Identify the methods used to determine significance when assessing results of a pretest/posttest study.

Self Assessment Questions:

Pharmacists are categorized as clinical pharmacists based on which parameters?

- A. Level of interaction with patients
- B. Board certification with BCPS or another specialized certification
- C. Percentage of time spent on clinical activities versus dispensing, administration, etc.
- D. There is no standard method of defining a clinical pharmacist

Determining the type of data in a study is an important step to accurately analyze results. Which category of data are Likert scales placed into?

- A. Nominal
- B. Ordinal
- C. Interval
- D. Ratio

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-757-L04-P

Review of the Effects Patient Financial Assistance has on Glycemic Control in Patients with Type I and Type II Diabetes Mellitus

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This study examined the effects of patient financial assistance via manufacturer programs and the Marshall Pharmacy 340B program on glycemic control in patients with type I and type II diabetes mellitus (DM). Records for patients in the Marshall Health Endocrinology Clinic enrolled in patient financial assistance were reviewed retrospectively. Patients were included if they were age 18 years or older, diagnosed with type I or II DM, enrolled in patient assistance through either manufacturer programs or Marshall Pharmacy 340B program, and had at least 6 months of glycemic data (i.e., A1c) prior to patient assistance enrollment and 6 months after, excluding 6 months of washout immediately after enrollment. A1c measurements had to be taken at least 90 days apart. Patients were excluded if they were enrolled in patient assistance for medications not indicated for the treatment of DM or if they became deceased within the 12-month period after patient assistance enrollment. Data recorded for patients who met criteria included: hemoglobin A1c; age; gender; ethnicity; BMI; insurance; if the patient was enrolled in assistance prior to, at time of, or after DM diagnosis; and when the medication being covered under patient assistance was started. The outcome was the rate of change in A1c in patients who received manufacturer patient assistance versus those that did not. This is a post hoc analysis intended to inform relative benefit of patient assistance programs and may illustrate the importance of addressing barriers patients face in obtaining medication. Final results and conclusions pending. This data will be presented at the Great Lakes Pharmacy Resident conference. The speaker has no actual or potential conflict of interest in relation to this presentation.

Learning Objectives:

Review A1c goals for patients with diabetes mellitus.

Identify the patient characteristics that may contribute to barriers in medication compliance.

Self Assessment Questions:

Which of the following A1c values is consistent with a diagnosis of diabetes?

- A. 0.065
- B. 0.059
- C. 0.06
- D. 0.063

Which of the following patient characteristics may be a barrier to medication compliance?

- A. Cost of medication
- B. Transportation to pharmacies for prescription pick-up
- C. Lack of insurance coverage for medications
- D. All the above

Q1 Answer: A Q2 Answer: D

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

Impact of a Transition from Alteplase to Tenecteplase for Acute Ischemic Stroke on Door-to-Needle Time

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Purpose: Stroke is the fifth leading cause of death in the United States. Currently, alteplase is the only FDA-approved thrombolytic for Acute Ischemic Stroke (AIS). However, more institutions are transitioning to tenecteplase from alteplase for AIS due to the ease of use and increased safety data despite the lack of FDA approval. Union Hospital switched from alteplase to tenecteplase in January 2023. This study aims to confirm that this transition was associated with an improved door-to-needle (DTN) time and to assess patient safety outcomes. Methods: This will be a single-center, retrospective cohort study conducted via chart review at Union Hospital in Terre Haute, Indiana, from January 7, 2022, to January 6, 2024. This study will include patients at least 18 years of age who received alteplase or tenecteplase in the emergency department (ED) for AIS within 4.5 hours of last known well. Patients will be excluded if they received thrombolytics for an alternate indication, were diagnosed with an in-hospital AIS, were pregnant, breastfeeding, or were a prisoner. The control group will receive alteplase at the standard dose of 0.9 mg/kg, with a maximum dose of 90 mg, with 10% delivered as an intravenous bolus over 1 minute and the remainder as a 60-minute infusion. The intervention group will receive tenecteplase 0.25 mg/kg, with a maximum dose of 25 mg, delivered as an intravenous push over 5 seconds. The primary outcome will be DTN time. Secondary outcomes will include proportion of patients with a DTN time within 30 minutes, angioedema, symptomatic intracranial hemorrhage, major bleeding, and in-hospital mortality. Results/Conclusions: Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recall the recommended dose for tenecteplase (TNK) in acute ischemic stroke.

Define the recommended timeframe of tenecteplase (TNK) administration from the last known well in acute ischemic stroke.

Self Assessment Questions:

What is the recommended dose for tenecteplase in acute ischemic stroke?

- A. 0.1 mg/kg IV push
- B. 0.25 mg/kg IV push

- C. 0.9 mg/kg with 10% as IV bolus, followed by 90% as IV infusion
D. 0.4 mg/kg IV Push

Within what timeframe of last known well should thrombolytics be administered in patients presenting with a disabling acute ischemic stroke?

- A. 1 hour
B. 8.5 hours
C. 4.5 hours
D. 24 hours

Q1 Answer: B Q2 Answer: C

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

Impact of Using Multiple Pharmacies to Fill Prescriptions on Medication Adherence in Patients with Cystic Fibrosis

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Purpose: Dornase alfa is one of the backbones of cystic fibrosis (CF) therapy and helps clear airways by breaking up and thinning mucous, making it easier to clear.

Medication adherence is shown to slow disease progression and reduce frequency of exacerbations. It has been shown that using a health system-associated pharmacy to fill CF medications increases adherence, but some insurance companies have contracts with specific pharmacies for CF medications, such as dornase alfa.

This often requires multiple pharmacies to fill prescriptions, which could lessen adherence. The objective of this study is to compare the average medication possession ratio (MPR) of dornase alfa between patients who use one specialty pharmacy to fill CF medications to those who use more than one specialty pharmacy.

Methods: This is an IRB approved, retrospective study evaluating the impact of the number of pharmacies used to fill CF medications on adherence to dornase alfa.

Included patients have a confirmed diagnosis of CF followed by Riley Hospital for Children outpatient CF clinic, prescribed dornase alfa between 1/1/19 and 12/31/19, and have fill history availability of at least 6 months. Excluded patients include those who utilized manufacturer free drug programs to fill dornase alfa. The primary endpoint is MPR for dornase alfa. Secondary endpoints are number of hospitalizations for CF exacerbations during the study period, length of stay during hospitalizations for CF exacerbations, and change in percent predicted forced expiratory volume in one second (PPFEV1) during study period. Nominal data will be evaluated using chi-square test. Continuous data will be tested with either a Mann Whitney U test, or an independent T-test depending on normality. Results: Data collection and analysis are ongoing. Results and conclusions will be presented at Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review cystic fibrosis (CF) pathophysiology and standard pulmonary treatment regimens.

Describe factors that have been shown to increase medication adherence in patients with CF.

Self Assessment Questions:

What is the mechanism of action of dornase alfa?

- A. Stabilization of the CFTR-gene to restore function and improve salt/water regulation across mucous membranes
B. Relaxes bronchial smooth muscle by antagonizing beta-2 receptors
C. Cleaving DNA of neutrophils in airway mucous, reducing viscosity
D. Reducing recurrent infections by interfering with bacterial protein synthesis

What factors have been associated with increased medication adherence in patients with CF?

- A. Patients of adolescent age
B. Having a dedicated pharmacist in the outpatient clinical team
C. Low socioeconomic status
D. High medication burden

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-849-L01-P

The Impact of MRSA Nasal Swab Cultures versus MRSA Nasal PCRs on Vancomycin De-escalation

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Purpose:

The use of methicillin-resistant Staphylococcus aureus (MRSA) nasal screening is recommended to aid in de-escalation of anti-MRSA therapy for patients with pneumonia. In March 2023, Trinity Health Oakland (THO) Hospital implemented a protocol allowing MRSA nasal cultures to be ordered for patients with suspected pneumonia. In July 2023, THO switched to MRSA nasal polymerase chain reaction (PCRs) testing for quicker turnaround times. The purpose of this study is to evaluate the difference in performance of MRSA nasal cultures versus PCRs and the effects they have on vancomycin de-escalation, associated costs, and clinical outcomes for patients receiving vancomycin for pneumonia.

Methods:

This retrospective, single center study evaluated adult patients admitted to THO between March 2023 and February 2024. Patients who received a vancomycin dose with planned continuation of vancomycin therapy and had a MRSA nasal screening for pneumonia were included. Patients were excluded if they received MRSA nasal screening 72 hours or more after initiation of vancomycin, had non-pneumonia indications or were on vancomycin for multiple indications, had both a culture and PCR result prior to discontinuation of vancomycin, had vancomycin discontinued prior to a culture or PCR result, or had vancomycin discontinued due to death or being transitioned to comfort care measures. The primary outcome was length of vancomycin therapy in patients who had MRSA nasal cultures compared to those who had PCRs. The secondary outcomes included number of vancomycin doses received, total milligrams of vancomycin received, number of vancomycin levels obtained, hospital and intensive care unit length of stay, in-hospital mortality, vancomycin re-initiation, incidence of acute kidney injury, readmission rates, and the positive and negative predictive values of the different MRSA nasal screening methods.

Results/Conclusion:

Results and conclusion to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Discuss the role of methicillin-resistant Staphylococcus aureus (MRSA) nasal screening in patients with pneumonia based on previous literature.

Describe the differences between a MRSA nasal culture and a MRSA nasal polymerase chain reaction (PCR).

Self Assessment Questions:

Which of the following statements regarding methicillin-resistant *Staphylococcus aureus* (MRSA) nasal screening is supported by previous literature?

- A. MRSA nasal screening should be used for all sources of MRSA infection.
- B. Anti-MRSA treatment for pneumonia can generally be withheld when MRSA nasal screening is negative.
- C. MRSA nasal screening should only be used in immunocompromised patients.
- D. MRSA nasal screening will be sensitive and reliable even if performed 48 hours after anti-MRSA coverage has been initiated.

Which of the following is true regarding MRSA PCR testing?

- A. Positive MRSA PCRs are more labor intensive for microbiology lab workups than positive MRSA nasal cultures.
- B. Material costs for MRSA nasal PCRs are less expensive than MRSA nasal cultures.
- C. MRSA PCRs have a quicker turnaround time than MRSA nasal cultures.
- D. MRSA PCRs are associated with a positive predictive value of > 95% in MRSA pneumonia.

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-852-L01-P

Implementing a Platform for Point-Of-Care Information for Parenteral Medications

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Parenteral Medication Administration Guidelines (PMAGs) are developed by the Center for Medication Utilization and approved by the System Pharmacy & Therapeutics Committee. PMAGs are posted on the Froedtert Medication Information intranet page and provide nurses and other clinician's guidance for administering parenteral medications. PMAGs summarize information from tertiary references and include institution-specific information, such as links to policies and treatment guidelines and suggested unit locations based on the extent of recommended monitoring. Limitations of the current PMAG system include lack of integration with formulary management software and maintenance of information accuracy. These limitations increase the risk of medication errors. This project seeks to evaluate current PMAG content and select and begin implementation of an alternative platform for conveying point-of-care information for parenteral medications. The primary outcome is selection and implementation of a chosen platform for disseminating point-of-care information for parenterally administered medications. Secondary outcomes include parenteral medications without associated PMAGs, PMAGs that contain specific restrictions, those with inaccurate content, median time since last revision, and medication errors caused by parenterally administered medications. Formulary parenteral medications and current PMAG and contents were collected from the Lexicomp Information Management System (LIMS) and documents on the health system's Medication Information intranet page. Medication errors are being collected from Froedtert Health Safety Intelligence platform, DatixWeb. Alternative options for a PMAG system were gathered from other hospitals' best practices, published literature, and analysis of the current PMAG template components. Findings were summarized and are being discussed with stakeholders for feedback on implementation. A total of 540 formulary parenteral medications were included in data collection for analysis. Two features within LIMS are being developed for further consideration of conveying PMAG information. Final results to be discussed at conference.

Learning Objectives:

Describe the best practices to having point-of-care guidelines for parenteral medication administration.

Identify the best practices for conveying point-of-care monitoring and administration information.

Self Assessment Questions:

1. Select two organizations that help promote the best use practices for the administration of intravenous medications.

- A. American Society of Health System Pharmacists (ASHP)
- B. American Pharmacists Association (APhA)
- C. Institute for Safe Medication Practices (ISMP)
- D. A & C

Which of the following is a best practice for conveying point-of care information on an institution's formulary software information

- A. Increased usability for end users
- B. Reduced clicks for end users
- C. Reduced risk of inaccurate information
- D. Decrease costs

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-812-L05-P

Adherence to Surgical Antimicrobial Prophylaxis Guidelines for Planned Orthopedic, Neurologic and Biliary Procedures

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Purpose

Surgical site infections are one of the most common nosocomial infections, with approximately 500,000 cases annually in the United States. The Froedtert and the Medical College of Wisconsin (F&MCW) Guideline for Perioperative Antimicrobial Prophylaxis is used to guide antibiotic prescribing during the perioperative period to prevent surgical site infections. It provides an algorithm for first-line antimicrobials, as well as alternatives for patients who have a beta-lactam allergy or are colonized with methicillin-resistant *Staphylococcus aureus* (MRSA). Inappropriate antimicrobial selection during the perioperative period can result in growth of microbial organisms, possibly leading to surgical site infections and further complications to a patient's health. The purpose of this project is to assess the current state of adherence to the F&MCW Guideline for Perioperative Antimicrobial Prophylaxis for planned orthopedic, neurologic and cholecystectomy procedures.

Methods

This is a retrospective analysis to be performed across three sites within a single health system with a primary outcome of assessing provider adherence to the F&MCW Guideline for Perioperative Antimicrobial Prophylaxis in predetermined surgical settings. Secondary outcomes will include rates of hospital readmissions, surgical site infections, and *Clostridioides difficile* infections (CDI) within 30 days of surgery along with adherence to the guidelines based on individual service line, level of ordering user and location of surgery. It will additionally serve to identify opportunities for education regarding antimicrobial selection. The study aims to include a total of 200 patients and will exclude patients who were pregnant, were being treated for an infection or had procedures performed outside the main operative rooms. Data will be collected for a three-month period from January 2023 to March 2023 and will be reported via descriptive statistics.

Results/Conclusions

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

Learning Objectives:

Identify alternatives for antibiotic selection according to the F&MCW Guideline for Perioperative Antimicrobial Prophylaxis

Identify the most common reason for non-compliance to the F&MCW Guideline for Perioperative Antimicrobial Prophylaxis.

Self Assessment Questions:

What is one reason providers should select an antibiotic other than what is recommended as first-line according to the F&MCW Guideline for Perioperative Antimicrobial Prophylaxis?

- A. Personal Preference
- B. Beta-lactam allergy
- C. Patients with MSSA colonization
- D.

What was the most common reason for non-adherence to the F&MCW Guideline for Perioperative Antimicrobial Prophylaxis?

- A. Wrong antibiotic
- B. Wrong dose
- C. Other
- D.

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-624-L01-P

Critical Care and Emergency Medicine Clinical Pharmacist Interventions During Evening and Overnight Hours

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Purpose: Critical care (CC) and emergency medicine (EM) clinical pharmacists play essential roles in high-acuity settings, providing expertise in medication selection, dosing, and monitoring. Interventions from daytime CC and EM clinical pharmacists have previously been described as having a positive impact on patient care.

However, there is a lack of research evaluating the impact of CC and EM clinical pharmacists during evening and overnight hours. The purpose of this research project is to describe interventions during evening and overnight shifts and quantify associated cost avoidance (CA) attributed to evening and overnight clinical specialists.

Methods: This is a prospective, observational study quantifying and describing interventions made by evening and overnight CC and EM clinical pharmacists.

Furthermore, interventions and activities were analyzed to evaluate potential CA. Interventions were collected by CC and EM pharmacists at the Indiana University Health Adult Academic Health Center from November 6, 2023 through February 6, 2024. Any patient-care intervention made by a CC evening or CC/EM nocturnist clinical pharmacist was included in the analysis; however, only accepted interventions were used to calculate potential CA. The primary endpoint was the number, type, and acceptance of interventions provided by CC and EM clinical pharmacists and the potential associated CA. Descriptive statistics, along with the conversion of interventions to CA, was done through values established from previous studies considering for inflation in 2023. **Results/Conclusions:** Results and conclusion will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Review data supporting the provision of inpatient clinical pharmacy services 24/7.

Describe methods and results of recent cost avoidance studies for pharmacists in the intensive care unit and emergency department.

Self Assessment Questions:

According to the 2020 updated position paper on critical care pharmacy services, what is a recommendation for 24/7 clinical pharmacy services?

- A. 24/7 clinical pharmacy coverage should be a requirement at high volume institutions
- B. As long as clinical pharmacists are covering throughout the day, coverage after hours is not needed
- C. Institutions should prioritize critical care pharmacy services to patients with the highest acuity and extend daily coverage to evening hours at a minimum
- D. The need for 24/7 critical care pharmacy coverage at level 1 institutions (typically an academic center that provides care for a wide range disorders and comprehensive support services) is only desirable rather than foundational

Which of the following methods were used to establish cost analysis values in the PHARM-CRIT and PHARM-EM studies that were foundational for this study?

- A. Sensitivity analysis using the highest quality of evidence from the Grading of Recommendations, Assessment, Development and Evaluation Evidence-to-Decision Framework for each section
- B. Inflation adjustments based on the specific year the study was active
- C. Calculation of monetary cost analysis to pharmacist salary ratio
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-753-L04-P

Evaluation of Efficacy of Levocarnitine for Propofol-induced Hypertriglyceridemia

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Purpose: Propofol is one of the preferred agents for sedation as recommended by the 2018 Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU (PADIS) guidelines. It is recommended over other agents, such as benzodiazepines due to improved short-term outcomes, such as ICU length of stay, duration of mechanical ventilation, and delirium. Propofol is a lipophilic agent formulated in soybean oil, triglycerides, and phospholipids. It causes adverse effects, such as bradycardia, hypotension, and hypertriglyceridemia. In turn, hypertriglyceridemia can lead clinicians to discontinue propofol and switch to a less-preferred benzodiazepine-based infusion to mitigate the risk of pancreatitis. One mechanism of propofol-induced hypertriglyceridemia is an acquired carnitine deficiency causing an inability to metabolize free fatty acids; the supplementation of levocarnitine can promote the metabolism of free fatty acids preventing hypertriglyceridemia. The purpose of this study was to evaluate the triglyceride-lowering benefits of levocarnitine supplementation in patients with propofol-induced hypertriglyceridemia. Methods: This is a retrospective, single center cohort study conducted at Loyola University Medical Center from January 1, 2013 through October 1, 2023 comparing levocarnitine supplementation for propofol-induced hypertriglyceridemia to no supplementation. The primary endpoint is the percent change of serum triglyceride levels from the development of hypertriglyceridemia to day 7. Secondary endpoints include change in sedation to midazolam and ICU length of stay. Categorical data will be analyzed using the Chi-Square and Fisher's Exact Tests. Continuous data will be analyzed using the Student T and Mann-Whitney U-Tests. A multivariable linear regression will be used to determine if levocarnitine administration is independently associated with a reduction in triglycerides. Results: Results and conclusions to be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

List reasons why propofol is preferred for sedation over benzodiazepine infusions
Explain how levocarnitine supplementation can facilitate the metabolism of fatty acids

Self Assessment Questions:

What dose is most commonly used to supplement a primary or acquired carnitine deficiency?

- A. 500 mg three times daily
- B. 1000 mg daily
- C. 1000 mg three times daily
- D. 6000 mg daily

Why is propofol preferred over benzodiazepine infusions?

- A. Shorter ICU length of stay
- B. Decreased duration of mechanical ventilation
- C. Decreased risk of delirium
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-615-L01-P

Development of a Pharmacist-Led Consult Service to Standardize Diabetes Management

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In acute care settings, the standard of care for treating hyperglycemia is insulin therapy. However, the use of insulin is not without risks. Pharmacists play a crucial role in ensuring safe and effective medication use by providing medication management services and collaborating with healthcare providers. At Froedtert & the Medical College of Wisconsin, a pharmacist-led diabetes consult service has been approved to standardize inpatient diabetes and insulin management, aiming to optimize patient glycemic outcomes and improve patient safety.

This quality improvement study is currently being conducted at Froedtert Menomonee Falls Hospital in the Modified Care Unit (MCU). Noncritical patients aged 18 and older, admitted to the MCU and receiving subcutaneous insulin for Type 2 diabetes or other causes of hyperglycemia not related to Type 1 diabetes, were included. Before the pilot, a standardized system wide guideline, policy and procedure for a consult service was developed. Pharmacists received all training materials, an education session and proved competence via case studies.

Pre-implementation data will be collected and analyzed from June 2023 to September 2023 using the electronic health record (EHR). Post-implementation data is gathered from January 2024 to April 2024 through EHR and time studies. Collected data includes blood glucose results, length of hospital stay, and patient-specific factors. Pharmacists' readiness, workload impact, and competency changes will be assessed through pre-post implementation surveys. A post-implementation time study will determine the duration of daily tasks for the diabetes consult service.

The primary outcome is the percentage of patients with euglycemia during the pharmacist-led diabetes consult service pilot. Secondary outcomes include the percentage of patients experiencing hypoglycemia, hyperglycemia, and mean length of stay. Pharmacists' self-competence, comfort, and readiness were assessed using Likert scales, and the time required for consult completion will be determined.

The study is ongoing. Results will be shared in the final manuscript.

Learning Objectives:

Review analysis of pre-post implementation data to assess the impact of pharmacist-led consult service for subcutaneous insulin management.
Discuss the benefits of implementing a pharmacist-led diabetes consult service on the rates of hypo- and hyperglycemia in select patients.

Self Assessment Questions:

The standard of care for treating hyperglycemia in an acute care setting according to the ADA 2023 guidelines is what?

- A. Dextrose
- B. Insulin
- C. Sodium-Glucose Co-Transporter 2 agents
- D. Glucagon-Like Peptide-1 agents

What is the role of the pharmacist?

- A. Ensuring safe and effective medication use
- B. Overseeing administrative tasks in the healthcare facility

C. Conducting surgical procedures
D. Managing hospital billing and financial transactions
Q1 Answer: B Q2 Answer: A
ACPE Universal Activity Number 0121-9999-734-L01-P

The role of pharmacy-led medication reconciliation at admission to the internal medicine service at a regional inpatient hospital.

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Background:

The National Institute of Health states that medication-associated errors exceed \$40 billion each year and 7,000 to 9,000 people die due to medication errors. A medication error is defined as any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer according to the National Coordinating Council for Medication Error Reporting and Prevention. The implementation of medication reconciliation at transitions of care is recommended as a solution to decrease medication errors. Pharmacists are educated in medication management and have a unique knowledge that can be utilized when completing medication reconciliations.

Statement of Purpose:

Evaluate the difference in medication reconciliation records when completed by a nurse compared to a pharmacist

Methods:

This is a prospective study conducted at an acute care facility in Kentucky from November 15, 2023 to January 4, 2024. A computer-generated report was run each weekday to identify new admissions to the internal medicine floor and 48 hours was allowed for pharmacy staff to complete the medication reconciliation process. The following patients were excluded: patients on less than 3 home medications, patients transferred from a facility, patients previously admitted during the study timeframe, patients discharged before the 48-hour time period, and patients on contact precautions. The clinical pharmacist used a combination of patient/family interviews, outpatient fill records, and outpatient medical providers to complete the medication reconciliation and compared to the records entered by the nurse. The pharmacist would then update the patient's chart with the corrected information and alert the providers to any discrepancies. Data collected was gender, age, number and type of discrepancies, and number of home medications after reconciliation.

Results and Conclusions:

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

Learning Objectives:

Describe the impact that medication errors have on the healthcare system.

Discuss the benefit a pharmacist's involvement in the process of medication reconciliation.

Self Assessment Questions:

How many people die every year from medication errors?

- A. 1000-3000
- B. 5000-7000
- C. 7000-9000
- D. 500-1500

Which of the following is a benefit of including a pharmacist in the process of medication reconciliation?

- A. Increased medication discrepancies.
- B. Pharmacists have a unique and specific knowledge of medications.
- C. Increased length of stay.
- D. Decreased medications administered during hospital stay.

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-792-L05-P

Elxacaftor/tezacaftor/ivacaftor Adverse Effects in Cystic Fibrosis (CF) Patients Aged 2-5 years old

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Purpose: Elexacaftor/tezacaftor/ivacaftor (ETI) is a cystic fibrosis transmembrane conductance regulator (CFTR) modulator approved for the treatment of CF. As of June 2021, ETI was approved for people with CF (PwCF) aged 6 years and older. It wasn't until April 2023 that ETI gained FDA approval for PwCF aged 2-5 years old. Post-marketing data of ETI treatment in PwCF aged 6-11 years old suggests that the rate and nature of adverse effects may differ from clinical trial data. The study's objective is to compare the rate of real-world adverse effects due to treatment with ETI in patients aged 2-5 years old to the rate of real-world adverse effects in patients aged 6-11 years old.

Methods: This retrospective, IRB-approved cohort study included PwCF treated with ETI between May 1st, 2023 to August 31st, 2023. Subjects were included if they were between the ages of 2-5 years old at the time of ETI initiation. Study exclusions included those that started ETI treatment outside of the study timeline. The primary endpoint is the rate of composite, real-world adverse effects due to treatment with ETI in PwCF aged 2-5 years old, compared to PwCF aged 6-11 years old.

Results: A total of 24 of the 48 patients (50%) aged 2-5 years old and 17 of 102 patients (14.3%) aged 6-11 years old reported at least one adverse event caused by ETI treatment ($p < 0.001$). Adverse events reported included behavior/mood changes (9), constipation (7), sleep disturbances (6), skin rash (3), elevated AST/ALT (3), hyperactivity (2), headaches, fatigue, diarrhea and dizziness (1). Data analysis for secondary endpoints will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Conclusion: There was a significant difference in the rate of composite, real-world ETI adverse effects in patients aged 2-5 years old when compared to patients 6-11 years old.

Learning Objectives:

Identify what adverse effects were reported during ETI clinical trials for PwCF 2-5 years old.

Describe the post-marketing effects that have been reported with ETI treatment in PwCF 6-11 years old.

Self Assessment Questions:

Which of the following adverse effects was most commonly reported in ETI clinical trials for PwCF ages 2-5 years old?

- A. Behavioral Changes
- B. Cough
- C. Sleep Disturbances
- D. Rash

Which of the following adverse effects was most commonly reported in real-world analysis of ETI treatment in PwCF ages 6-11 years old?

- A. Rash
- B. Bilirubin Elevations
- C. Headaches
- D. Constipation

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-711-L01-P

P2Y12 receptor inhibitor interference of functional testing for heparin-induced thrombocytopenia

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Purpose: Heparin-induced thrombocytopenia (HIT) is an immune-mediated reaction characterized by the development of antibodies against complexes formed between heparin and platelet factor 4 (PF4). The current standard approach for identifying HIT antibodies involves a two-step process, with an initial screening step using an immunoassay-based method to detect PF4 antibodies, followed by confirmation with a functional assay. Ticagrelor and clopidogrel are two drugs in the class of P2Y12 receptor inhibitors frequently used in the management of atherosclerotic disease. In 2019, the manufacturers of ticagrelor and clopidogrel reported instances of false negative results in functional testing for HIT among patients using these drugs. The prescribing information for ticagrelor was updated to include a warning about the potential for false negative results in HIT functional testing. The current literature describing this interaction is limited, with little guidance on how to monitor or manage it.

Methods: This is a single-center, retrospective, cohort study of patients admitted to a quaternary medical center between September 2019 and June 2023, who received the antiplatelet agents ticagrelor or clopidogrel during the same admission in which HIT antibody testing was performed. The participants will be further described by the presence of positive immunoassay testing, the administration of at least 5 doses of antiplatelet drug prior to HIT testing, and the results of the serotonin release assay (SRA) or the PF4-dependent P-selectin expression assay (PEA). The primary outcome will be the number of patients with positive immunoassays and negative functional assays after administration of P2Y12 inhibitors.

Results: Results will be presented at the conference.

Conclusions: Conclusions will be presented at the conference.

Learning Objectives:

Describe current literature exploring the potential interaction between P2Y12 receptor inhibitors and HIT functional assays.

Discuss potential strategies to identify and monitor the interaction.

Self Assessment Questions:

Which assay is potentially affected by P2Y12 receptor inhibitor administration?

- A. Serotonin release assay (SRA)
- B. Heparin-induced platelet activation assay (HIPA)
- C. P-selectin expression assay
- D. All of the above

In the context of P2Y12 receptor inhibitor administration, what recommendation represents the most effective approach for modifying HIT antibody testing protocols to minimize clinical impact?

- A. Disregard the false negatives, as they have minimal clinical significance
- B. Evaluate patient outcomes and advocate for the reassessment of HIT testing protocols in the context of antiplatelet drug administration
- C. Discourage HIT antibody testing when P2Y12 inhibitors are administered

D. Diagnose HIT using two immunoassays

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-537-L01-P

Short versus Long Course of Antibiotics after Incision and Drainage of Uncomplicated Skin Abscesses: A Retrospective Cohort Study (SLIDES)

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Purpose: The current standard of care for uncomplicated skin abscesses includes source control through incision and drainage (I&D); however, the role and duration of adjunct antibiotic therapy are not well defined. Whereas the Infectious Diseases Society of America recommends I&D alone, the Surgical Infection Society recommends I&D and antibiotics for seven to ten days. Conflicting guideline recommendations may expose patients to unnecessary antibiotics and increase the risk of adverse drug events. This study evaluated the clinical outcomes of short versus long course of antibiotics in patients with uncomplicated skin abscesses after I&D.

Methods: A retrospective cohort study was performed using data extracted from the electronic health record of a multicenter health system in Louisville, Kentucky.

Adults presenting to the emergency department (ED) for a cutaneous skin abscess with subsequent procedural I&D were included. Exclusion criteria included healthcare visit for cutaneous abscess in the 30 days prior to ED visit, adequate antibiotic therapy within 14 days, and index ED visit resulting in admission. Patients with diagnosis of non-cutaneous abscesses, bites, or hidradenitis suppurativa were excluded as well as members of vulnerable populations. The primary outcome was clinical failure rate at 14 days in patients with uncomplicated skin abscesses receiving short (≤7 days) versus long (>7 days) course of antibiotics following I&D.

Secondary outcomes were to compare clinical failure rate at 30 days, Clostridioides difficile disease rate within 90 days, and risk factors associated with 14-day clinical failure between patients receiving short and long courses of antibiotics.

Results & Conclusions: To be presented at the 2024 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Recall key guideline recommendations for the management of uncomplicated skin abscesses

Describe the relationship between clinical failure and duration of antibiotic therapy in patients with uncomplicated skin abscess

Self Assessment Questions:

Based on the 2020 SIS SSTI Guidelines, how long is adjunctive antibiotic therapy recommended for simple skin abscesses post I&D?

A. 24-48 hours

B. 5 days

C. 7-10 days

D. 14 days

Which of the following statements is correct among patients with uncomplicated skin abscesses?

A. Patients treated with longer courses of antibiotics have significantly higher rates of clinical failure

B. Patients with shorter courses of antibiotics have significantly higher rates of clinical failure

C. Clinical failure rates are similar between patients receiving short and long courses of antibiotics

D. There are no studies evaluating short versus long course of antibiotics in the setting of uncomplicated skin abscesses

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-554-L01-P

Optimizing Pharmacist Team-Integration for ICU patient Management (OPTIM): an exploration of pharmacist-to-patient ratio

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Limited data exists to support an ideal pharmacist-to-patient ratio that allows for optimal patient care in the setting of an intensive care unit. It is hypothesized that patients that are cared for by clinical pharmacists with high patient care burdens, measured by ratio and workload indices, have worse patient-centered outcomes, including increased hospital length of stay, ICU length of stay, and mortality. The purpose of this study is to explore the relationship between pharmacist-to-patient ratio and patient outcomes in critically ill patients, particularly to determine if a higher pharmacist workload results in increased mortality.

This multi-center, observational cohort study was completed in two phases, a prospective phase followed by the retrospective phase. In the prospective phase lasting 100 calendar days, critical care pharmacists recorded daily patient workload and identified major patient outcomes. In the retrospective phase, information on enrolled patients was collected including demographic information, initial 24-hour severity (SOFA), 24-hour MRC-ICU score, and more detailed patient outcomes. Patients were included in the study if they were admitted to an ICU service during the prospective study period. At Eskenazi Health specifically, this study period occurred from August 28 to December 29, 2023. Statistics for all participating health systems will be completed by the study site, University of Georgia, in March 2024.

Results and conclusions specific to Eskenazi Health will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the potential impact a high pharmacist-to-patient ratio can have on the outcomes of critically ill patients.

Discuss the components of the SOFA and MRC-ICU scores and how the results of these scores may impact critical care pharmacist workload.

Self Assessment Questions:

What gaps in literature currently exist surrounding a pharmacist's role in critical care?

A. The ideal pharmacist to patient ratio in an ICU setting

B. A pharmacist's impact on mortality in critically ill patients

C. A pharmacist's impact on ICU length of stay

D. All of the above

A. _____ MRC-ICU score is associated with _____ patient complexity and _____ pharmacist workload.

A. Low, higher, higher

B. High, lower, lower

C. High, higher, higher

D. Low, lower, higher

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-876-L04-P

Over-The-Counter Drug Facts Label Comprehension in English- and Spanish-Reading Populations

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Purpose: Health literacy impacts health outcomes and is influenced by language barriers. In 2020, approximately 42 million people in the United States reported speaking Spanish and 16 million speak English less than “very well.” People with limited English proficiency are at higher risk for experiencing decreased access and quality of care. In July 2023, the Food and Drug Administration approved an over-the-counter (OTC) oral hormonal contraception tablet, norgestrel (Opill®). Traditionally, healthcare providers and pharmacists provide detailed information to patients about hormonal contraception’s correct and intended use, side effects, and contraindications. Given the OTC status, there is a higher likelihood of patients using norgestrel to prevent pregnancies. There is no formalized method to counsel patients who purchase an OTC product, or to determine the level of knowledge patients can understand from reading the norgestrel label. No current federal regulations exist for OTC labels to meet specific readability or grade level criteria.

Methods: A 13-item assessment was developed by researchers and distributed as a cross-sectional, anonymous, web-based survey to participants with an appointment at the HealthLinc Mishawaka clinic. The survey consisted of 7 required knowledge items about norgestrel (administration, use of secondary contraception methods, side effects) and 6 optional items (participant demographics, current and prior contraceptive usage). Any participant that primarily read English was provided an English copy of the survey and label, and any participant that primarily read Spanish was randomized in a 1:1 fashion to receive a Spanish copy of the survey with either an English label or Spanish label. It is anticipated that a two-sample student’s t-test will be used for data analysis with a targeted sample size of 33 participants per group.

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

Learning Objectives:

Recall the impact of language barriers on health literacy.

Discuss the expected impact on health outcomes from an over-the-counter contraceptive pill (norgestrel).

Self Assessment Questions:

Which of the following are potential outcomes associated with low health literacy due to language barriers?

- A. Poor patient satisfaction and compliance
- B. Decreased use of primary care services and screening
- C. Increased use of emergency services
- D. All of the above

Which of these best describes the positive health impacts of norgestrel's over-the-counter status?

- A. Decreasing the number of unintended pregnancies in the United States
- B. Promoting a reliable form of contraceptive usage in a safe manner for those with decreased access to health care
- C. Providing norgestrel's over-the-counter drug facts label in English only
- D. Utilizing the pharmacist to answer any questions about norgestrel's safe and intended use

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-884-L99-P

Evaluating the Predictive Value of MRSA Nares PCR Swabs with MRSA Wound Cultures

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Background: Methicillin-resistant *Staphylococcus aureus* (MRSA) infections are complex to manage due to antibiotic overuse. With increasing resistance, there is a need for accurate, rapid diagnostics to guide treatment regimens and prevent complications. MRSA polymerase chain reaction (PCR) nares swabs provide a rapid, non-invasive method of identifying individuals with MRSA colonization. In patients with pneumonia, a negative MRSA-PCR can be used to facilitate de-escalation of antibiotics. While the negative predictive value (NPV) of MRSA-PCR has been shown to be 99% for pneumonia, its utility in skin and soft tissue infections (SSTIs) is currently limited. The purpose of this study is to determine the NPV and positive predictive value (PPV) of MRSA-PCR in SSTIs.

Methods: This is a retrospective, cohort study of admitted patients ≥18 years of age. Patients diagnosed with an SSTI who had an MRSA-PCR and wound culture within 7 days of each other were included. Patients were excluded if they were decolonized for MRSA, transferred from an outside hospital, or given anti-MRSA antimicrobials for greater than 72 hours prior to MRSA-PCR collection.

Results: A total of 129 patient encounters between June 5, 2021 and May 1, 2023 were included. Most patients had a negative MRSA-PCR (n=97;75%), were an average of 51 years old, and male (n=70;54%). The most common comorbidities were diabetes (n=43;33%) and substance use disorder (n=36;28%). The NPV of MRSA-PCR in MRSA SSTI was 95.8% and the PPV was 57.6%. MRSA colonization had a sensitivity of 82.6% and specificity of 86.8%.

Conclusions: A negative MRSA screen is associated with decreased probability of an MRSA SSTI. Based on this data, it would be reasonable to de-escalate empiric MRSA antimicrobial coverage for SSTI if a patient has a negative MRSA-PCR.

Learning Objectives:

Describe current literature gaps regarding the utility of MRSA nares PCR swabs in the setting of skin and soft tissue infections (SSTIs)

Discuss the utility of MRSA nares PCR swabs in the setting of SSTIs

Self Assessment Questions:

1. In the context of skin and soft tissue infections, what is the primary utility of MRSA nares PCR swabs?

- A. To identify MRSA infections
- B. To determine antibiotic resistance patterns

C. To rule out MRSA infections

D. To replace traditional wound cultures for antibiotic selection

How does the potential use of MRSA nares PCR swabs impact the selection of antimicrobial therapy in skin and soft tissue infections?

A. It encourages broad spectrum antibiotic use

B. It facilitates targeted antibiotic selection

C. It reduces the need for antibiotic treatment all together

D. It provides opportunity for de-escalation of antibiotics

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-862-L01-P

Examination of Changes in Clinical Outcomes for Patients Living with Human Immunodeficiency Virus (HIV) before and after Conversion to Injectable Cabotegravir/rilpivirine

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Purpose: Cabotegravir/rilpivirine (Cabenuva) is the only FDA-approved long-acting injectable antiretroviral combination for the treatment of human immunodeficiency virus 1 (HIV-1). To date, just two small studies outside of phase III clinical trials have evaluated cabotegravir/rilpivirine's clinical efficacy. This study will aim to compare clinical indices including HIV RNA viral load, CD4+ lymphocyte count, body weight, serum lipids, renal function and hepatic function before and after conversion from oral antiretrovirals to injectable cabotegravir/rilpivirine. The change in relative adherence when switching from oral to injectable therapy will also be assessed.

Methods: The study is a retrospective pre-post analysis of patients with a diagnosis of HIV-1 followed at Community Health Network infectious diseases clinics between January 1, 2021, and September 30, 2023, and for at least three months prior to and after switching to injectable cabotegravir/rilpivirine. Patients will be excluded from the study for the following reasons: age less than 18 years; pregnancy, incarceration or institutionalization during the study period; inadequate data for comparison; and known HIV-resistance to cabotegravir and/or rilpivirine. Primary and secondary outcome data for clinical parameter and adherence changes over time will be analyzed using the paired T-test, Wilcoxon signed-rank test or Friedman test depending on data normalcy and distribution. The desired sample size of 50-100 participants will be able to detect a 10 to 20 percent difference in pre- and post-parameters with a p-value of 0.05 or less.

Results: Data collection is in progress, and results will be presented at the Great Lakes Pharmacy Resident Conference in April 2024.

Conclusions: Conclusions based on study results will be presented at the Great Lakes Pharmacy Resident Conference in April 2024.

Learning Objectives:

Recall guideline recommendations regarding the use of injectable cabotegravir/rilpivirine for the treatment of HIV-1 infection.

Recognize potential adverse effects of anti-retroviral medications, particularly integrase strand transfer inhibitors (INSTI) and non-nucleoside reverse transcriptase inhibitors (NNRTI).

Self Assessment Questions:

What is the maximum allowed administration interval between cabotegravir/rilpivirine injections after the first two (loading) doses?

A. 35 days

B. 56 days

C. 63 days

D. 90 days

Which of the following adverse effects is associated with rilpivirine?

A. elevated AST/ALT

B. bone fractures

C. hypothyroidism

D. Fanconi syndrome

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-688-L02-P

The Implementation Journey of a Pharmacist-Driven Transition of Care Clinic

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Background/ Statement of Purpose:

Efficient transitions of care (TOC) are essential for patient well-being, ensuring a smooth transition between healthcare practitioners, settings, and homes. Ineffectual transitions contribute to adverse events, hospital readmissions, and escalated healthcare costs. Medicare beneficiaries confront a significant 20% readmission rate, incurring a cost of \$17.4 billion annually. Research reveals medication discrepancies, stemming from a lack of continuity across care settings contributes to adverse drug reactions and preventable readmissions. Heart failure and COPD stand out as the primary causes for readmission at Trinity Health Muskegon (THM) with the TOC process distributed among care managers, social workers, and pharmacists without a defined procedure. Pharmacists, strategically positioned for patient involvement in care transitions, play a crucial role. Studies demonstrate that TOC programs led by pharmacists post-hospital discharge effectively reduce 30-day readmission rates. This quality improvement initiative aims to evaluate the impact of transition of care pharmacists in two residency clinics.

Methods:

To gather comprehensive data on the patient population, a retrospective study was conducted at THM, focusing on the causes of readmission for heart failure and COPD over a three-month period (October 2022 to December 2022). Simultaneously, a transition of care process was initiated at two residency clinics. A pharmacist reviewed eligible patients' discharge summaries and medications lists. A telephone or face-to-face encounter was completed with the patient. Inclusion criteria consisted of individuals discharging from THM with a primary care physician at the two residency clinics, ages 18 and older, not pregnant, and not admitted for scheduled procedures. The primary endpoint was the difference in overall readmissions at the two clinics after implementation of the pharmacist-led TOC initiative. Additionally, a secondary endpoint was categorization of interventions conducted by pharmacists during the transition of care process.

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

Learning Objectives:

Identify key steps in the implementation process of the TOC clinic.

Describe the nature of pharmacist interventions in the transition of care process at medical residency clinics.

Self Assessment Questions:

What accurately characterizes the fundamental steps in the implementation process of a TOC clinic?

- A. Recognizing stakeholders
- B. Defining eligible patients
- C. Describing the type of pharmacist interventions
- D. All of the above

The pharmacist's role(s) in a TOC clinic includes:

- A. Performing medication reconciliation
- B. Resolving medication access issues
- C. Disease state management
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-853-L04-P

Investigation of Pharmacy Revenue Integrity at a Large Academic Medical Center

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Purpose

Healthcare costs continue to increase, straining both patients and those providing care. A complex financial relationship exists between health systems, providers, and insurance companies. When focusing on pharmacy, there are various requirements from insurance companies to receive payment for services. When these requirements are not fully met, health systems do not receive the full payment that is expected. Optimizing pharmacy revenue integrity (PRI) is an opportunity to ensure that health systems are maximizing revenue capture and minimizing any potential loss. Health systems nationwide have shown the value of developing a PRI team to maximize coverage for their patients and work through any insurance barriers. Health systems must optimize use of financial resources to be able to ultimately benefit more patients in the long term. This project is an opportunity assessment of improving pharmacy revenue integrity at a large academic medical center.

Methods

This project is a focused review of select cost centers assessing prior authorizations/pre-certifications, denials, and write offs at a large academic medical center. This information is categorized to identify opportunities for improvement and to evaluate the potential for new process implementation.

Results/Conclusion

Data analysis is in progress. Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify components that lead to loss of pharmacy revenue

Describe factors that are considered essential to improvement in pharmacy revenue integrity

Self Assessment Questions:

Which of the following factors may lead to loss of pharmacy revenue?

- A. Use of correct billing codes
- B. Pharmacy denials management follow up
- C. Lack of prior authorizations prior to treatment
- D. Timely charge descriptions master (CDM) maintenance

Which of the following components are considered essential to improvement in pharmacy revenue integrity?

- A. Having a team that has direct reporting to finance leadership

- B. Working separately from the existing revenue cycle teams
 - C. Having robust data access
 - D. Ignoring previous models that have led to success
- Q1 Answer: C Q2 Answer: C
ACPE Universal Activity Number 0121-9999-762-L04-P

A Comparative Study of Different Lead-in Dosing Strategies Using Direct Oral Anticoagulants (DOACs) for the Treatment of VTE

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Purpose: Following acute venous thromboembolism (VTE), patients are most vulnerable to VTE progression and recurrence. The study designs for rivaroxaban and apixaban attempted to mitigate this risk by using higher a lead-in dose during the acute phase. However, novel DOACs like dabigatran and edoxaban lack lead-in doses, yet exhibit efficacy in the treatment of VTEs. In addition, there is an observed increased risk of bleeding and patient confusion in those who received lead-in dosing. This study aims to compare recurrent VTEs and bleeding events patients who did or didn't receive a lead-in dose of apixaban or rivaroxaban.

Methods: Retrospective, non-inferiority, single healthcare system study of adult patients who received apixaban or rivaroxaban for acute VTE between Jan 1, 2018, and Aug 31, 2023. The control group will consist of patients who received either apixaban 10mg twice daily for seven days or rivaroxaban 15mg twice daily for 21 days following the acute VTE event. The comparator group will consist of patients who were treated only with the maintenance dose of apixaban or rivaroxaban for the treatment of VTE. Exclusion criteria includes patients under 18 years old, pregnant, or detainees. The primary outcome is to compare the number of hospitalizations due to thrombotic events within 1, 3 and 6 months of initiation of either a lead-in or non-lead-in dose of apixaban or rivaroxaban for the treatment of VTE. The secondary outcome is to compare the number of hospitalizations due to bleeding events within 1, 3 and 6 months of initiation of either a lead-in or non-lead-in dose of apixaban or rivaroxaban for the treatment of VTE. All data will be collected from computerized medical records.

Learning Objectives:

Discuss the purpose of using lead-in doses in the treatment of acute VTE with rivaroxaban and apixaban

Discuss the potential risks associated with lead-in dosing of rivaroxaban and apixaban

Self Assessment Questions:

Which of the following is the standard lead-in dose time frame for initiating a patient on Eliquis for DVT/PE?

- A. 2 weeks
- B. 3 days
- C. 7 days
- D. 30 months

According to studies, when is a patient at highest risk for recurrent VTE after initiation of anticoagulation?

- A. one week
- B. 30 days
- C. 6 months
- D. 24 hours

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-802-L05-P

Utilization of Antibiotics for the Treatment of Urinary Tract Infections in End-of-Life Patients

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Background/Purpose: The use of antibiotics for end-of-life patients is controversial; currently there is limited guidance on the use of antibiotics in hospice patients. The threat of antibiotic resistance, risk of adverse events, variable efficacy, and the time to benefit in hospice patients makes their use divisive. The purpose of this project is to examine the utilization of antibiotics for urinary tract infections (UTIs) in hospice patients. **Methods:** This multi-center retrospective observational cohort investigation evaluated the prescribing of antibiotics in symptomatic versus asymptomatic hospice patients being treated for UTIs and assessed antibiotic initiation based on PPS of $\geq 30\%$ or $< 30\%$. Patients included in this study were adults initiated on oral antibiotics for UTI. Exclusion criteria included antibiotics initiated prior to admission, prophylactic antibiotics, non-oral antibiotics, or if the patient revoked election of hospice. **Results:** A total of 56 patients were prescribed antibiotics for UTIs during the study period. Half of the antibiotics were prescribed appropriately based on documented symptoms when starting the antibiotics. There was not a statistically significant difference between appropriate utilization based on PPS of $\geq 30\%$ or $< 30\%$ using the Mann-Whitney U test ($p = 0.255$). **Conclusion:** The prescribing of antibiotics in end-of-life patients is not always appropriate regardless of the PPS. This indicates hospice patients may be started on antibiotics without any symptoms and are started on an unnecessary medication that could cause adverse effects.

Learning Objectives:

Identify the symptoms of urinary tract infections in end-of-life patients.

Recall risks associated with treating asymptomatic infections in end-of-life patients.

Self Assessment Questions:

Which of the following is an appropriate symptom of a urinary tract infection that may result in initiation of antibiotics?

- A. Urine with color
- B. Dark urine
- C. Dysuria
- D. Positive culture result

What is the risk when initiating an antibiotic in an asymptomatic end-of-life patient?

- A. Drug-related adverse event
- B. Increased medication burden
- C. Antibiotic resistance
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-882-L01-P

Evaluation of a change in pre-op cefazolin use criteria in patients with reported beta-lactam allergies undergoing surgery at a community hospital

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Purpose: Pre-surgical patients with documented beta-lactam allergies are at an increased risk of developing surgical site infections (SSIs) due to the receipt of non-preferred pre-operative antibiotics compared to patients without beta-lactam allergies. Furthermore, many patients who report penicillin or cephalosporin allergies can safely tolerate beta-lactams within other classes and even within the same class depending on the R1 side chain similarity and reported allergy. On February 28th, 2023, Munson Healthcare launched an initiative titled the "Kefzol for all (or most)" campaign in the peri-operative setting. This updated guidance recommends using cefazolin pre-operatively for all patients who report a beta-lactam allergy, except if the reported allergy is specifically to cefazolin, or is consistent with a Type II, III, or IV reaction.

Methods: We conducted a retrospective cohort study at Munson Medical Center from January 1st, 2021 to September 30th, 2023, to evaluate this change in pre-operative cefazolin use in patients with documented beta-lactam allergies who underwent surgery. Outcomes were compared before and after the February 28th, 2023 "Kefzol for all (or most)" initiative. The primary outcome was SSIs within 90 days of surgery in patients with documented beta-lactam allergies, as defined by the Centers for Disease Control and Prevention's National Healthcare Safety Network. Secondary outcomes were SSIs in patients with and without documented beta-lactam allergies, the percentage of patients with and without beta-lactam allergies who received cefazolin, the percentage of patients with beta-lactam allergies that received alternative pre-op antibiotics (i.e. vancomycin, gentamicin, clindamycin), and the addition of a cefazolin allergy added to the electronic medical record within 30 days of surgery in patients with a reported beta-lactam allergy at the time of surgery compared to those without.

Results/Conclusions: Results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the impact of a change in cefazolin use criteria on surgical site infections in patients with documented beta-lactam allergies.

Classify surgical site infections according to the Centers for Disease Control and Prevention's National Healthcare Safety Network (CDC NHSN) criteria.

Self Assessment Questions:

All of the following are contraindications to receive cefazolin EXCEPT

- A. Type II (cytotoxic) allergy to ampicillin
- B. Type III (immune complex) allergy to nafcillin
- C. Type I (anaphylactic) allergy to only amoxicillin during childhood
- D. Type IV (delayed, cell-mediated) allergy to cefepime

In a patient scheduled for a laparoscopic cholecystectomy which of the following is the preferred prophylactic pre-surgery antimicrobial

- A. Cefazolin
- B. Vancomycin
- C. Clindamycin
- D. Levofloxacin

Q1 Answer: C Q2 Answer: A

ACPE Universal Activity Number 0121-9999-675-L01-P

Comparison of Sodium Polystyrene Sulfonate (SPS) and Sodium Zirconium Cyclosilicate (SZC) for the Treatment of Severe Acute Hyperkalemia

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Background: Hyperkalemia is defined as $K^+ > 5.0$ mEq/L and is a common electrolyte abnormality that results in roughly 800,000 emergency department visits each year. Severe hyperkalemia, defined as $K^+ \geq 6.5$ mEq/L, is a medical emergency due to the risk of mortality from cardiac arrhythmias. The reasons for elevations in potassium are often multifactorial and risk factors include comorbid conditions and certain medications. The mainstays of hyperkalemia treatment are insulin, albuterol, sodium bicarbonate, loop diuretics, potassium binders, and calcium gluconate. Emergent dialysis may also be considered in severe cases. One proposed benefit of potassium binders is their ability to delay emergent dialysis. Currently, two of the binders, sodium zirconium cyclosilicate (SZC) and sodium polystyrene sulfonate (SPS), are used off-label for acute hyperkalemia. Nearly all of the available literature describes the degree of potassium lowering for each agent alone but there is a lack of head to head trials. The aim of this study is to evaluate the use of SZC versus SPS for the treatment of severe acute hyperkalemia and assess the need for emergent dialysis. We hypothesize that the use of SZC will lead to fewer emergent dialysis sessions when compared to SPS.

Methods: This is a single center, retrospective cohort study. Patients with severe hyperkalemia who received at least one dose of SPS or SZC from 8/1/2022 to 8/30/2023 at University Hospitals Cleveland Medical Center were included. Patients on a potassium binder outpatient and those who underwent solid organ transplant within seven days of binder administration were excluded from the analysis. The primary endpoint is time to emergent dialysis. Secondary endpoints include degree of potassium lowering for each agent and the cumulative amount of other therapies utilized in 24 hours. Results/Conclusions: Results and conclusions will be presented at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Discuss treatment options for severe acute hyperkalemia

Identify the impact of potassium binder use on the need for emergent dialysis

Self Assessment Questions:

Which of the following is correct in the comparison between SZC and SPS?

- A. SZC is less expensive than SPS
- B. Both agents have the same onset of action
- C. SZC is highly specific for K^+ whereas SPS is non-specific
- D. Only SZC is used off-label for the treatment of acute hyperkalemia

Which of the following treatment options for hyperkalemia does not lower potassium levels?

- A. Furosemide

- B. Sodium Bicarbonate
- C. Albuterol
- D. Calcium Gluconate

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-584-L01-P

Apixaban Loading Dose Versus Load Omission in Hospitalized Adults with Acute Venous Thrombosis: A Retrospective Safety Analysis

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Statement of purpose: Direct oral anticoagulants (DOACs) include an initial loading dose to decrease rates of early recurrence of venous thromboembolism (VTE). However, patients receiving ≥ 36 hours of initial parenteral anticoagulation were excluded from the FDA approval trials. In hospitalized patients with acute VTE there is lack of guidance on transition to DOACs in patients initially receiving parenteral anticoagulation.

Statement of methods used: This retrospective, single center cohort study was conducted at a quaternary, level 1 trauma, academic medical center. Adult patients diagnosed with acute VTE on admission or during hospitalization between January 1, 2014 and August 30, 2023 who received at least one dose of apixaban prior to discharge were eligible for inclusion in the study. Patients were grouped into two cohorts, (1) adult patients with acute VTE who received ≥ 1 dose of apixaban 10 mg (loading dose, LD group) or (2) adult patients with acute VTE not loaded with apixaban (maintenance dose, MD group). Exclusion criteria included non-FDA approved doses for VTE, apixaban initiation ≥ 7 days from diagnosis of VTE, or receipt of anticoagulation prior to admission. Patients were followed for 3 months after apixaban initiation.

The primary aim was to evaluate differences in the incidence of major and clinically relevant non-major bleeding between LD and MD groups within 3 months of apixaban initiation. Secondary aims include the incidence of recurrent VTE and all-cause mortality and a multivariate logistic regression to identify risk factors for bleeding.

Summary of (preliminary) results to support conclusion: To date 200 patients have been included. Data collection and analysis are ongoing.

Conclusions reached: Conclusions will be presented at Great Lakes Pharmacy Conference in April 2024.

Learning Objectives:

Describe the initial loading period for direct oral anticoagulants during the acute phase of venous thromboembolism.

Identify existing gaps in the literature for the loading phase of direct oral anticoagulants in hospitalized patients.

Self Assessment Questions:

Which of the following is true regarding the acute phase of venous thromboembolism?

- A. The acute phase of VTE describes the first 48 hours following diagnosis of DVT or PE.
- B. In the acute phase of VTE, patients are at the highest risk of thrombus extension, recurrence, respiratory compromise, and death.
- C. Transition from a parenteral anticoagulant to apixaban should occur after the acute phase of VTE to prevent early recurrence.
- D. The acute phase of VTE describes the first 3 months following diagnosis of DVT or PE.

Which of the following is true regarding apixaban loading period for acute VTE?

- A. The FDA approved loading dose of apixaban for VTE is 15 mg BID for 21 days followed by 20 mg daily.
- B. In the AMPLIFY trial, patients received parenteral anticoagulation for the first 7 days prior to initiation of apixaban to prevent early recurrence of VTE.
- C. The FDA approved loading dose of apixaban for VTE is 10 mg twice daily for 7 days followed by 5 mg twice daily.
- D. Dosing recommendations for the transition from parenteral anticoagulation to apixaban for treatment of VTE are well described in the literature.

Q1 Answer: B Q2 Answer: C

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

Exploring the Impact of LTV Prophylaxis in Patients Receiving Hematopoietic Stem Cell Transplantation (HSCT) from Cytomegalovirus (CMV) Seropositive Donors

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Purpose: Patients undergoing hematopoietic stem cell transplant (HSCT) and receiving post-transplant cyclophosphamide (PTCy) for prevention of graft versus host disease (GVHD) face higher risks of cytomegalovirus (CMV) infection. At UW Health, we utilize letermovir (LTV) prophylaxis in adult patients undergoing allogeneic HSCT when the patient is CMV seropositive (R+), or if they receive their transplant from a CMV seropositive donor (D+). This project assesses the impact of LTV prophylaxis in patients undergoing allogeneic HSCT, from CMV seropositive donors, with a focus on patients who receive post-transplant cyclophosphamide for GVHD prophylaxis.

Methods: Retrospective chart review of allo-HSCT adult recipients of CMV-seropositive donors or CMV-seropositive recipients from January 2019 to December 2022. All included patients received PTCy on day +3 and day +4 and had no detectable CMV viral load at day +14. These patients were initiated on LTV prophylaxis and monitored until day +100. The primary outcome was the number of patients who developed clinically significant CMV, warranting treatment, assessed through day +100. Baseline characteristics including risk factors for developing CMV infection were compiled for both donor and recipient CMV serotypes.

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

Learning Objectives:

Identify the benefit of letermovir for CMV prophylaxis in high-risk patients.

Recognize the risk of CMV reactivation in D+/R- allo-HSCT patients who receive PTCy.

Self Assessment Questions:

Which of the following statements are true regarding the relative risk reduction of letermovir for CMV prophylaxis in high-risk patients?

- A. LTV prophylaxis showed no clinically significant benefit for high-risk patients.
 - B. LTV prophylaxis reduced incidence of clinically significant CMV infection by 38% v. placebo.
 - C. LTV prophylaxis increased incidence of clinically significant CMV infection.
 - D. LTV prophylaxis reduced incidence of clinically significant CMV infection by 5% v. placebo.
- What is the risk of clinically significant CMV reactivation in allo-HSCT patients who are CMV serostatus D+/R- and receive PTCy?
- A. 1
 - B. 0.8
 - C. 0.2
 - D. <5%

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-570-L01-P

Assessment of Ambulatory Antibiotic Use Trends for Upper Respiratory Infections and Potential Stewardship Intervention Impact via Clinic- and Provider-Level Reports

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In 2023, the CDC identified acute bronchitis, nonspecific upper respiratory infection (URI), and viral pharyngitis as high priority conditions for stewardship interventions. Studies consistently show that over 50% of antibiotics prescribed for respiratory symptoms in ambulatory settings are inappropriate or unnecessary. The purpose of this study is to identify outpatient antimicrobial prescribing trends for URIs at UW Health and assess the impact of provider and clinic level report cards.

All antibiotic prescriptions with an associated diagnosis of nonspecific upper respiratory infections following an ambulatory encounter with UW Health Family or Internal Medicine Clinics between November 14th, 2023 and January 8th, 2024 were collected via business intelligence software and standardized to antibiotic prescriptions per 1,000 encounters. Clinics were then ranked based on prescribing rates. Eight clinics with the highest prescribing rates were randomized in a 1:1 ratio to intervention or control groups. The intervention group will receive monthly provider & clinic level report cards detailing antibiotic prescribing rates paired with educational material on management of URIs. The control group will function as is without stewardship intervention. Satisfaction surveys will be distributed to the intervention group at 3- and 6-months. Following completion of a 6-month intervention window we will compare antibiotic prescribing rates between control and intervention groups to assess impact of provider report cards. We will also compile provider satisfaction results and integrate provider feedback on improvement of clinic and provider reports.

8 clinics were evaluated, antibiotic prescribing rates for URIs ranged from 160-350 antibiotics per 1,000 encounters. We are approaching the intervention phase. We expect clinic- and provider-level reports to generate a behavioral effect (i.e., change in prescribing practice) to decrease antibiotic prescribing for URIs. This assessment and provider satisfaction/feedback will help shape ambulatory stewardship interventions.

Learning Objectives:

Identify current rate of antibiotic prescribing for upper respiratory tract infections at UW Health primary care clinics.
 Identify the impact monthly provider and clinic level report cards had on ambulatory antibiotic prescribing rates and provider satisfaction following 6 month intervention window.

Self Assessment Questions:

According to the CDC, which of these conditions is considered high priority for antimicrobial stewardship?

- A. COVID-19 infection
- B. Nonspecific upper respiratory infection
- C. Skin and soft tissue infections
- D. Bacterial pneumonia

Which best describes the potential benefit of antimicrobial stewardship in ambulatory clinics?

- A. Reduced cost associated with antibiotic prescriptions
- B. Increased satisfaction amongst patients
- C. Decreased incidence of upper respiratory infections
- D. Potential reductions in antimicrobial resistance for upper respiratory infections

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-707-L01-P

Evaluation of Modification of Continuous-Veno Venous Hemofiltration Replacement Fluids Dispensing

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Kidney replacement therapy (KRT) is utilized in individuals experiencing chronic and acute renal failure. Continuous venovenous hemofiltration (CVVH) is a classification of kidney replacement therapy (KRT), utilized in critically ill patients that require KRT but are unable to tolerate traditional forms of dialysis. Previously at University Hospitals Cleveland Medical Center (CMC), CVVH replacement fluids were dispensed patient specific daily from central pharmacy. In early 2023 the operational process was modified to provide CVVH replacement fluids as floor stock in intensive care units.

The purpose of this study is to evaluate the operational and clinical impact of modifying the CVVH fluid dispensing process.

This is a retrospective chart review including of patients admitted at CMC from September 2022 to September 2023. A total of 160 patients were included for analysis, with 80 patients in the pre- and post-floor stock implementation groups. The primary objective is to compare the time to CVVH initiation between groups. Secondary objectives include evaluating appropriate antimicrobial dosing during CVVH therapy and the impact on pharmacy department expenditure for CVVH replacement fluids.

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

Learning Objectives:

Describe the safety, efficacy, and practicality of modifying operational processes for Continuous Veno-Venous Hemofiltration.
Identify antimicrobial therapies which require dosage adjustment upon CVVH initiation.

Self Assessment Questions:

Which of the following is associated with delaying initiation of CVVH?

- A. Venous access
- B. Acute bacterial infection
- C. Hemodynamic instability
- D. Allergy to porcine products

What pharmacokinetic or pharmacodynamic property of a medication would be associated with increased clearance after CVVH initiation?

- A. Hydrophilic
- B. Highly protein bound
- C. Small volume of distribution
- D. Large molecular weight

Q1 Answer: A Q2 Answer: A

ACPE Universal Activity Number 0121-9999-637-L01-P

Review of Heparin Dosing Protocol use at Munson Medical Center

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Purpose: In 2018 heparin monitoring parameters were collected at Munson Medical Center for the purpose of comparing aPTT vs anti-Xa based heparin dosing and monitoring. This data was used to update the heparin dosing protocol at Munson Medical Center and compare time to therapeutic level of heparin gtt when dosed by nursing or pharmacy staff. Five years later, this data collection is being repeated following numerous reports/errors of issues pertaining to the dosing of heparin via protocol. These data sets will be compared to analyze for change in key monitoring parameters related to time to first therapeutic level, second consecutive level, number of labs ordered, number of bleeding/clotting events, and the difference between the initial rate compared to the final rate that yields two consecutive therapeutics levels. Methods: Data will be collected via retrospective patient chart review using Munson Medical Center charts during a four-month study period between August 1st, 2023, and November 30th, 2023. Patients 18 and older who received at least 24hours of therapeutic heparin will be included, patients transferred to MMC from other hospitals and pregnant patients receiving heparin will be excluded. The primary outcome will be to determine if there is a statistically significant difference in the time to achieving therapeutic levels of heparin and the number of dosage titrations required for therapeutic level of heparin between patients in 2018 vs. 2023. Results and Conclusion to be presentation at Great Lakes Pharmacy Resident Conference.

Learning Objectives:

List at least three possible barriers to therapeutic heparin levels

Recognize instances where heparin dosing metrics have shifted at MMC in the last 5 years

Self Assessment Questions:

Potential barriers to therapeutic heparin levels exclude what kind of error?

- A. Confusion with department dosing responsibility
- B. Inconsistencies of heparin gtt formulation
- C. Misunderstanding or lack of heparin use knowledge
- D. Lack of reliable and consistent lab values

Drift in heparin dosing protocol efficacy can be seen in what metrics?

- A. Increased time to therapeutic level
- B. Higher starting rates of heparin gtt
- C. Lower starting rates of heparin gtt
- D. Efficacy cannot drift with a protocol

Q1 Answer: B Q2 Answer: A

ACPE Universal Activity Number 0121-9999-786-L04-P

Characterization of Dose-dense Doxorubicin and Cyclophosphamide within the KEYNOTE-522 Trial Regimen for Triple Negative Breast Cancer

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Purpose: The Keynote-522 trial established a widely used treatment regimen for triple negative breast cancer (TNBC) with pembrolizumab added to neoadjuvant chemotherapy consisting of doxorubicin and cyclophosphamide given every three weeks (classic AC). Although dose-dense AC administered every two weeks is standard of care, there are logistical concerns of desynchrony with pembrolizumab given every three weeks. The purpose of this study is to characterize the efficacy, safety, and timing of a modified Keynote-522 regimen including dose-dense AC at Henry Ford Hospital for TNBC.

Methods: This retrospective cohort study will include patients aged 18 years and older with TNBC who received at least two cycles of doxorubicin and cyclophosphamide alongside pembrolizumab as neoadjuvant chemotherapy from October 1, 2021 to December 31, 2023 at Hendry Ford Hospital. Patient characteristics to be collected include age, gender, menopausal status, ECOG performance status, tumor classification, nodal involvement, overall cancer stage, HER-2 status score, PD-L1 expression, and Ki67 expression. The primary endpoint will be incidence of grade 4 neutropenia using Common Terminology Criteria for Adverse Events Version 5.0. Secondary endpoints include pathologic complete response rate at time of surgery, incidence of adverse events including anemia and immunotherapy-related toxicity, incidence of treatment delays, incidence of switching from dose-dense AC to classic or vice versa, sequence of neoadjuvant phases, total length of treatment, and number of hospital admissions. With an estimated enrollment ratio of dose-dense to classic AC of 5:1, 72 participants are needed to yield 80% power in detecting a difference in the primary outcome between treatment groups.

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

Learning Objectives:

Describe the proper timing of administration for agents within the KEYNOTE-522 regimen for triple negative breast cancer.

Identify the potential toxicities of chemotherapy regimens containing doxorubicin and cyclophosphamide.

Self Assessment Questions:

How often should pembrolizumab 200 mg be administered in the treatment of triple negative breast cancer?

- A. Every 1 week
- B. Every 2 weeks
- C. Every 3 weeks
- D. Every 4 weeks

What is a common toxicity of regimens containing doxorubicin and cyclophosphamide that may result in treatment delays for breast cancer patients?

- A. Neurotoxicity
- B. Neutropenia
- C. Neuropathy
- D. Pneumonia

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-592-L01-P

Safety and Efficacy of Direct Oral Anticoagulants Compared to Warfarin in Hemodialysis

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The FDA approved apixaban for use in dialysis for atrial fibrillation and venous thromboembolism and rivaroxaban for atrial fibrillation based on limited pharmacokinetic and pharmacodynamic data. Trials have shown discrepancies in preferred dosing regimens in pharmacokinetic data, several outcomes trials that have shown a reduction in bleeding and potential decreases in recurrent venous thromboembolism rates. Studies have shown that apixaban 5 mg may result in lower thrombosis rates, which differs from what pharmacokinetic studies have shown, but were based on insurance claims, which are likely to underreport outcomes. The objective of this study is to evaluate the safety and efficacy of DOACs compared to warfarin in patients on dialysis.

This single-center, retrospective, cohort study will evaluate the rates of venous thromboembolism and bleeding events in patients on apixaban or rivaroxaban compared to warfarin while on dialysis. Patients will be followed at the time of meeting both inclusion criteria: on intermittent hemodialysis and apixaban or rivaroxaban. They will be followed until the end of study time, outcome(s) occurred, switched to a different anticoagulant, or lost to follow-up. Patients will be excluded if the anticoagulation indication is not for venous thromboembolism or atrial fibrillation, pregnant, requiring dialysis for less than 1 month, or receiving peritoneal dialysis. The primary outcome will be time to the first event of thrombosis or bleeding event. Secondary outcomes will include bleed severity, time to first bleeding event, time to first thrombosis event, and all-cause mortality. Data collection is in process and results will be presented.

In conclusion, there is limited reliable data about the safety and efficacy of DOACs when used in hemodialysis for atrial fibrillation and venous thromboembolism. This study will help to add to the available data to further support data on this topic and whether DOAC use is a viable option.

Learning Objectives:

Discuss the role direct oral anticoagulants have in hemodialysis

Describe when direct oral anticoagulants should be used in hemodialysis

Self Assessment Questions:

Based on initial outcomes studies, the preferred dose for apixaban in hemodialysis is which?

- A. 2.5 mg once daily
- B. 5 mg once daily
- C. 2.5 mg twice daily
- D. 5 mg twice daily

Based on pharmacokinetic and pharmacodynamic studies, what is the preferred dose for apixaban in hemodialysis?

- A. 2.5 mg once daily
- B. 5 mg once daily
- C. 2.5 mg twice daily
- D. 5 mg twice daily

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-559-L01-P

Valproic Acid for Treatment of Agitation and Delirium in Neurosurgical Intensive Care Unit Patients

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Purpose: Patients admitted to the intensive care unit (ICU,) specifically neurosurgical patients, are at an increased risk of developing agitation and delirium due to direct inflammation and oxidative stress associated with neurosurgery. Currently, there are limited therapeutic options for the management of agitation and delirium in ICU patients. Valproic acid (VPA), an antiepileptic and mood stabilizer, has been hypothesized to assist with the management of delirium through its modulation of gamma-aminobutyric acid (GABA), glutamate, dopamine, and serotonin receptors. This retrospective, descriptive study aimed to assess the impact of VPA on adjunctive agent requirements for the management of agitation and delirium in neurosurgical ICU patients.

Methods: This was a single-center, retrospective, descriptive study of neurosurgical ICU patients initiated on valproic acid for agitation or delirium. Patients admitted to UofL Health "UofL Hospital between April 1st, 2016 and August 31st, 2023 were evaluated for inclusion. Neurosurgical patients 18 years of age or older, admitted to the ICU, and started on VPA for agitation or delirium for at least 3 days were included. Patients were excluded if they were on VPA prior to admission, started on VPA for an indication other than agitation/delirium, or were pregnant or incarcerated. The primary outcome evaluated changes in adjunctive delirium or sedative agent requirements following VPA initiation. Secondary outcomes included positive Richmond Agitation and Sedation Scale scores, use of restraints, VPA levels, VPA continuation at ICU and hospital discharge, disposition, and ICU length of stay. Safety outcomes included thrombocytopenia, hyperammonemia, and liver function test abnormalities.

Results/Conclusion: Data collection and analysis is on-going. Results will be presented at the Great Lakes Pharmacy Resident Conference in April 2023.

Learning Objectives:

Review current recommendations for the management of agitation and delirium in intensive care unit (ICU) patients.

Discuss the proposed mechanism and current evidence available for valproic acid in patients with agitation and delirium.

Self Assessment Questions:

Which of the following statements most appropriately reflects recommendations from the Society of Critical Care Medicine for the treatment of ICU delirium?

- A. Scheduled haloperidol should be utilized to help prevent the development of ICU delirium
- B. Quetiapine may be administered as needed to assist with symptoms of delirium for patients in severe distress
- C. The utilization of scheduled benzodiazepines may minimize the development of ICU delirium
- D. Valproic acid may decrease adjunctive delirium and sedative agent requirements

Which of the following is one of the proposed mechanisms for valproic acid in the treatment of delirium?

- A. Combined dopamine and serotonin antagonism
- B. Promotes binding of glutamate to NMDA receptors
- C. Selective alpha2-adrenoceptor agonism
- D. Inhibition of voltage gated sodium channels leading to decreased glutamate release

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-720-L01-P

Comparing the Efficacy and Safety of Gemcitabine + Abraxane (G+A) Versus Gemcitabine + Abraxane + Capecitabine (GAX) in the Treatment of Locally Advanced or Metastatic Pancreatic Cancer

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Pancreatic cancer is a highly aggressive malignancy with a poor prognosis. Gemcitabine + Abraxane (G+A) is a commonly used first-and second line chemotherapy regimen in patients with locally advanced and metastatic pancreatic cancer, with the MPACT trial showing a statistically significant improvement in overall survival compared to gemcitabine monotherapy. Capecitabine is occasionally added, making gemcitabine + Abraxane + capecitabine (GAX). Limited data has been published on the use of the GAX regimen, mostly focusing on tolerability of the regimen rather than efficacy. The addition of capecitabine may offer increased efficacy, but also may add toxicity.

This study aims to compare efficacy and safety of G+A versus GAX in patients with locally advanced or metastatic pancreatic cancer.

This is a single-center, retrospective cohort study. Patients diagnosed with locally advanced or metastatic pancreatic cancer who received either G+A or GAX from January 2014 " September 2023 will be included. Included patients will have locally advanced or metastatic pancreatic ductal adenocarcinoma receiving G+A with or without capecitabine. Patients will be excluded if receiving their treatment as neoadjuvant or adjuvant therapy, are being treated for a neuroendocrine tumor, or if their care was not reflected in the available medical charts. Collected baseline characteristics will include; genetic mutations, location of primary tumor and sites of metastasis, number of metastatic sites, kidney and liver function, ECOG performance status, CA19-9 level at diagnosis. The primary endpoint is progression-free survival (PFS). Secondary endpoints include overall survival (OS), objective response rate (ORR), all-grade and grade 3-4 toxicity.

The primary objective of this study is to compare the progression free survival of patients receiving G+A versus GAX. Additional objectives will include determining the median overall survival of each regimen, objective response rates, the rate of previously selected toxicities, and evaluation of the relationship between patient/disease factors.

Learning Objectives:

Identify available treatment options for Pancreatic Ductal Adenocarcinoma (PDAC)

Describe differences in toxicity between G+A and GAX

Self Assessment Questions:

Which of the following is a benefit of the addition of capecitabine to the previously established G+A regimen?

- A. Provides increased sense of control to patients
 - B. Provides clear overall survival benefit in comparison to G+A
 - C. Allows for lower doses of Gemcitabine and Abraxane due to potential synergy
 - D. Mimics Fluorouracil bolus doses in patients who have difficulty making it to an infusion center
- Which of the following is the most likely toxicity of added capecitabine?

- A. Dry Mouth
- B. Hand/Foot Syndrome
- C. Alopecia
- D. Hypertension

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-543-L01-P

Triazole treatment and prophylaxis across transitions of care: Are there opportunities for improvement?

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Purpose: Triazoles are the drug of choice for prophylaxis and treatment of invasive fungal diseases (IFDs); however, significant limitations to triazole use can include adverse drug events and interactions. To optimize triazole therapy, therapeutic drug monitoring (TDM) is recommended for voriconazole, posaconazole, and itraconazole when prolonged durations are required and can prove challenging without robust transitions of care (TOC) services. This study purpose is to evaluate if current triazole TOC practices adhere to institutional guidelines for antifungal TDM for solid organ transplant (SOT) and hematopoietic stem cell transplant (HSCT) patients receiving triazoles for treatment or prophylaxis.

Methods: This IRB-approved, single-center retrospective cohort study includes patients from 3/2022-6/2023. Patient cohorts are defined as (i) optimal triazole management and (ii) sub-optimal triazole management. Patients included were >18 years of age, SOT or HSCT recipient, prescribed at least one outpatient prescription for voriconazole, posaconazole, or itraconazole with an expected duration of >3 months, had at least one indicated level obtained outpatient, and documented at least 1 follow-up outpatient visit within 30 days to 3 months after triazole initiation. Patients excluded were pregnant, incarcerated, could not take medications enterally, had absolute contraindications to triazoles, or expired prior to TDM level follow-up. The primary outcome of this study is to assess guideline adherence with the HFH Pharmacist Antifungal Therapeutic Drug Monitoring and Pharmacogenetic Optimization Guideline. Guideline adherence was defined as management consistent with guidelines for initial dosing, timing of first level, appropriateness and timing of repeat levels, and appropriate dose adjustment/response to level. Secondary outcomes include infection eradication, breakthrough infection, mortality, and triazole dose-related side effects. Pharmacist intervention will also be assessed through pharmacy notes and i-vents.

Results/Conclusion: Data analysis is in progress. Results and conclusions to be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Explain the importance of therapeutic drug monitoring (TDM) for triazole medications in the treatment and prophylaxis of invasive fungal diseases (IFDs)

Discuss ways in which the TDM monitoring for IFDs may be improved across transitions of care

Self Assessment Questions:

When should a repeat voriconazole TDM level be obtained?

- A. Three days after initiation
- B. At every follow up visit
- C. With a change in formulation but the dose is the same
- D. When a patient's tacrolimus dose is increased

Which of the following could be associated with improved adherence to triazole TOC guidance?

- A. Monitoring levels during every week of therapy
- B. Standardizing TOC pathways to include a clinical pharmacist
- C. Ordering CYP2C19 genotyping for all patients
- D. Ordering a T2 Candida panel on patients initiating anti-fungal prophylaxis

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-593-L01-P

Soy What? Risk factors associated with primary bloodstream infections in adult patients receiving parenteral nutrition - does the lipid formulation matter?

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Purpose: Parenteral nutrition (PN) is a known risk factor for primary bloodstream infections (BSIs). Intravenous lipid emulsions (ILEs) are a vital component of PN, however, the pro-inflammatory and metabolic burden differs between formulations. Current data suggests ILEs composed of 100% soybean oil results in more infections, however, American Society of Parenteral and Enteral Nutrition guidelines do not recommend one formulation over the other. The purpose of this study is to determine independent risk factors associated with primary BSIs in patients receiving PN with either 100% soybean oil ILE or mixed-oil ILE.

Methods: This IRB-approved, propensity-matched, retrospective cohort analysis will include patients admitted to an 877-bed academic medical center between January 2019 and November 2023. Adult patients who received PN including an ILE for at least 72 hours will be included. Patient cohorts will be defined by those who did and did not develop a primary BSI. Primary BSI will be defined as a BSI that occurs 72 hours after PN (including an ILE) is initiated with no alternative source of infection other than the central venous catheter (CVC). Patients will be matched in a 2:1 ratio for those who did not develop a BSI to those who did develop a BSI. Propensity scores will be calculated using CVC line days to account for potential confounding. A sample size of 462 patients will be included to detect a 10% difference in infection rates between patients who received 100% soybean oil ILE and mixed-oil ILE. Statistical analysis will use Chi-Square test or Fisher's exact test for nominal data and student's t-test and Mann Whitney U-test for continuous variables. Multivariable logistic regression will be used to identify exposures independently associated with primary BSIs, such as ILE formulation.

Results: Results will be presented at Great Lakes Pharmacy Residency Conference

Learning Objectives:

Describe the differences among intravenous lipid emulsion formulations.

Identify patient-specific risk factors that increase risk of primary bloodstream infections.

Self Assessment Questions:

Which of the following is a pro-inflammatory metabolite(s) of soybean oil?

- A. Arachidonic acid
- B. Docosahexaenoic acid (DHA)
- C. Eicosapentaenoic acid (EPA)
- D. All of the above

2. Which of the following is an independent risk factor for catheter-associated bloodstream infections?

- A. Single lumen central venous catheters
 - B. Receipt of stress ulcer prophylaxis
 - C. Diagnosis of diabetes
 - D. Total parenteral nutrition
- Q1 Answer: A Q2 Answer: D
ACPE Universal Activity Number 0121-9999-521-L01-P

Evaluating Effectiveness of Anti-Factor Xa Assay Versus Activated Partial Thromboplastin Clotting Time (aPTT) Monitoring for Pharmacist-Managed Heparin Dosing

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Purpose: Historically, at Columbus Regional Health (CRH), patients requiring therapeutic heparin infusions have been monitored utilizing activated partial thromboplastin clotting time (aPTT) to make dosing adjustments. While this test is less expensive, literature now suggests a preference for monitoring patients utilizing anti-factor Xa (anti-Xa) assays. Many studies indicated that patients monitored with anti-Xa assays reach therapeutic levels faster and stay therapeutic longer, thus reducing the number of tests required for each patient. This study aims to evaluate if the pharmacist-driven Heparin Dosing Procedures utilizing the anti-Xa assay at CRH is more effective than monitoring utilizing aPTT.

Methods: This study will review patients admitted to CRH between March 1 and August 31, 2022, and 2023, and receiving therapeutic heparin infusions dosed by pharmacists to evaluate the effectiveness of anti-Xa assay monitoring compared to aPTT monitoring. All patients admitted in 2022 were monitored using aPTT levels, whereas patients in 2023 were primarily monitored using anti-Xa levels. Patients included in the study must have an active "Pharmacy to dose anticoagulation" consult order with an identified indication as delineated in the Pharmacy Heparin Dosing Policies and Procedures. Any patients receiving prophylactic subcutaneous heparin, surgical irrigations, requiring non-protocol therapeutic ranges, or heparin not dosed by a pharmacist were excluded from the study. Patients receiving heparin infusions for less than 24 hours or with fewer than three levels drawn were also excluded. The primary outcome is monitoring efficacy, defined as a composite of the time taken to reach the therapeutic range and the total time spent in the therapeutic range. Secondary outcomes include the number of lab assays per patient, percent of therapeutic, subtherapeutic, or supratherapeutic levels, and number of heparin dosing adjustments required to achieve therapeutic range.

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

Learning Objectives:

Review literature regarding laboratory assays for therapeutic heparin monitoring and application to clinical practice.

Identify potential opportunities for improving the time spent in the therapeutic goal range for patients receiving unfractionated heparin dosed by pharmacists.

Self Assessment Questions:

When used as the monitoring assay for heparin dosing, what indirect measure does an anti-Xa assay demonstrate?

- A. The function of the intrinsic and common clotting pathways
- B. The rate of clearance of heparin
- C. The effect of heparin on clotting factors VII, IX, X, and II
- D. The plasma concentration of heparin

For which of the following patients would anti-Xa monitoring be preferred over aPTT monitoring?

- A. Patients with the presence of lupus anticoagulant
- B. Patients with hypertriglyceridemia
- C. Patients with recent direct oral anticoagulant (DOAC) use
- D. Patients previously monitored with aPTT levels

Q1 Answer: D Q2 Answer: A

ACPE Universal Activity Number 0121-9999-719-L01-P

Safety and efficacy of tacrolimus conversion between immediate- and extended-release formulations in kidney transplant recipients

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Background:

Due to its efficacy in preventing rejection in kidney transplant recipients (KTR), tacrolimus, a calcineurin inhibitor, is one of the most commonly utilized immunosuppressive medications. While tacrolimus is very effective at preventing allograft rejection, it requires frequent trough blood level monitoring and has significant adverse effects (AE), such as hypertension, hyperkalemia, and nephrotoxicity. Tacrolimus also has the AE of neurotoxicity which is related to high peak concentrations. To help mitigate unwanted AE, once-daily tacrolimus extended-release (LCPT) was developed. LCPT demonstrates a similar AUC₂₄ profile as immediate-release tacrolimus (IR-TAC) with a lower peak exposure and similar safety and efficacy outcomes. At University Hospitals Cleveland Medical Center (UHMC), KTR receive de novo twice daily IR-TAC with potential to be transitioned to LCPT based on patient specific factors such as high dose requirements, drug cost, AE, and compliance concerns. IR-TAC is converted to LCPT using the manufacturer's recommendation of 1:0.8. The purpose of this study is to evaluate the usage, safety, and efficacy of LCPT in KTR at a single transplant center.

Methods:

This is a retrospective study evaluating KTR who were transitioned from IR-TAC to LCPT between October 1, 2019 and April 30, 2023 at UHMC. Patients who received multiorgan transplants or were reinitiated on IR-TAC within 30 days of conversion were excluded from the study. The primary outcome is to evaluate the incidence of rejection within 3 months pre- and post- formulation change. Secondary endpoints include incidence of rejection within 1-year, dose conversion factor, and pre- and post- assessments of time in therapeutic range, incidence of infection, and serum creatinine. In addition to descriptive statistics, McNemar's test and paired t-test will be utilized to analyze nominal data and therapeutic range, respectively.

Results and Conclusions:

Results and conclusions will be reported and presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the differences between IR-tac and LCPT formulations

Discuss the importance of maintaining appropriate immunosuppression in KTR

Self Assessment Questions:

Which of the following statements regarding IR-tac and LCPT is false?

- A. Tacrolimus is a calcineurin inhibitor
- B. Tacrolimus does not require blood level monitoring
- C. Common side effects of tacrolimus include tremors and headache
- D. Tacrolimus is nephrotoxic

A kidney transplant recipient, who is 1-year post transplant, has been stable on tacrolimus IR 5 mg every 12 hours (total daily dose of 10 mg) with a trough level of 5.5 ng/mL (goal 5-8 ng/mL). The patient will be transitioned to LCPT. What starting dose of LCPT would you recommend for this patient based on the manufacturer's recommendations?

- A. 6 mg daily
- B. 7 mg daily
- C. 8 mg daily
- D. 9 mg daily

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-601-L01-P

Management of Sexually Transmitted Infections for Sexual Assault Survivors in the Emergency Department

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Purpose: The emergency department is the initial and primary point of care for victims of sexual assault. Immediate medical care for sexual assault victims should include treatment of injuries, testing for STIs, and prevention of sexually transmitted infections and unwanted pregnancy. Previous studies have alerted that only 20.4% of sexual assault survivors receive appropriate care during their post-sexual assault visits. The purpose of this project is to evaluate post-sexual assault quality of care provided to victims in the emergency department.

Methods: The study is a retrospective cohort evaluating sexual assault victims who presented to Henry Ford Hospital Detroit within 72 hours of non-consensual intercourse from January 1st, 2022, until December 31st, 2023. Patient cohorts were defined as (i) patients who received guideline-directed empiric antibiotic treatment and testing for STIs and (ii) patients who did not receive guideline-directed treatment or testing. Patients were included if they presented within 72 hours of sexual assault and were ≥ 15 years old. The primary outcome of appropriate infection testing and empiric treatment was defined as testing performed for chlamydia, gonorrhea, HIV, HPV, HBV, and trichomoniasis (women only) and treatment with ceftriaxone, doxycycline, metronidazole, and HIV PEP when indicated. Secondary outcomes included HIV testing, vaccinations, and contraception prevention, if appropriate. A sample size of 248 patients will provide 80% power. Data were collected from electronic medical records through chart review. Data will be analyzed using measures of central tendency and variability for descriptive data, chi-square testing for categorical data, and student's t-test for continuous data.

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

Learning Objectives:

Describe empiric STI treatment in sexual assault survivors who receive care in the emergency department.

Discuss STI testing recommendations for sexual assault survivors who receive care in the emergency department.

Self Assessment Questions:

Which of the following empiric antibiotic regimens would be recommended per CDC STI Treatment Guidelines, 2021, for a female presenting to the emergency department?

- A. Ceftriaxone, doxycycline, and metronidazole
- B. Ceftriaxone, azithromycin, and metronidazole
- C. Ceftriaxone and doxycycline
- D. Ceftriaxone and metronidazole

Which of the following is a long-term complication of inappropriate testing of STIs in the emergency department?

- A. Painful urination
- B. Cervical and rectal cancers
- C. Flu-like symptoms
- D. Unusual discharge from genitals

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-726-L01-P

Optimizing Pharmacy-Led Medication History Workflows for Planned Patient Admissions

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Statement of Purpose: Increasingly complex patients and growing pharmacy demands within acute care environments requires efficiency in the time and responsibilities of pharmacy team members, striving for the best of care for all. The Froedtert Hospital Department of Pharmacy is responsible for completion of an admission medication history within 24 hours of admission for almost all inpatients. Optimization of this patient care activity is vital within Froedtert Hospital, an institution with an average of 37,000 inpatient admissions annually. This project aims to develop admission medication history workflows that would allow this activity to be shifted to prior to admission for planned patient admissions in order to optimize the time and responsibilities of acute care pharmacy team members. The primary objective of this pre-post quality improvement project is to optimize the admission medication history process for planned patient admissions with a secondary objective of improving the overall medication history and reconciliation processes.

Methods: The project includes creation of a pharmacy-led workflow targeting planned patient admissions. Technicians, interns, and students will complete scheduled phone calls to patients to conduct medication histories prior to admission. Each encounter will be documented and saved under the future inpatient encounter allowing for easier and timelier access to medication reconciliation performed by the pharmacist upon patient admission.

Results/Conclusion: Data results and conclusion will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify inefficiencies within current medication history workflows with emphasis on planned patient admissions.

Describe novel, pharmacy-led workflows that can be utilized to optimize current state of the medication history workflow for planned patient admissions.

Self Assessment Questions:

Which of the following are true?

- A. Institutions like Froedtert are being challenged financially with emphasis on optimization of pharmacist time and utilization of lower-cost pharmacy labor
- B. Froedtert has NOT identified any inefficiencies within the overall medication history and reconciliation processes
- C. In current state, only 15% of planned patient admissions present with a pharmacy-led admission medication history completed prior to inpatient admission from the pre-operative clinic.
- D. A and C

Which of the following describe potential areas of optimization within the medication history workflow for planned patient admission?

- A. Utilization of lower-cost labor (Technicians/Interns/Learners)
- B. Medication histories collected and completed ahead of admission reduces medication errors during provider medication reconciliation
- C. Medication histories collected and completed ahead of admission reduces pharmacist time spent during medication reconciliation
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-754-L04-P

Standardization of Pharmacy Inventory Management Services Across UW Health Clinics

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Pharmacy services are provided in differing capacities amongst the hundreds of clinics ranging from pharmacy technicians servicing the individual clinics and performing inventory management, to clinic managers performing inventory control and medication order fulfillment. These achieve similar end results of inventory management but differ in the process from clinic to clinic causing inconsistencies. The services being reviewed include aspects of ordering, fulfillment, delivery, expiration audits, recall management, and management of clinic stock vs patient-specific medications.

The purpose of this project is to increase standardization in pharmacy services across clinics. The objectives include: 1) Develop a model reflecting current distribution and inventory management of pharmacy services amongst clinics, 2) Create options for standard distribution and inventory management strategies and select direction with ambulatory stakeholder team, 3) Implement selected distribution and inventory management models, and 4) Evaluation of implemented interventions.

Through surveying of clinic leaders and pharmacy technicians, a compilation of data will determine current state processes for medication distribution and inventory management. Additional information will provide an understanding of compliance, time spent completing tasks, and ownership of tasks. Creation of different models will highlight how we will be defining changes that identifies new workflow ownership, time estimations, and workforce to maintain new inventory management system. Review will occur by stakeholders to appoint ownership to tasks to provide streamlined services across all clinics. The team will then identify a timeline for implementation of the agreed upon model, assessing additional requirements needed to achieve final state. Resurveying leaders, we will enumerate differences between current and proposed states and gauge understanding of implemented medication system.

This new model will create direction and transparency for both clinic managers at each site and our internal technician team, that will be readily available to be adopted to additional clinics as the system expands.

Learning Objectives:

Discuss benefits of standardizing inventory management systems across multiple sites

Define potential models of inventory management systems for application across clinics within a health system pharmacy

Self Assessment Questions:

What are the benefits standardizing inventory management systems across all clinic settings?

- A. More predictable workload for pharmacy distribution
- B. Consistent compliance to medication management regulatory standards
- C. Creation of role clarity in inventory management system
- D. All of the above

What processes should be included when evaluating differing models to implement across multiple sites?

- A. Stakeholder Committees
- B. Owners of each Task
- C. Workforce/FTE Calculations
- D. All of the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-784-L04-P

Unveiling the Impact of Methicillin-resistant Staphylococcus aureus (MRSA) Polymerase Chain Reaction (PCR) Testing on Anti-MRSA Therapy Duration for Pneumonia

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Purpose: Methicillin-resistant Staphylococcus aureus (MRSA) is an important pathogen in pulmonary infections. Guidelines recommend adding anti-MRSA therapy empirically for those with risk factors. Waiting for final respiratory culture results can lead to prolonged courses of anti-MRSA therapy, increasing the risk of adverse drug reactions, antimicrobial resistance, and healthcare costs. MRSA polymerase chain reaction (PCR) tests are a rapid diagnostic test that can allow for earlier discontinuation of anti-MRSA therapy. The purpose of this study is to compare patients with pneumonia who received a MRSA PCR nasal swab with those who did not and its impact on patient outcomes.

Methods: This retrospective chart review includes adult patients aged 18-89 years at Springfield Memorial Hospital in Springfield, IL who were hospitalized and had a diagnosis of pneumonia from July 1st, 2022 to June 30th, 2023. The primary objective of this study is to determine the duration of anti-MRSA therapy between MRSA PCR use and non-use. Secondary outcomes include time to MRSA PCR collection and result, length of hospital stay, mortality, cost of hospitalization, 30-day readmission, and the incidence of acute kidney injury (AKI), defined as an increase of serum creatinine of 0.3 mg/dL or greater over a 48-hour period, or by an increase in serum creatinine by 50% from baseline within 7 days. Patients were included in the study if they had an indication of pneumonia and at least one dose of vancomycin or linezolid charted while inpatient. Exclusion criteria included a concurrent bacterial infection or positive MRSA sputum culture. Data collection is in progress; results and conclusions will be presented at the 2024 Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Recognize the utility of the MRSA PCR test in the de-escalation of antimicrobial therapy for patients with pneumonia.

Identify the differences in outcomes between a cohort of patients with pneumonia who received a MRSA PCR nasal swab and patients who did not.

Self Assessment Questions:

Studies have shown that a negative MRSA PCR test has a high ____ predictive value of approximately ____% for community-acquired and nosocomial pneumonia.

- A. positive; 99%
- B. negative; 99%
- C. positive; 70%
- D. negative; 70%

What are potential outcomes of utilizing a MRSA PCR test in patients with pneumonia?

- A. A shorter duration of anti-MRSA therapy
- B. A shorter hospital stay
- C. Less likelihood of developing an acute kidney injury (AKI)
- D. All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-575-L01-P

Implementation of Medication Dispense Tracking within a Health System

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Purpose:

Medication dispensing processes have changed significantly over time to incorporate technological advances allowing for improvements in medication safety, workflow efficiencies, and timely medication administration. However, some medications are still dispensed from centralized pharmacies and require delivery via manual medication dispensing processes that are prone to delays and opportunities for missing medications. Medication dispense tracking is the process of recording medication logistics data to provide transparency to the status of medications dispensed by the pharmacy. Studies assessing medication dispense tracking have demonstrated a reduction in medication re-dispenses, medication messages, call volume, and medication turnaround times. The purpose of this project was to evaluate the implementation of an EMR integrated dispense tracking process at a four-hospital community health system.

Methods:

This process improvement project was implemented at four community hospitals within Norton Healthcare. The PDCA (Plan-Do-Check-Act) methodology was utilized in this process improvement project. EMR integrated dispense tracking was implemented in two phases: a pilot study at a single community hospital followed by expansion to three additional hospitals within the health system. The study period consisted of 2-month pre-and post-implementation phases for the pilot study and 1-month pre-and post-implementation phases for the system-wide expansion. The primary outcome was number of re-dispenses per 1000 patient days. Secondary outcomes were number of medication messages per 1000 medication messages, cost savings, and pharmacy staff time repurposed.

Results/Conclusion:

To be presented at the 2024 Great Lakes Pharmacy Resident Conference

Learning Objectives:

Select the most common cause of medication administration omission

Recognize benefits of implementing medication dispense tracking

Self Assessment Questions:

Medication administration omission is most commonly attributed to which cause?

- A. Patient refusal
- B. Medication not on unit
- C. NPO status
- D. Patient off the unit

Dispense tracking has been shown to result in which of the following?

- A. Increased medication message volume
- B. Decreased automated dispensing cabinet utilization
- C. Increased call volume
- D. Decreased medication re-dispenses

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-764-L04-P

Comparison of blood pressure fluctuations on hematoma expansion in hemorrhagic stroke

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Purpose:

Intracerebral hemorrhage (ICH) constitutes a subtype of stroke characterized by the spontaneous rupture of blood vessels within the brain parenchyma, resulting in accumulation of blood in brain tissue. It accounts for a significant proportion of stroke-related morbidity and mortality. The management of ICH involves a complex array of strategies aimed at minimizing hematoma expansion and improving patient outcomes. One such strategy recommended by the 2022 American Heart Association/American Stroke Association guidelines involves using blood pressure (BP) lowering agents that limit fluctuations and maintain smooth, sustained BP control leading to reduced hematoma expansion and better functional outcomes. Understanding this relationship is essential to optimize ICH management.

Methods:

This retrospective chart review included adults aged 18 to 90 years, admitted to Springfield Memorial Hospital (SMH) between January 1st 2018 to December 31st 2023. The primary objective of this study was to compare the rate of hematoma expansion in patients with ICH who received blood pressure management agents via intravenous push versus continuous infusion. Secondary objectives included BP fluctuations, time to BP goal, rate of kidney injury, and disposition. Patients were included if they had a diagnosis of ICH confirmed with Computed Tomography (CT) or Magnetic Resonance Imaging (MRI). Patients without any initial and follow-up scans around 12 hours from admission were excluded. Patients were also excluded if there was any presence of pre-existing hypotension (systolic BP <90 mmHg) or bradycardia (heart rate < 50 beats per minute), significant aortic stenosis, other valvular heart diseases, or pregnancy. Furthermore, patients who received more than two doses of labetalol or hydralazine and are later converted to nicardipine or clevidipine were excluded. Additionally, individuals who received BP agents other than labetalol, hydralazine, nicardipine, or clevidipine were excluded.

Results/Conclusions:

Presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Define different approaches to blood pressure management in ICH patients to understand their impact on hematoma expansion rates.

Discuss the relationship between blood pressure fluctuations and the rate of hematoma expansion.

Self Assessment Questions:

What is the primary focus of evaluating different approaches to blood pressure management in ICH patients?

- A. Reducing blood pressure
- B. Minimizing hematoma expansion rates
- C. Improving renal function
- D. Increasing cardiac output

In the context of ICH, what is the primary aim of using blood pressure-lowering agents, as recommended by guidelines?

- A. Accelerating hematoma expansion
- B. Inducing hypotension
- C. Increasing heart rate variability
- D. Minimizing fluctuations in blood pressure

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-703-L01-P

Efficacy of direct oral anticoagulant reversal for intracranial hemorrhage with fixed-dose 4-factor prothrombin complex concentrate in patients weighing over 80 kilograms

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Purpose:

The purpose of our study was to evaluate the effect of patient weight on the efficacy of direct oral anticoagulant (DOAC) reversal in intracranial hemorrhage (ICH) with fixed-dose 4-factor prothrombin complex concentrate (4F-PCC). 4F-PCC is administered for emergent reversal of anticoagulant medications including warfarin and DOACs. Neurocritical care guidelines from 2016 recommended reversal of DOACs for ICH with dosing of 50 units/kilogram (kg) based on low-quality evidence at the time. Multiple authors have recently published retrospective analyses of low-dose (25 units/kg) versus high-dose (50 units/kg) protocols in small series with similar hemostatic efficacy between groups. Recently, Trinity Health has switched to a fixed-dose strategy of 2,000 units which approximates to 25 units/kg in patients of 80 kg weight. Some guidelines for anticoagulation reversal recommend a fixed dose of 2,000 units of 4F-PCC for DOAC reversal; however, these guidelines cite limited data and are not focused on patients with intracranial hemorrhage. There is concern that patients with an ICH weighing over 80 kg may be at greater risk for hematoma expansion due to the use of a fixed-dose reversal strategy.

Methods:

This was a retrospective, single-center, pre-post study comparing hemostatic efficacy for patients receiving weight-based vs fixed-dose 4F-PCC for DOAC reversal for ICH. The primary outcome was hemostatic efficacy on repeat computed tomography (CT), defined as excellent/good or poor. Secondary outcomes include length of stay, need for surgical intervention, mortality, and discharge disposition. Outcomes were compared between the weight-based dosing regimen of 50 units/kg and the fixed-dose strategy of 2,000 units.

Results:

Results will be presented at the 2024 Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Describe the mechanism of action of 4F-PCC for DOAC reversal.

Review current literature regarding fixed-dose 4F-PCC use in DOAC-associated ICH.

Self Assessment Questions:

What 4F-PCC dose does the 2016 Neurocritical Care Guidelines recommend for reversal of DOACs?

- A. 100 units/kg
- B. 50 units/kg
- C. 10 units/kg

D. 25 units/kg

Poor hemostatic efficacy is defined as _____

A. $\leq 20\%$ increase in hematoma volume

B. $>20\%$ increase in hematoma volume

C. $>35\%$ increase in hematoma volume

D. $>50\%$ increase in hematoma volume

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-582-L01-P

Gap Analysis of Clinical Services for Research Participants

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Purpose:

When clinically evaluating investigational drugs, to assess items such as drug-drug interactions and dose modifications, investigational drugs may require additional resources, such as the study protocol, investigational brochure, or pharmacy manual to avoid protocol deviations. Pharmacists may be the ideal individuals to perform these drug related activities for research participants. A pilot study showed only approximately 21% of investigational drugs are added the medication list in the EHR 48 hours after the first study visit [Redic et al. 2017] and preliminary evidence shows that number improves to 33% after 1 year for outpatient self-administered medications. This may indicate that pharmacists are not the primary owners of medication reconciliation for investigational drugs. With greater than 95% of investigational drugs dispensed for outpatient or infusion, embedded clinic pharmacists and infusion pharmacists are most likely to address investigational drugs. This quality improvement/quality assurance project aims to determine if services analogous to those provided for approved drugs are performed when dealing with investigational drugs by pharmacists.

Methods:

This study is single center, survey based gap analysis. A survey will be conducted in the ambulatory practice area with embedded clinic pharmacists and infusion pharmacists to determine frequency of common clinical services performed for FDA approved drugs, frequency of investigational drug analogous services performed, and confidence in performing those investigational services. To elucidate the clinic areas where investigational drugs may be initiated, patients treated be abstracted from the RP accountability software Vestigo (Ann Arbor, Michigan) from January 1, 2023, to December 31, 2023. Gaps in service will be defined as % difference between common practices of approved drugs and investigational drugs. Aggregated binary unpaired data will be analyzed using the McNemar test.

Results/Conclusions:

This QI/QA project will identify any differences in practice between approved drugs and investigational drugs. Results to be presented at GLPRC.

Learning Objectives:

Discuss unique considerations of investigational drug.

Describe recommended clinical practices for investigational drugs.

Self Assessment Questions:

What are unique challenges associated with clinical care when dealing with an investigational drug?

A. Limited access to investigational drug information.

B. Protocol specific dosing.

C. Protocol identified prohibited medications.

D. All of the above

Which of the following are recommended services for patients taking investigational drugs?

A. Recommend herbal supplementation.

B. Ensure investigational drugs are documented with standardized formatting in the EHR.

C. Assess medication list for drug-drug interactions or prohibited medications per study protocol.

D. B and C

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-814-L05-P

Optimization of Patient Enrollment in Specialty Pharmacy

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URAC is an independent, non-profit organization that sets quality standards for the healthcare industry and specialty pharmacies. URAC accreditation requires a patient management program or (PMP) be available to all patients receiving a specialty medication. PMP requires specific contacts that include assessments, education, and ensures that our patients are receiving safe, effective, and affordable care.

Patients receiving medications at University of Michigan Specialty Pharmacy (UMSP) are registered in the PMP program through the patient enrollment contact. Patient enrollment is initiated when specialty receives a new patient or new therapy through a new prescription or referral from one of University of Michigan's clinics. With this information, the specialty team comprised of pharmacists and medication access staff help navigate new patients through initial review of appropriateness of prescription, initial assessment, patient education, prior authorizations, enrollment, and financial assistance. Over time, there have been changes of ownership and variabilities in workflow of patient enrollment. This process should be standardized and optimized to ensure timely start and lower cost of specialty medications.

This is a process improvement study that is retrospective and descriptive of the process of patient enrollment at UMSP. Our goal is to assess the impacts of time from prescription transmission to patient enrollment before and after the August 1st standardization. Inclusion criteria contains all new specialty patients shipped medication from 5/1/23 through 12/31/23. A pre- and post-implementation period surrounding the date of standardization will be evaluated. Turnaround time evaluated will be defined as the time it takes once a prescription is received by UMSP to time patient receives medication.

The impact of this process improvement study will allow us to evaluate the impact of our current practices and identify additional areas for process improvement to reduce time to medication initiation and cost for specialty patients.

Learning Objectives:

Discuss the importance of the patient management program (PMP) for URAC accreditation and patient therapy management

Review the considerations and outcomes for specialty pharmacy workflow standardization to improve turnaround time for specialty patient enrollment.

Self Assessment Questions:

Patient Management Programs (PMPs) are characterized by which of the following?

- A. They are essential for URAC accreditation of specialty pharmacies
- B. They provide structure for communication and documentation regarding medication therapy management for specialty pharmacies
- C. They delay the start of and increase the cost of specialty medication therapy
- D. A and B are correct

Which was a result of patient enrollment workflow standardization at University of Michigan Specialty Pharmacy?

- A. Decreased turn around time for patient enrollment in prescription and referral based workflow
- B. Decreased turn around time for patient enrollment in prescription based workflow and increased turn around time in referral based workflow
- C. Increased turn around time for patient enrollment in prescription based workflow and decreased turn around time in referral based workflow
- D. Increased turn around time for patient enrollment in prescription and referral based workflow

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-838-L99-P

Optimization of Admission Medication Histories at an Academic Medical Center

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Purpose

Medication history completion is an essential backbone for providing accurate and error-free initiation of home medications upon admission to the hospital. Delay in completing the history process has hindered patient care and lead to more inpatient medication errors. These errors result from, inappropriate initiation of medications that are no longer taken at home or omission of important home medications. Froedtert Hospital has employed a strategy using pharmacist extenders to complete medication histories as of August 2022. At Froedtert, every APPE student spends two days in the emergency department (ED) as a Transitions of Care (TOC) student during each rotation block where they complete histories for their eight-hour day along with other ED pharmacy staff. In general, the TOC student, ED APPE students, ED PGY1 and PGY2 learners, and ED pharmacists work together to complete a majority of the medication histories prior to patients' admission. Any histories not completed in the ED are completed on a hospital floor by decentralized technicians or pharmacists. To streamline the admission process, the purpose of this study is to improve the current medication history process on admission.

Methods/Outcomes

We plan to maximize medication histories completed within the ED prior to admission to hospital floors. The primary outcome is to complete a gap-analysis of histories completed in the ED by pharmacy extenders compared to the total number of patients admitted to the inpatient hospital floors. The secondary outcomes include determining a reasonable number of medication histories completed within an eight-hour shift by quantifying the number of ED admissions daily based on day of week, time of day, and the number of histories completed during that time. Transitions of care students are the benchmark for these outcomes.

Results/Conclusions

Final results and conclusions are in process and will be presented at the Great Lakes Conference.

Learning Objectives:

Identify barriers to medical care if medication histories are not completed in a timely fashion upon admission to the hospital.

Identify average number of histories that is reasonable for a TOC student to complete in an eight-hour shift.

Self Assessment Questions:

What is NOT a possible outcome from a delayed medication history?

- A. Inappropriate initiation of medications that are no longer taken at home.
- B. Omission of ordering important home medications while inpatient.
- C. Delay in treatment or care.
- D. Longer stay in the emergency department.

What is a reasonable number of medication histories a pharmacy representative at Froedtert Hospital should expect to complete in an 8 hour work day?

- A. 3 Histories
- B. 20 Histories

C. 11 Histories
D. There is no expectation
Q1 Answer: D Q2 Answer: C
ACPE Universal Activity Number 0121-9999-778-L04-P

Impact of symptom reporting on antibiotic appropriateness

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Purpose: The CDC has identified antibiotic resistance to be a global threat to public health. Despite our best efforts, urinary tract infections continue to be over diagnosed and subsequently over-treated. This study aims to evaluate how symptom selection during antibiotic ordering and verification impacts appropriateness of therapy.

Methods: This is an IRB approved retrospective study. All prescribed antibiotic orders with an indication of "urinary tract infection" will require additional selections intended to describe the symptoms patients are experiencing. Pre and post implementation data will be collected from August 2022 through September 2023. The primary endpoint is the reduction in inappropriate antibiotics prescribed for asymptomatic bacteriuria. The secondary endpoint will explore the frequency in which each symptom was selected during the ordering process.

Results and Conclusions: Data analysis ongoing. Preliminary results will be shared at the 2024 Great Lakes Pharmacy Conference.

Learning Objectives:

Identify when antibiotics are appropriate for urinary tract infections
Recognize the most commonly reported symptoms for urinary tract infections

Self Assessment Questions:

Which of the following is a risk of inappropriately treating asymptomatic bacteriuria?

- A. Increased antimicrobial resistance
- B. Unwanted adverse effects including diarrhea, nausea/vomiting
- C. Decreased length of stay
- D. Option A and B

Which of the following are commonly reported symptoms for patients presenting with a possible urinary tract infection?

- A. Dysuria
- B. Headache
- C. A and D
- D. Hematuria

Q1 Answer: D Q2 Answer: C

ACPE Universal Activity Number 0121-9999-516-L01-P

Evaluating the Impact of Pharmacist Management of Osteoporosis in the Ambulatory Care Setting

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Abstract

In the U.S., approximately 8 million women and 2 million men over 50 years old have osteoporosis. An estimated 27 million women and 16 million men have low bone mass and are at increased risk of developing osteoporosis. There is room for collaboration in osteoporosis management as studies have revealed that pharmacists can recognize various gaps in management of this condition and make the appropriate treatment recommendations. As a result of a new initiative, in January 2023, Community Health Network's ambulatory care pharmacists became more involved in the management of osteoporosis.

We hypothesize that pharmacists have identified gaps in care, modified treatments to ensure they are appropriate, encouraged screening, and improved overall osteoporosis care for patients. Results from this study will provide additional evidence of the impact that ambulatory care pharmacists have when providing osteoporosis care.

This study has been approved by the Institutional Review Board. Data will be collected through a retrospective chart review of patients who have seen a pharmacist at a Community Health Network Ambulatory Care Clinic for osteoporosis management from January 1, 2023 through June 30, 2023. An internal dashboard will be utilized to identify patients that meet the inclusion and exclusion criteria and will be used for chart review. This chart review will consist of approximately 722 patients, and 361 randomly generated patients will be narrowed down with application of the exclusion criteria. The primary objective of this study is to determine what pharmacist interventions are being made when completing osteoporosis management visits. The secondary objective is to assess how the pharmacist's involvement in the osteoporosis management team impacted the patient's overall disease state. The objectives will be tested for normalcy and analyzed using descriptive statistics and the Mann Whitney U or the two-sample unpaired t -test depending on whether data is parametric or nonparametric.

Learning Objectives:

List three patient care interventions that ambulatory care pharmacists can make when managing osteoporosis.
Identify at least one gap in osteoporosis care that can be mitigated by ambulatory care pharmacist involvement.

Self Assessment Questions:

Ambulatory care pharmacists' involvement in osteoporosis management can

- A. Help encourage routine screening for osteoporosis
- B. Help align osteoporosis therapy plans with guideline recommendations
- C. Help adjust osteoporosis therapy plans to account for patient specific factors and preferences
- D. All of the above

Select the correct statement Across the U.S., ambulatory care pharmacists have increased recognition as beneficial members of the osteoporosis management team.

- A. Across the U.S., ambulatory care pharmacists have increased adverse effects for patients receiving osteoporosis therapy management
- B. Across the U.S., ambulatory care pharmacists have increased recognition as beneficial members of the osteoporosis management team
- C. Across the U.S., ambulatory care pharmacists have decreased recognition as beneficial members of the osteoporosis management team
- D. Across the U.S., ambulatory care pharmacists have decreased access to quality care for patients receiving osteoporosis therapy management

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-566-L01-P

A Retrospective Institutional Evaluation of the use of Procalcitonin to Discontinue Antibiotics in Lower Respiratory Tract Infections

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Purpose: Procalcitonin is a biomarker for the early detection of bacterial infections with clinical significance due to its positive correlation with disease severity and elevated serum levels. Furthermore, multiple randomized trials have shown that a procalcitonin-based algorithm can reduce antibiotic use by allowing for early cessation of antibiotic therapy in stable, low risk patients with a low serum procalcitonin. This study aims to assess the use of low serum procalcitonin levels to stop antibiotic therapy in patients with lower respiratory tract infections at Covenant Healthcare. The findings will evaluate appropriate ordering and adherence to the current institutional procalcitonin policy.

Methods: This retrospective, single-center, institutional policy evaluation aims to evaluate the use of low serum procalcitonin in the cessation of antibiotics in lower respiratory tract infections in adults. The primary outcome is the discontinuation of antibiotic therapy in adults with community acquired pneumonia due to a serum procalcitonin of <0.25 micrograms/L and who are admitted for at least 24 hours. Secondary outcomes include the average number of times procalcitonin levels are ordered per patient, cost of procalcitonin usage, average length of antibiotic therapy, acceptance of pharmacist interventions, and 30-day readmission rates. A sample size was calculated based on previous literature to detect a 20% difference in outcomes between the previous literature adherence rate and the study sites adherence rate using chi-square analysis with a significance level of 0.05 and 90% power. It is estimated that 54 patients would be needed.

Results & Conclusions: Preliminary data resulted with a chi square of 13.89 and a P value of <0.05. Further results and conclusions will be presented at the Great Lakes Pharmacy Resident Conference.

Learning Objectives:

Identify the clinical utility of procalcitonin in stewardship of lower respiratory tract infections.

Discuss the potential benefits of early antibiotic cessation in patients with low serum procalcitonin.

Self Assessment Questions:

In which clinical case could procalcitonin be used to augment antimicrobial coverage for Lower Respiratory Tract Infection (LRTI)?

A. Procalcitonin has a positive predictive value, so antimicrobial coverage should always be added if procalcitonin rises above 0.25 mcg/L.

B. Procalcitonin has a negative predictive value, so discontinuation of antimicrobial coverage should be considered if the serum concentration is less than 0.25 mcg/L.

C. Procalcitonin has a positive predictive value, so antimicrobial coverage should be discontinued if procalcitonin rises above 0.25 mcg/L

D. Procalcitonin has a negative predictive value, so antimicrobial coverage should always be added when the procalcitonin is less than 0.25 mcg/L

Which of the following is/are potential positive effects of early antibiotic cessation?

A. Lower risk of resistance

B. Reduced length of hospital stays

C. Lower chance of adverse effects

D. All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-888-L01-P

Patient Factors in Adopting Cystic Fibrosis Transmembrane Regulator Modulator Therapy and Adherence to Safety Monitoring

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Purpose: The management of cystic fibrosis (CF) has significantly advanced over the past two decades following the approval of the CF transmembrane conductance regulator (CFTR) modulators. Despite the availability of these agents, some people with CF (pwCF), their caregivers and/or clinicians may elect not to start therapy for various reasons, including concern for side effects, frequency of monitoring, insurance and cost issues, and presumed lack of benefit. If therapy is elected, routine labs and eye exams can be challenging, affecting appropriate safety monitoring. Understanding factors that may impact these outcomes is important in the coproduction of CF care.

Methods: This a single-center, retrospective chart review of all patients diagnosed with CF and followed by an outpatient pediatric pulmonologist at C.S. Mott Children's Hospital from September 2022 through September 2023. Children diagnosed with CF related metabolic syndrome, ineligible for CFTR modulator therapy based on genotype, organ transplant recipients, and patients transferred out of the health system during the study period are excluded from the study. Data collection from the electronic medical record will include demographics, medication therapy, and clinical outcomes, entered into a REDCap database. Primary outcomes are the proportion of eligible patients prescribed a CFTR modulator and adherence to routine monitoring. Secondary outcomes include the proportion of patients with a documented possible adverse effect(s) following modulator initiation, management of the adverse effect(s), and patient factors possibly associated election of therapy an adherence to routine monitoring.

Data collection is underway. Results and conclusions will be presented at the Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Recognize the importance and benefits to initiating CFTR modulator therapy in patients with cystic fibrosis

Describe potential factors associated with CFTR modulator initiation and adherence to routine monitoring

Self Assessment Questions:

1. Which is true regarding fibrosis transmembrane conductance regulator (CFTR) modulators?

- A. All patients with cystic fibrosis are eligible to initiate therapy
- B. Eligibility is based on CF genotype and age
- C. All modulators have comparable effectiveness on lung function, nutrition status, and exacerbation rate
- D. Addition of modulators result in step down in CF therapy in all patients

Which is/are possible barriers to initiating CFTR modulator therapy?

- A. Concern for side effects
- B. Frequency of monitoring
- C. Presumed lack of benefit
- D. All of the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-614-L01-P

Identification of risk factors for *Pseudomonas aeruginosa* in patients with Community-Acquired Pneumonia

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Community-acquired pneumonia (CAP) is a highly prevalent infection associated with increased hospitalization, morbidity, and mortality. Infection with the gram-negative organism *Pseudomonas aeruginosa* (PSAR) has been linked to severe illness and poor clinical outcomes. The Infectious Diseases Society of America (IDSA)/American Thoracic Society (ATS) 2019 CAP guidelines recommend developing locally validated risk factors for PSAR to guide empiric treatment. This study investigated the risk factors for PSAR in patients diagnosed with CAP at Loyola University Medical Center (LUMC).

This was a data expansion of a single-center retrospective cohort study of patients diagnosed with CAP at LUMC from August 1, 2017 through July 31, 2023. Patient lists were generated via a clinical decision support tool (MedMined[®]). A list of all patients with PSAR in respiratory cultures were reviewed and screened for inclusion criteria. The comparator group was screened for inclusion from a list of all patients with a diagnosis of CAP and that had positive respiratory cultures within the study period. Data was obtained from the electronic medical record. CAP was diagnosed based on evidence of pneumonia on chest x-ray with two or more clinical signs (e.g., temperature > 38 degrees Celsius or < 36 degrees Celsius, respiratory rate > 20 breaths per minute, supplemental oxygen above baseline, cough, and sputum production). Patients were excluded from the study if they were diagnosed with hospital-acquired or ventilator-associated pneumonia, had a history of cystic fibrosis, or confirmed viral or fungal pneumonia. The primary endpoint was to identify PSAR risk factors in patients treated for CAP at LUMC.

Learning Objectives:

Identify risk factor(s) for *Pseudomonas aeruginosa* infection in patients with community-acquired pneumonia.

Describe the purpose of developing a locally validated scoring system to detect *Pseudomonas aeruginosa*

Self Assessment Questions:

Which of the following is a current risk factor for *Pseudomonas aeruginosa* in patients with community-acquired pneumonia according to the Infectious Diseases Society of America (IDSA)/American Thoracic Society (ATS) 2019 CAP guidelines?

- A. Recent hospitalization and receipt of parenteral antibiotics within the last 90 days
- B. Recent use of oral antibiotics of more than 7 days within the last 6 months
- C. Use of inhaled corticosteroids within the past 12 months
- D. Long term residence in a nursing home or skilled nursing facility

Which of the following best supports the effort to create a locally validated scoring system to detect *Pseudomonas aeruginosa* in community-acquired pneumonia (CAP)?

- A. *Pseudomonas aeruginosa* is the most prevalent organism associated with CAP and should be screened for as soon as possible
- B. Early detection can help reduce the risk of antimicrobial resistance due to broad-spectrum antibiotic exposure
- C. There is no potential benefit to a locally-validated scoring system
- D. *Pseudomonas aeruginosa* is not a known pathogen associated with CAP and early screening methods can justify removal of inappropriate antimicrobials

Q1 Answer: A Q2 Answer: B

ACPE Universal Activity Number 0121-9999-656-L01-P

Implementation of a Centralized Infusion Referral Team to Optimize Access and Site of Care at a Large Academic Medical Center

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Purpose

Hospitals in the United States are seeing a shift in the site of healthcare delivery. Payers are now moving patients traditionally receiving infusions of medications within the four walls of the hospital to an alternative, lower cost site of care such as ambulatory infusion suites or home infusion. Lack of standardization and payer mandates makes it difficult to identify a qualifying site of care based on the medication prescribed. Currently, each Froedtert specialty clinic follows different workflows for identifying and referring patients. The purpose of this project is to evaluate a centralized approach for identifying and referring patients to a qualifying site of care using a Centralized Infusion Referral Team (CIRT). The primary objective is to improve patient access through the CIRT. The secondary objective is measuring patient satisfaction in our services pre and post implementation.

Methods

The project includes two phases: The first will be a pre-implementation phase, which will pilot standing up a centralized infusion referral team and decision tool to streamline the infusion referral process. This pilot phase will be limited to key partnerships with specific disease state clinics who expressed interest in the pilot project. The primary outcome will measure the overall time from medication prescribing to the patient receiving their infusion. The secondary outcome will measure CG-CHAPS scores at the different infusion locations within the Froedtert system. After successful completion of the pre-implementation phase, the centralized infusion referral team will expand their scope system wide to include all non-oncology outpatient infusion clinics.

Results/Conclusions

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

Learning Objectives:

Describe the patient benefit of having a Centralized Infusion Referral Team (CIRT)

Describe and explain patient challenges with infusion services prior and after implementation of the CIRT

Self Assessment Questions:

Based on our assessment, what was the impact on patient's access to infusion services after implementation of the CIRT?

- A. Longer time to schedule infusion appointment
- B. Shorter time to receive infusion
- C. There was no impact on access
- D. Longer time to insurance authorization

Based on our assessment, what were some challenges with infusion services that were resolved after the implementation of CIRT?

- A. More transparent communication & timeline
- B. Autonomy to choose & preference infusion location
- C. Shorter time to access infusion services
- D. All the above

Q1 Answer: B Q2 Answer: D

ACPE Universal Activity Number 0121-9999-788-L04-P

Psychiatric Relapse Rates with Voluntary Versus Involuntary Inpatient Long-Acting Injectable Antipsychotic Use

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Medication nonadherence is a challenge for many chronic illnesses, particularly schizophrenia and other serious mental illness (SMI) where patients may lack insight and social support. Maintenance treatment is often necessary for psychiatric stability, but negative perceptions and side effects may result in poor adherence.

Nonadherence can lead to illness relapse, progression, rehospitalization, increased medical costs, and increased rates of suicide. Long-acting injectable antipsychotics (LAIA) were developed to improve adherence and decrease hospitalization; they are a cornerstone in the treatment of psychotic disorders. In practice, it is anticipated that patients with SMI initiated on LAIAs under court-order will have improved outcomes post-discharge; however, little information is available about this subgroup. This study aims to evaluate the effect of LAIAs on relapse rates in patients with schizophrenia, schizoaffective disorder, or bipolar I disorder and identify characteristics that impact effect of antipsychotic use in these conditions. This multi-center, retrospective chart review includes adult patients admitted to a UC Health inpatient acute psychiatric unit between 2016 and 2023 who received an LAIA or oral antipsychotic (OAP) and have a diagnosis of schizophrenia, schizoaffective disorder, or bipolar I disorder. Descriptive statistics and regression models will be performed to determine patient factors associated with LAIA use and relapse. The primary outcome is rate of relapse following psychiatric hospitalization in patients discharged after inpatient initiated or reinitiated LAIA voluntarily versus involuntarily. Secondary outcomes include time to hospitalization between community injection program patients versus patients involuntarily receiving an LAIA, relapse rates in patients with a first episode psychosis (FEP) or mania and initiated on an LAIA versus FEP patients on an OAP alone, and characteristics related to metabolic syndrome in patients receiving LAIA versus OAP alone. Data collection and analysis are on-going. Results will be presented at the 2024 Great Lakes Pharmacy Residents Conference.

Learning Objectives:

Recall the current recommendations for long-acting injectable antipsychotic (LAIA) use in serious mental illness (SMI)

Discuss the clinical and safety outcomes associated with LAIA use in patients with schizophrenia, schizoaffective disorder, or bipolar I disorder

Self Assessment Questions:

1. When does the American Psychiatric Association suggest patients with schizophrenia receive treatment with a long-acting antipsychotic (LAIA)?

- A. As adjunctive therapy to a mood stabilizer
- B. After treatment failure with two different antipsychotics
- C. If they prefer such treatment or have a history of poor or uncertain adherence
- D. Once adherent to an oral antipsychotic for at least 4 months

Which of the following is the primary outcome of this research study?

- A. Incidence of metabolic syndrome in patients initiated on a long-acting injectable antipsychotic
- B. Relapse rates in patients initiated or reinitiated on a long-acting injectable antipsychotic voluntarily versus involuntarily
- C. Rate of discontinuation of a long-acting injectable antipsychotic due to neuroleptic malignant syndrome
- D. Occurrence of extrapyramidal symptoms in patients initiated on a long-acting injectable antipsychotic during inpatient hospitalization

Q1 Answer: C Q2 Answer: B

ACPE Universal Activity Number 0121-9999-744-L01-P

Comparison of Sedation Selection Upon Development of Hypertriglyceridemia

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Sedation in the intensive care unit (ICU) is commonly used in patients who require mechanical ventilation. Non-benzodiazepine sedatives are preferred as benzodiazepine-based regimens have been associated with worse outcomes, such as longer ICU length of stay (LOS), longer duration of mechanical ventilation, and increased risk of delirium. Propofol is a favorable option for many patients requiring continuous sedation, however it is formulated in a lipid-emulsion which can increase triglycerides (TG). Risk factors for and the incidence of propofol-induced hypertriglyceridemia (HTG), defined as TG $\geq$ 400 mg/dL, are well described, and there is clinical concern for development of pancreatitis. Despite the concern for pancreatitis, the incidence is low (less than 5%) and the clinical outcomes of propofol-induced HTG are not well established. Furthermore, propofol-induced HTG often leads to initiation of unfavorable sedatives like midazolam. This study aims to compare the clinical outcomes associated with propofol continuation and midazolam initiation in patients who develop propofol-induced HTG to determine optimal sedative selection after development of HTG.

This study is a single-center, observational, retrospective, cohort study of ICU patients with propofol-induced HTG from January 1, 2018 to July 31, 2023 at Loyola University Medical Center. Patients were included if they had a documented TG $\geq$ 400 mg/dL, received propofol for at least 48 hours, and targeted light sedation (RASS 0 to -2). Patients who were continued on propofol after documented HTG were compared to those who were transitioned to a midazolam infusion. Patients were excluded if no serum triglyceride level was collected or if patients were admitted for pancreatitis. The primary outcome is ICU LOS, and secondary outcomes include hospital LOS, mortality and ICU delirium. A multivariate linear regression was used to evaluate factors that are independently associated with an increase in ICU LOS.

Results will be presented at the 2024 Great Lakes Pharmacy Residency Conference.

Learning Objectives:

Identify the risks of propofol induced hypertriglyceridemia.

Discuss the outcomes associated with propofol and midazolam in patients with HTG.

Self Assessment Questions:

Propofol is formulated in a lipid-emulsion which can lead to the development of?

- A. Hypotension
- B. Respiratory Distress
- C. Hypertriglyceridemia
- D. Tachycardia

When compared to propofol, benzodiazepines have been associated with which of the following?

- A. Longer ICU length of stay
- B. Increased rates of ICU delirium
- C. Longer duration of mechanical ventilation
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-692-L01-P

Evaluation of Achievement of Metabolic Goals (hypertension, diabetes, and/or hyperlipidemia) in People with HIV in the Illinois Department of Corrections (IDOC)

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Purpose: Individuals living with HIV present with metabolic abnormalities such as dyslipidemia, increased cardiovascular risk, and increased insulin resistance. Recent studies identified biologic mechanisms of these metabolic abnormalities that may be due to arterial inflammation and endothelial dysfunction attributed to chronic HIV infection. Additionally, the REPRIEVE trial showed that for patients with HIV and low-to-moderate risk of cardiovascular disease, statin treatment was beneficial in decreasing the risk of adverse cardiovascular disease. Through our interdisciplinary Illinois Department of Corrections (IDOC) HIV Telemedicine clinic, individuals in custody receive comprehensive care from HIV/infectious diseases trained providers. The purpose of this study is to evaluate the incidence of individuals with HIV in custody who achieve guideline-recommended metabolic goals while receiving care from the IDOC HIV telemedicine clinic. Methods: This retrospective cohort study evaluated people living with HIV who were followed by the IDOC/University of Illinois Hospital HIV Telemedicine clinic between 01/01/2021 and 06/30/2022. The primary outcome was the achievement of one or more individualized metabolic goals including: blood pressure, fasting blood glucose, A1C, and cholesterol within one year compared to baseline. Metabolic goals are defined based on current guideline recommendations for each of the previously mentioned disease states. The secondary outcome will be changes in first-line medication therapy between the first and last clinic visit for hypertension, diabetes, or hyperlipidemia. Statistical analysis will be completed using descriptive statistics, Mann-Whitney testing for age, viral load, and CD4+ count, and McNemar test for the incidence of achieving metabolic goals. Conclusion: preliminary results and conclusions will be presented at the 2024 Great Lakes Pharmacy Residency Conference

Learning Objectives:

Recognize the metabolic abnormalities observed in patients with HIV

Identify pharmacological interventions that provide cardiovascular benefit for patient with HIV

Self Assessment Questions:

Which parameters can we use to identify metabolic abnormalities in patients with HIV?

- A. HgbA1C
- B. Blood Pressure
- C. Fasting Blood Glucose
- D. A & B

Based on the REPRIEVE study, which medication class was shown to provide cardiovascular benefit in patients with HIV?

- A. ACE inhibitors
- B. Statins
- C. SGLT-2i
- D. Beta Blockers

Q1 Answer: D Q2 Answer: B

ACPE Universal Activity Number 0121-9999-621-L02-P

Understanding the Influence of Patient Residence on Long-term Outcomes of Acute Lymphoblastic Leukemia Treatment at an Academic Medical Center

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Background: While the mortality associated with acute lymphoblastic leukemia (ALL) has been decreasing over time, not all populations experience these benefits equitably. Overall survival (OS) of ALL decreases with increasing age, beginning with a stark survival cliff in the adolescent and young adult (AYA) populations. There are several socioeconomic factors that may affect long-term outcomes for AYA patients with ALL, including the medical center at which patients receive treatment. National guidelines specifically recommend that patients with ALL receive treatment at specialized centers. However, some data have demonstrated that patients who travel longer distances for care may experience lower OS. The relationship between distance traveled to ALL treatment at a Comprehensive Cancer Center (CCC) and long-term outcomes, therefore, requires further elucidation.

Objectives: This study aims to examine the relationship between distance traveled to ALL treatment and long-term treatment outcomes for AYA patients at a single, academic CCC. The investigators will also explore the incidence of appointment cancellations and the significance of previously published risk factors for poorer long-term outcomes in patients with ALL.

Methods: This retrospective, single-center, cohort study will include patients aged 15-39 years old with previously untreated ALL who received at least 1 cycle of post-induction chemotherapy at Michigan Medicine between June 2014 and June 2023. Patients with ALL-like disease of high grade-lymphoma (AL-HGBL-MBR) will be excluded. The primary endpoint will be OS, and secondary endpoints will include event-free survival (EFS) and incidence of appointment cancellations or no-shows during courses 1-4 of therapy. Descriptive statistics will be used for baseline patient characteristics. Survival estimates will be calculated using the Kaplan-Meier method, and multivariate risk analysis will be assessed using a Cox Regression Analysis.

Results: Pending

Conclusions: The results of this study will guide future risk assessment and resource allocation for patients with ALL.

Learning Objectives:

Identify vulnerable patient populations and their risk factors for poorer long-term outcomes of ALL treatment.

Describe the relationship between distance traveled to ALL treatment and long-term treatment outcomes.

Self Assessment Questions:

Which of the following statements is true regarding the relationship between ALL and patient age?

- A. Incidence of medical comorbidities decreases as patients get older
- B. Incidence of some unfavorable ALL cytogenetics and karyotypes increase as patients get older
- C. Enrollment in clinical trials for ALL treatment increases as patients get older
- D. Patients are more likely to receive higher-intensity chemotherapy as they get older

Which of the following risk factors has been associated with poorer overall survival in previous ALL data?

- A. White/Caucasian race
- B. Higher socioeconomic status
- C. Lack of medical insurance
- D. English as a primary language

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-736-L01-P

Evaluation of Efficacy and Safety of Neuro Heparin Protocol in Patients with High Risk of Bleeding

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Statement of Purpose:

The purpose of this study is to compare the bleeding and thrombosis risk of the neuro low intensity heparin protocol to standard intensity stroke heparin protocol at Community Healthcare System.

Background:

Elevated aPTT levels have been heavily correlated to heparin-associated bleeding, especially for patient who are already at high risk of bleeding. In order to safely and effectively prevent thrombosis and minimize complications in patients who are at high risk of bleeding, many hospitals have designed a low intensity protocol. Limited studies have found that low intensity was just as efficacious and safe as standard intensity.

Methods:

This is a retrospective analysis to compare the efficacy and safety of neuro protocol to stroke protocol in adult patients who received heparin infusion for systemic anticoagulation at Community Healthcare System from 1/1/22 to 4/30/23. Both protocols start without bolus. Stroke protocol has an initial rate of 18 units/ kg/ hour with a goal aPTT of 70-100 seconds equivalent to anti-Xa level of 0.3 to 0.7 units/mL. Neuro protocol has an initial rate of 10 units/ kg/ hour with a goal aPTT of 65-80 seconds equivalent to anti-Xa level of 0.2 to 0.4 units/mL.

The primary objective is the difference in incidence of bleedings and incidence of new or worsening thrombus between two protocols. The secondary objectives include the difference in transfusion requirement, mortality rate, ICU length of stay and total hospital length of stay between two protocols. Descriptive statistics and T-test will be performed and p-value <0.05 is considered statistically significant.

Results and Conclusions:

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

Learning Objectives:

Identify and assess the efficacy of neuro protocol with a low aPTT goal (65-80 seconds) compared to stroke protocol with a standard aPTT goal (70-100 seconds).

Identify and assess safety of neuro protocol with a low aPTT goal (65-80 seconds) compared to stroke protocol with a standard aPTT goal (70-100 seconds).

Self Assessment Questions:

In our study, what anti-Xa level is corresponding to therapeutic aPTT of 70-100 seconds?

- A. 0.2 to 0.4 units/mL

- B. 0.3 to 0.6 units/mL
- C. 0.3 to 0.7 units/mL
- D. 0.4 to 0.8 units/mL

Which of the following patient population is at a higher risk of hemorrhagic conversion?

- A. Large acute ischemic stroke
- B. Recent cranial or spinal surgical procedure
- C. Active intracranial hemorrhage
- D. All of the above

Q1 Answer: C Q2 Answer: D

ACPE Universal Activity Number 0121-9999-631-L01-P

Implementation of Retail Pharmacy Dispensing Locker Technology across an Academic Health-System

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Considering increasing pressures of decreased reimbursement and shrinking operating margins, health-systems strive to find innovative opportunities to increase revenue. One area of growing focus is prescription capture as a business venture. However, increasing prescription capture requires balancing operating costs and customer convenience. Utilization of dispensing locker technology allows for increased customer convenience by expanding service hours while keeping operating costs low. The purpose of this project is to implement dispensing locker technology to increase prescription capture across the health-system.

Three pilot sites were selected for implementation of dispensing locker technology based off patient volume, pharmacy dispensing volume, and revenue capture. Stakeholders across different departments were engaged to understand the impact of implementing technology on security, facilities, and information system. Build was completed within the outpatient pharmacy dispensing software, point of sale system and patient access portal to support dispensing through the new technology. Policies and standard operating procedures were updated to include new workflow. Staff educational materials were created prior to implementation of technology. Primary outcomes of locker implementation were the number of prescriptions dispensed and revenue generation from prescriptions sold through the lockers. Outcome data was extracted from dispense locker and accounts receivable software.

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

Learning Objectives:

Discuss the benefits of a retail pharmacy dispensing locker technology in a health-system.
 Outline the methods for implementing dispensing locker technology at one's own institution.

Self Assessment Questions:

1. What are potential benefits of using a pharmacy dispensing locker within a health-system?

- A. Patient convenience
- B. Increased prescription capture
- C. Limited regulatory oversight
- D. A&B

What is a crucial component for implementing dispensing locker technology at one's own institution?

- A. Ensuring standardization with current workflows
- B. Understanding interface compatibility with existing software
- C. Maximizing stakeholder involvement
- D. All the above

Q1 Answer: D Q2 Answer: D

ACPE Universal Activity Number 0121-9999-759-L04-P

Incidence of Inappropriate Midodrine Continuation Post Discharge from Intensive Care Units at a Community-Based Academic Medical Center

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Purpose:

Midodrine is an oral alpha-1-agonist used in intensive care units (ICUs) to assist in weaning patients off intravenous vasopressors. Use of midodrine with contraindicated health conditions has the potential to cause harm once patient is discharged. Midodrine is not always deescalated once blood pressure is stable or at discharge, resulting in patients taking medication with no indication. The purpose of this study is to review the use of midodrine initiated within intensive care units and observe the rate of continuation post discharge in patients who do not have an appropriate indication.

Methods:

This study has received Institutional Review Board approval. The retrospective chart review began by identifying patients who received midodrine in the ICU between June 1st, 2022, to May 31st, 2023. Patients were excluded if they were less than 18 years of age, pregnant, did not survive to discharge, or received prior midodrine doses outside of the ICU. ICD-10-CM codes were used to identify patients health conditions of interest. The primary outcome is incidence of hospital discharge on midodrine without an appropriate indication. Appropriate indications are defined as cirrhosis, hepatorenal syndrome, orthostatic hypotension, and end stage renal disease on hemodialysis (HD). The secondary outcome is incidence of hospital discharge on midodrine with a contraindicated disease state. Contraindicated disease states are defined as heart failure, hypertension, renal impairment without HD, or hyperthyroidism. Renal impairment is defined as a patient's final serum creatinine (SCr) greater than 2.0 mg/dL. Collected data will include but is not limited to age, sex, ethnicity, final SCr, diagnosis of any condition outlined in the primary or secondary outcomes, 90-day readmission, and discharge prescription for midodrine. The collected data will be used to assess a component of the hospital's critical care de-escalation process and emphasize the importance of thorough transitions of care.

Results: N/A

Conclusions: N/A

Learning Objectives:

Recall the mechanism of action of midodrine

Identify contraindicated health conditions to midodrine

Self Assessment Questions:

The mechanism of action of midodrine can be defined as:

A. Alpha-1-antagonist

B. Alpha-1-agonist

C. Beta-1-antagonist

D. Beta-1-agonist

Which of the following health conditions is contraindicated to midodrine use?

A. Cirrhosis

B. Orthostatic hypotension

C. Heart failure

D. End stage renal disease on hemodialysis

Q1 Answer: B Q2 Answer: C

ACPE Universal Activity Number 0121-9999-794-L05-P